

**HYPERTENSION MANAGEMENT DURING THE COVID-19 PANDEMIC:
ASSOCIATED PSYCHOSOCIAL FACTORS**

A thesis submitted during June, 2023 to the Centre for Health Psychology, School of Medical Sciences, University of Hyderabad in partial fulfilment of the requirements for the award of

DOCTOR OF PHILOSOPHY IN PSYCHOLOGY

by

OINDRILA MUKHERJEE

Reg. No. 18CPPH02

Guide:

PROF. MEENA HARIHARAN



Centre for Health Psychology
School of Medical Sciences

University of Hyderabad
Central University Campus P.O.
Gachibowli, Hyderabad - 500 046
Telangana
India

*To my extraordinary parents, without whom this journey
would have been impossible and whose infinite love, care,
and support have helped me reach this milestone, I
dedicate my doctoral research to you.*

DECLARATION

I, Oindrila Mukherjee, hereby declare that this thesis entitled “Hypertension Management During the COVID-19 Pandemic: Associated Psychosocial Factors” submitted by me under the guidance of Prof. Meena Hariharan is a bonafide research work which is also free from plagiarism. I also declare that it has not been submitted previously in part or in full to this University or any other University or Institution for the award of any degree or diploma. I hereby agree that my thesis can be deposited in Shodhganga/INFLIBNET.

A report on plagiarism statistics from the University Librarian is enclosed.

Date: 14.06.2023



(OINDRILA MUKHERJEE)

Regd. No. 18CPPH02

//Countersigned//



(Prof. Meena Hariharan)

Signature of the Guide

प्रोफेसर मीना हरिहरण / Prof. Meena Hariharan
स्वास्थ्य मनोविज्ञान केन्द्र
Centre for Health Psychology
हैदराबाद विश्वविद्यालय / UNIVERSITY OF HYDERABAD
हैदराबाद / HYDERABAD-500 046. भारत / INDIA.



CERTIFICATE

This is to certify that the thesis entitled “Hypertension Management during the COVID-19 Pandemic: Associated Psychosocial Factors” submitted by Oindrila Mukherjee bearing Reg. No. 18CPPH02 in partial fulfilment of the requirements for the award of Doctor of Philosophy in Psychology in the Centre for Health Psychology under School of Medical Sciences is a bonafide work carried out by her under my supervision and guidance.

This thesis is free from plagiarism and has not been submitted previously in part or in full to this or any other University or Institution for award of any degree or diploma.

Further, the student has the following publications before submission of thesis for adjudication and has produced evidence for the same in the form of the reprint in the relevant area of her research:

1. Padhy, M., Hariharan, M., **Mukherjee, O.**, Mutnury, S. L., & Anand, V. (2021). Effect of Illness Duration and Gender on Coping Skills Deficiency among Chronic Illness Patients. *International Journal of Advanced Multidisciplinary Research*, 8(9), 13-25.
2. Padhy, M., Hariharan, M., Mutnury, S. L., & **Mukherjee, O.** (2021). Flourishing: Role of Perseverance and Passion for Long-Term Goals in Relation to Subjective Vitality. *International Journal of Health Sciences and Research*, 11(6), 6-12.
3. **Mukherjee, O.**, & Mutnury, S. L. (2021). Management of chronic illness through music therapy: A Review. *Indian Journal of Health Studies*, 3(2), 55-94.

and

the student has made presentations in the following conferences:

1. Annual Convention of the National Academy of Psychology (NAOP) organised by Ahmedabad University (2023)
2. International Conference of Indian Academy of Applied Psychology organized by University of Delhi (2023)
3. Virtual International Seminar on Indic Healing Systems: A Holistic Perspective on Mind, Body & Spiritual Culture organised by Association of Health Psychologists in collaboration with Stockholm University, Sweden; Bhaktivedanta Research Center, Kolkata; Sri Padmavati Mahila Visvavidyalayam, Tirupati (2022)

4. International Conference of Developing New India through Science, Social Science, Humanities & Research organised by Indian Mental Health & Research Centre and Shia P. G. College, Lucknow (2022)
5. International Conference of Indian Academy of Applied Psychology organized by Department of Psychology, Mizoram University (2022)
6. International Conference of Indian Academy of Applied Psychology organized by Department of Psychology, Punjabi University Patiala (2021)
7. National Seminar on Health and Well-Being: Reflecting on Dominant Practices & Emerging Challenges organized by Department of Psychology, University of Delhi (2020)
8. International Conference on Health Psychology organized by CARE Institute of Behavioural Sciences, Chennai (2019)
9. International Conference of Indian Academy of Applied Psychology organized by Department of Psychology, Kurukshetra University (2019)

Further, the student has passed the following courses towards fulfilment of coursework requirement for Ph.D.

Course Code	Name	Credits	Pass/Fail
HP826	Research Methodology and Advanced Statistics	4	Pass
HP827	Book Review	4	Pass
HP828	Review Paper	4	Pass
HP829	Empirical Paper	4	Pass



GUIDE

प्रोफेसर मीना हरिहरण / Prof. Meena Hariharan
स्वास्थ्य मनोविज्ञान केन्द्र
Centre for Health Psychology
हैदराबाद विश्वविद्यालय / UNIVERSITY OF HYDERABAD
हैदराबाद / HYDERABAD-500 046. भारत / INDIA.



HEAD OF THE CENTRE

अध्यक्ष / Head
स्वास्थ्य मनोविज्ञान केन्द्र
Centre for Health Psychology
हैदराबाद विश्वविद्यालय / University of Hyderabad
हैदराबाद / Hyderabad-500 046. भारत / India



DEAN OF THE SCHOOL

सकाय अध्यक्ष
Dean
चिकित्सा विज्ञान संकाय
School of Medical Sciences

ACKNOWLEDGEMENTS

A wise person once said,

“Gratitude is the currency of the Universe.”

Over the years, with varying life experiences, I have realized the magical power of gratitude in not only uplifting my mood, improving my health, and enhancing my resilience, but also in manifesting the future I desire. Without the support of others, no success has become a reality. Throughout my academic journey, I have been blessed with a strong support system in the form of my family, friends, and community who have been the driving forces behind my achievements. Here, I would like to thank each person who played an instrumental role in helping me attain this milestone, in my academic life.

Words cannot express my gratitude to my dear mother, father, and brother. Their unwavering support and belief in my abilities strengthened me during times of crisis. I have received an unimaginable amount of emotional support as well as resources from them, which I have cherished during the highs of my PhD journey and that has nourished me during the lows of the same. My family has always prioritized my education before anything else, and I hope that their sacrifices have not gone in vain. I wish for every child to have parents like mine, whose never-ending encouragement shows the path to endless possibilities even during challenging times, like that of the COVID-19 pandemic. My brother, Devaloy Mukherjee, has aptly played the role of a younger brother by watching over me from a distance and helping me achieve my goals. His innocent mischiefs and words of wisdom during periods of stress helped me keep my cool. The blessings and positive energy of my beautiful grandparents from this world and beyond have propelled me towards this milestone. Although both my grandfathers are not with me in their tangible forms now, I know that their positive energy surrounds and safeguards me in times of need. I thank my family for all the things they have

done to provide me with love, comfort, support, and security during my doctoral research. I also thank my extended family for keeping me motivated.

Being a highly spiritual person, I am abundantly grateful to God and their Angels for always protecting me, supporting me, and guiding me towards the right path. You are the primary operating force in my life, thank you for filling me with positive energy and picking me up whenever I fall. In your presence, I flourish. There are no words describing your continuous contributions to my life and my growth.

At the core of my doctoral journey is my Guide, – Prof. Meena Hariharan, whose mentorship has been pivotal in shaping my research journey and has laid a strong foundation for my future endeavours. Her strong passion towards the field of Health Psychology motivated me every day to pursue a career in this area. Her insightful feedback and constructive criticism helped me refine my study, enabling me to develop a rigorous and comprehensive doctoral research study. I will always cherish the lessons learned, the memories created, and the profound impact of Ma'am on my life. Thank you, Ma'am, from the bottom of my heart for being an exceptional research supervisor and for your unwavering commitment to my success.

I would like to express my gratitude to all my teachers at the Centre for Health Psychology, who have been my guiding lights during my master's course (MSc Health Psychology) and whose positive influence has helped me during my doctoral journey. Each of my interactions with Dr Meera Padhy has left me feeling more confident, and from her, I have learned that nothing is impossible if one has the right amount of willpower and belief in oneself. Thank you, ma'am, for everything you have done for me. I want to offer my sincere gratitude to Dr CV Usha, who inspired me in various ways, especially in teaching me the importance of being meticulous and thorough in my research work. Dr G. Padmaja played an important role in the seven years of my association with the Centre for Health Psychology. During my role as a research scholar, I was fortunate to have been selected by ma'am to assist her with the

Counselling Lab classes, and I have enjoyed learning immensely from her. My interactions and classes with ma'am honed my counselling skills as well as my interpersonal skills. Thank you, ma'am, for giving me the opportunity to learn from you.

Another key influence on my academic journey is Dr Suvashisa Rana, to whom I offer my gratitude. Sir's classes helped me develop and strengthen the core of my research skills and statistical knowledge. I consider myself lucky to have been a part of Sir's classes, who has taught the core concepts of statistics so well that it was a motivating factor in my decision to pursue a doctoral programme. Dr NDS Nagaseema has never failed to ignite a spark of curiosity within me, and her constant encouragement to explore new horizons has truly shaped my learning experience. Ma'am, your teaching methods were innovative and engaging, making even the most challenging topics seem approachable. I thank you for being my teacher. Through my comparatively brief interactions, I have gained practical knowledge in psychological assessments and delivering interventions from Dr C Vanlalhrauii. I am confident that the lessons I have learned from you will continue to shape my future endeavours, thank you ma'am. I would like to thank all the faculty members of Centre for Health Psychology for shaping my career path and giving me valuable academic experiences.

I am thankful to the members of my Research Advisory Committee – Prof. Meena Hariharan, Dr Meera Padhy, Dr CV Usha, Dr G. Padmaja, Dr NDS Nagaseema and Prof. C.R. Rao for providing their valuable inputs towards my doctoral work. I would also like to express my sincere gratitude to Prof. N. Balakrishna, for generously contributing his statistical expertise to enhance the analysis of my study and giving the results a much-required final touch. I am also thankful to the members of the Institutional Ethics Committee of University of Hyderabad for evaluating and approving my research proposal which enabled me to proceed for data collection.

I also offer my sincere gratitude to the office personnel at the Centre for Health Psychology, University of Hyderabad – Ms Sucharitha Dandigari, Mr Vara Prasad, Mr Shyam Sunder, Ms Srilatha, Mr Arjun, Mr Srikanth, Mr Nagaraju, Mr Pratap Singh and Mr Ashok for facilitating the administrative procedures related to my work and promptly responding to my queries.

A fundamental aspect of any research study is the data collection phase. The data collection for the current study involved several challenges as it was undertaken during the various phases of the nationwide lockdowns imposed during the COVID-19 pandemic. I will remain forever grateful to the following individuals who have facilitated and have been of great assistance during the data collection phase of my study: Mr Himangshu Kothari, Ms Mahima Mishra, Ms Treesa Rose, Ms Srijoni Podder, Mr Avishek Sarkar, Ms Aishwarya Subbanna, Ms Bhavya Srivastava, Ms Faza Eliza Usmani, Ms Khushboo Khatri, Ms Kirti Sejwal, Ms Muskan Arora, Ms Megha Garg, Mr Manav Raj, Ms Nivedita Basu, Ms Niharika Suri, Ms Prakruthi Natraj, Mr Rajdeep Rajak, Mr Saksham Kesarwani, Ms Sneha Ramanan, Mr Utkarsh Mishra, and Ms Vaishnavi Mathur. Their invaluable contributions and dedicated efforts have been instrumental in the success of this study. Their contributions have undoubtedly enhanced the quality of the data and the overall success of the research. I am indebted to them for their precious support and I thank them for the significant role they have played in my doctoral study. I am indebted to each and everyone who participated in my study, without whose contribution I would not be able to reach this milestone. I thank all the participants from the bottom of my heart for consenting to be a part of my research. I am also thankful to SurveyMonkey, a web-based survey platform for providing technological assistance during my data collection.

This PhD journey would have been lonely and gloomy without the succour and companionship provided by my co-scholars and juniors at the Centre for Health Psychology –

Suma Lavanya Mutnury, Teisovinu Semou, Laxmi Priyanka Nakka, Nikhil Raj, Abhik Nayak, Prachi Pandey, Annanya Pragnya Roy Sharma, Kirtideepa Subhadarshini, Aysha Thasleema, Rizwana Maryam, Lienngailhing Khongsai, and Varsha Anand. I thank my all juniors for the constant support, encouragement, and the readiness to help whenever I needed assistance. Your words have always motivated me to cross the finish line.

I would especially like to thank Suma Lavanya Mutnury, Teisovinu Semou and Laxmi Priyanka Nakka for being an integral part of my academic journey. Your presence, support, and collaboration have greatly enriched my experience, and I am overjoyed that we have been able to reach this milestone as a collective. Suma, together, we have tackled complex situations, engaged in stimulating debates, and have uplifted each other in overwhelming situations. The synergy created by our collective efforts has been truly remarkable, and I am grateful for the friendship we have formed along the way. It would not be wrong to say that, at times, it felt as if we could empathize the most only with each other. I want to thank you from the bottom of my heart for always standing by my side (especially during the trying time of the COVID-19 pandemic), giving me advice when I needed it the most, and for your enduring support without any complaint. I am very grateful to have shared my doctoral research experience with you.

Nikhil Raj, firstly, my wonderful friend and, then my co-scholar, has been a source of incredible fun and memorable moments. Your friendship and the experiences we have shared together in the past seven years have brought so much joy and happiness to my academic life, and for that, I am truly thankful. Whether it was our laughter-filled conversations in the Scholar's Room, academic discussions or simply hanging out and enjoying each other's company over some juice, every moment spent with you has been filled with genuine happiness and positivity. Thank you, Nikhil for supporting me like a true friend.

Yet another major support system came in the form of my amazing seniors – Sandra Roshni Monteiro, Aarti Nagpal Mehta, Swarajya Kopparty, D. Asha and R. Lalnuntluangi.

I want to express my deepest appreciation and gratitude to my esteemed senior-turned-elder sister, Sandra di, as I lovingly call her. Your guidance, support, and mentorship have had a profound impact on my personal and professional development, and I am incredibly grateful for your presence in my life. Your willingness to listen, answer my questions, and provide thoughtful advice has been immensely helpful. Your experience, knowledge, and expertise have provided invaluable insights that have helped shape my path. Your promptness in responding to my queries each time, despite your personal responsibilities; your readiness to go above and beyond in helping me with every phase of my study; and your sincere dedication to your work has left a mark on me. Thank you, Sandra di, for inspiring me in multiple ways. Another eternal source of inspiration to me is Aarti di, whose timely guidance and presence of mind have been a positive influence over me. I have always looked up to her dynamic personality and ability to achieve multiple accolades within a short span of time. Thank you, Aarti di, for giving me a different perspective on life and always treating me like your younger sister. Further, I would like to express my gratitude to the beautiful lush green campus of University of Hyderabad, and the available facilities, for providing a conducive environment to pursue my research work as well as rejuvenate myself.

The journey of a PhD programme is filled with vicissitudes and unpredictability. I have been blessed with a loving and incredible set of friends who have proven to be my consolation and have contributed immensely to my doctoral journey – Srinija Giduturi, Sukanya Basu, Sebanti Majumder, Nikhil Raj, Debbroto Dev, Abhik Nayak, Debayan Sinha, Prachi Pandey, and Keshav Chandra. Though not directly, but indirectly they have played a big role in keeping my mental health in check. They are the pillars of support and joy in my life, and I am incredibly grateful for their presence. Through the ups and downs, they have been there for me, offering their unwavering friendship and understanding, even when I refused to spend time with them or could not be there for them.

Srinija has been my number one since my day one at the Centre for Health Psychology. Thank you, Srinija, for providing me with comfort and care during my moments of physical and emotional exhaustion. Sukanya has been an abundant source of support, motivation and encouragement during my PhD journey and I am deeply grateful to you for believing in me even when I doubted myself. My heartfelt appreciation and gratitude to Sebanti and Prachi for being my go-to people in the University. They have been my home away from home, my anchors, and my biggest cheerleaders during my stay in the University. My bond with Sebanti has grown from friendship to family, as we faced the ups and downs of our respective PhD experiences together. She has been and continues to be the best friend I needed during this time. The relationship I share with Prachi, my junior-turned-close friend, deepened and strengthened over time with our shared personal experiences and stimulating academic discussions. She has been a strong support system in the past two years and I thank for being by my side at all times. My wonderful friends Nikhil Raj and Abhik Nayak have given me memories that I will cherish forever. In times of celebration or sorrow, you have been by my side, offering your love and support. Your empathy and compassion have touched my soul, and I am forever grateful for your kindness.

A big thank you to Debbroto Dev, for being my favourite confidante and lending an ear when I needed someone to listen to me. Your willingness to listen without judgment has been a priceless gift. You have provided comfort and solace during my difficult times, reminding me that I am never alone. Debayan and Keshav, thank you for the support and encouragement you have shown me. Both of you have instilled confidence in me, have been there with me to celebrate and also when I needed a shoulder to cry on. Thank you for motivating me in times of despair, helping me with my work, and for your unwavering belief in my abilities.

In the last phase of my doctoral study, I grew close to an extraordinary group of people who, in time, have become like parents to me, providing guidance, support, and love in a way

that mirrors that of a parent. To my friends who have embraced this parental role – Sandra Roshni Monteiro, Arko Jyoti Banerjee, Nilanjan Sarkar, Panchami Bhattacharjee and Gugu Bhattacharjee - thank you for being a constant presence in my life. You have pushed me towards the completion of my research, have offered a listening ear, wise advice, a comforting shoulder to lean on and have also made my days filled with laughter during my moments of desolation.

I am thankful to a few individuals whose contribution, though from a distance, has made this thesis a success. I would like to extend my gratitude to my University hostel mates whose support has made living conditions in the hostel easier – Sebanti Majumder, Prachi Pandey, Annanya Pragnya Roy Sharma, Sae Vaze, Sandhya Esam, Alma Themreichon, Srirupa Poddar, Prachi Pandey, Mamina Bhol, Rameshori Chanu, Kirtideepa Subhadarshini, Aysha Thasleema, Monalisha, Sampurna Bhaumik. I am thankful to a few four-legged friends whose companionship brightened my days at the hostel – Maxy, Pluto, Cho Cho, Jojo, Ravi Kumar and Sher Khan. My long-distance friends – Surmeet Gaba, Vishal Ahankari, Rohan Dabholkar, and Prachi Bang – have served as a constant source of motivation. I appreciate the hours we have spent talking on the phone, exchanging heartfelt messages, and even engaging in virtual activities together, which have made my days better.

During the data analysis and thesis writing stages of my PhD journey, the Indira Gandhi Memorial Library grew into my second home. I am deeply grateful for the support I received from the library staff and security personnel, especially their prompt help when I was unable to access theses, dissertations, or books. The proper upkeep of the library provided a conducive environment that helped me work peacefully for hours at a stretch. My experiences in the library helped me develop sweet bonds with a few individuals – Keshav Chandra, G Raja Ashok Reddy, Sriganth Rajashekhar, N Thippe Swamy, Boda Suresh, and Praveen Chauhan. I am thankful to them for adding sunlight to my PhD journey. I would also like to appreciate

the presence of my friends back home – Sukanya Basu, Nivedita Basu, Nipun Mukherjee, Aneet Mandal and Debayan Sinha for motivating me and always spreading positive energy into my life. Their best wishes have played a part in helping me reach this milestone during my academic expedition.

As part of my academic experience, I have had the opportunity to interact with several students, some of whom have made a difference in my PhD programme by driving me to learn more and widen my horizons. I sincerely thank each of you for your genuine contribution to my academic journey – Shrinidhi Sathish, Kalyani Deshpande, Shalini Mukherjee, Mahathi Natva, Pragati Magham, Manav, Dean George, Prathyusha YV, Kimi Ralte, Pooja Kumari, B Rajesh, Juhi Rani Singh, Praneetha Teja, Rubeena Begum. Sruthikeerthy R, Mathangi Ramasubramanian, Priyanka Priya, Jerusha Wilson, Elizabeth Wilson, Naman Agarwal, Sohail Shaikh, Trinath D, Pradeep Chand, Yamini Sumalatha, Arun Kumar, Janali Mishra, Tanushree Mishra, Nayan-Tara Krishnan, Feby Lukose, Smaranika Bhattacharya, and Rashi Tyagi.

I would like to extend my heartfelt gratitude to my school teachers from Shree Swaminarayan Gurukul, Vapi – Anisha Dabholkar Ma'am, Dixita Desai Ma'am, and Kavita Naik Ma'am – for instilling strong academic values in me at a young age, which has propelled me towards choosing academia as my career path. You have not only imparted knowledge but have also inculcated in me a love for learning that will continue to guide me in my future endeavours. My teachers at Christ Junior college and CHRIST (Deemed to be University), Bangalore – Reva George Ma'am, Rekha Ahuja Ma'am, Stephen Samuel Sir have had a significant impact on my education and personal growth, and I am truly grateful for the role they have played in shaping my interest in the field of Psychology, especially Health Psychology.

I would like to express my deepest gratitude to Dr Surekha Chukkali, Dr Ridhima Shukla, Dr Fr Viju P Devassy, and Dr Fr Jossy George for providing me with an opportunity

to work for CHRIST (Deemed to be University), Delhi NCR as an Assistant Professor and for their complete support towards the completion of my doctoral research. Thank you Surekha ma'am for your constant encouragement and motivation, you have always accommodated my requests, even when it was difficult, and for that I will remain forever grateful.

Above all, I am deeply indebted to myself, for being patient, resilient, and determined throughout the journey of my doctoral research. I am especially thankful for my physical and mental health which has enabled me to undertake and complete this challenging academic dream that I have harboured from a very young age.



OINDRILA MUKHERJEE

ABSTRACT

The lack of immunity against the silent global epidemic of hypertension is a frightening reality. This non-communicable disease is a call for global attention towards the well-being of a very valuable system in the human body – the cardiovascular / circulatory system. It is estimated that at least one in four adults in India has hypertension. Effective management of hypertension is reflected in normal blood pressure readings (BP readings), lower manifestation of clinical symptoms and a good quality of sleep, while the actual hypertension management is achieved through compliance behaviour. In this study, hypertension management refers to BP readings, compliance behaviour, hypertension clinical symptoms, and sleep quality, where each one constitutes a significant component of hypertension management. Management of hypertension is impacted by psychosocial factors. The term ‘psychosocial’ connotes psychological and social factors. Theories of health behaviour examine the role of psychosocial factors in promoting health behaviour. Each theory has been proposed with its own assumptions and limitations. The common assumption of the theories is the intention of an individual to execute a health behaviour during the normal period. The COVID-19 pandemic, however, was a clear deviation from the norm. During this time, the perceptions of a disease like hypertension assumed a new significance, severity and susceptibility, emotional arousal and anxiety were high, social norms and subjective norms changed, attitude towards the disease underwent a sudden change from complacency to seriousness, perception of benefit from health behaviours were enhanced along with the perception of barriers, motivation to comply was likely to have changed either in a positive direction or towards learned helplessness, the perception of the behavioural outcome also would have shown leanings towards a positive direction. Such changes occurred as a result of the risk factor (COVID-19 infection) associated with the disease condition (hypertension) was of high seriousness involving fatality. Hypertensive population was classified as an ‘at risk’ group, vulnerable to the consequences of

the COVID-19 infection. Multiple studies have indicated the deterioration in adherence in hypertensive persons during the COVID-19 pandemic. Hypertensives, on the one hand, were labelled as a high-risk group, while a better care of their hypertension was a challenge due to lockdowns and related nation-wide restrictions. It is likely that coping with such new changes may have impaired hypertension management. Therefore, the present study attempts to examine the factors that facilitated and hindered hypertension management during the COVID-19 pandemic. A selected range of psychosocial factors was tested for their relationship with disease management among hypertensive patients. These included hypertension knowledge, social support, health hardiness and COVID-19 pandemic stress. A correlational design with a cross-sectional approach was adopted within a quantitative research design in this study. Data were collected from 406 adult men and women diagnosed with primary hypertension in India utilizing purposive and snowball sampling techniques. Through a web-based survey, the following measures were administered: COVID-19 Pandemic Stress Scale, Hypertension Knowledge Test, The Medical Outcomes Study Social Support Instrument, Sleep Quality Scale, Hypertension Clinical Symptoms Checklist, Hypertension Compliance Scale, and Revised Health Hardiness Inventory – 24. All participants were debriefed at the end of the data collection procedure. In line with the primary objective of the study, stepwise regression results revealed that a total of 17 variables were identified as psychosocial factors contributing to hypertension management. *T*-test and ANOVA results indicated differences in the study groups with respect to their blood pressure levels, experience of the clinical symptoms of hypertension, compliance behaviour and sleep quality. Further, using structural equation modelling, the study was successful in tracing a path from the psychosocial factors towards blood pressure and hypertension clinical symptoms routing via hypertension compliance. In this study, the role of health hardiness has emerged as a strong determining factor that even camouflaged the well-established path between compliance and BP readings. This means that health hardiness was

found to have a relatively high contributing effect towards blood pressure, compared to the contribution of compliance in maintaining normal BP levels. To reduce non-communicable disease mortality, disease management should be prioritized. The COVID-19 pandemic strained healthcare systems globally from 2019 to 2022, making it difficult for chronic illness patients to access routine care. This study emphasizes the undervalued role of social support during a pandemic, where social distancing was necessary. It also reveals the potential of health hardiness, a little-explored personality factor in connection with hypertension. Promoting health hardiness through interventions can enhance the hardy disposition in hypertension patients, lowering blood pressure. This study lays the foundation for a new robust theory of health behaviour.

CONTENTS

Title	Page No.
<i>Declaration</i>	iii
<i>Certificate</i>	iv
<i>Acknowledgements</i>	vi
<i>Abstract</i>	xvi
<i>List of Tables</i>	xx
<i>List of Figures</i>	xxii
<i>List of Appendices</i>	xxiii
<i>List of Abbreviations</i>	xxiv
Chapter I: INTRODUCTION	1
Chapter II: REVIEW OF LITERATURE	23
Chapter III: METHOD	64
Chapter IV: RESULTS	83
Chapter V: DISCUSSION	125
<i>References</i>	151
<i>Appendices</i>	189

LIST OF TABLES

Table No.	Table Title	Page No.
1.1	Categorization of Blood Pressure Based on the Indian Guidelines on Hypertension – IV (2019) (Shah et al., 2020)	9
3.1	Design of the Study	65
3.2	Demographic Characteristics of Participants (n = 406)	69
4.1	Basic Information on Health and Financial Status of Participants (n = 406)	85
4.2	Results Showing Mean (M), Standard Deviation (SD), T Values and Cohen's D for Blood Pressure Readings Among Hypertensive Adults With and Without a Family History of Hypertension (N=406)	87
4.3	Results of One-Way ANOVA With Means (M), Standard Deviations (SD), F Values and Effect Size (η^2) of Hypertension Clinical Symptoms Among Hypertensive Adults Across Three Levels of Education (N = 406)	89
4.4	Mean Comparisons Using Tukey's HSD Test Between the Three Groups for Hypertension Clinical Symptoms	89
4.5	Results of One-Way ANOVA With Means (M), Standard Deviations (SD), F Values and Effect Size (η^2) of Hypertension Compliance Among Hypertensive Adults Across Three Levels of Education (N=406)	91
4.6	Mean Comparisons Using Tukey's HSD Test Between the Three Groups for Hypertension Compliance	92
4.7	Results of one-way ANOVA with means (M), standard Deviations (SD), F values and effect size (η^2) of sleep quality among hypertensive adults with respect to occupation (n = 406)	93
4.8	Mean Comparisons Using Tukey's HSD Test Between the Four Groups for Difficulty Waking From Sleep	95
4.9	Results of One-Way ANOVA With Means (M), Standard Deviations (SD), F Values and Effect Size (η^2) of Sleep	96

	Quality Among Hypertensive Adults With Respect to Their Illness Duration (N = 406)	
4.10	Mean Comparisons Using Tukey's HSD Test Between the Three Groups for Difficulty Waking From Sleep	97
4.11	Table Showing Intercorrelations Among the Variables Under Study	84
4.12	Table Showing Intercorrelations Among the Variables Measuring Hypertension Management	84
4.13	Summary Table of Stepwise Regression Analysis for All Psychosocial Variables Predicting Blood Pressure	103
4.14	Summary Table of Stepwise Regression Analysis for All Psychosocial Variables Predicting Hypertension Clinical Symptoms	107
4.15	Summary Table of Stepwise Regression Analysis for All Psychosocial Variables Predicting Hypertension Compliance	110
4.16	Summary Table of Stepwise Regression Analysis for All Psychosocial Variables Predicting Sleep Quality	113

LIST OF FIGURES

Figure No.	Figure Title	Page No.
4.1	Confirmatory Factor Analysis Depicting Measurement Model Among All Psychosocial Factors	120
4.2	Hypothetical Model Depicting the Pathway Leading to Hypertension Management	121
4.3	Structural Equation Model Depicting the Causal Pathway Between Psychosocial Factors and Hypertension Management in Indian Hypertensive Adults	123

LIST OF APPENDICES

A1	Demographic and Health Details Sheet
A2	Hypertension Knowledge Test
A3	Medical Outcomes Study Social Support Instrument
A4	Revised Health Hardiness Inventory – 24
A5	Sleep Quality Scale
A6	Hypertension Compliance Scale
A7	Hypertension Clinical Symptoms
A8	COVID-19 Pandemic Stress Scale
B1	Institutional Ethics Committee Decision Letter
B2	Informed Consent Form
C	The COVID-19 Pandemic Stress Scale – Exploratory Factor Analysis
D	Publications • Effect of Illness Duration and Gender on Coping Skills Deficiency among Chronic Illness Patients • Flourishing: Role of Perseverance and Passion for Long-Term Goals in Relation to Subjective Vitality • Management of chronic illness through music therapy: A Review
E	Plagiarism Statistics Report

LIST OF ABBREVIATIONS

ACE	Angiotensin-Converting Enzyme
AGFI	Adjusted Goodness of Fit Index
AIDS	Acquired Immunodeficiency Syndrome
AMOS	Analysis of Moment Structures
ANOVA	Analysis of Variance
AOR	Adjusted Odds Ratio
ARB	Angiotensin Receptor Blockers
APA	American Psychological Association
BP	Blood pressure
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CMIN	Chi-Square Value
COPSS	COVID-19 Pandemic Stress Scale
COVID – 19	Coronavirus Disease 2019
CVHO	Cardiovascular Health Officers
CWC	Community Health Centre
DALYs	Disability-Adjusted Life-Years
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic Blood Pressure
DF	Degrees of Freedom
GBD	Global Burden of Disease
GFI	Goodness of Fit Index
HBM	Health Belief Model
HCSC	Hypertension Clinical Symptoms Checklist
HHD	Hypertensive Heart Disease

HHI	Health Hardiness Inventory
HIV	Human Immunodeficiency Virus
HKT	Hypertension Knowledge Test
HRV	Heart Rate Variability
HSD	Honestly Significant Difference
HWC	Health and Wellness Centres
ICMR	Indian Council of Medical Research
IEC	Institutional Ethics Committee
IFI	Incremental Fit Index
IHCI	India Hypertension Control Initiative
JNC	Joint National Committee
KMO	Kaiser-Meyer-Olkin
MAP	Mean Arterial Pressure
MCQ	Multiple Choice Question
Mm / Hg	millimetre per level of mercury
MOBILE	Motivations and Barriers to Physical Activity in Patients With Type 2 Diabetes and Hypertension
MOS	Medical Outcomes Study
NCD	Non Communicable Diseases
NFI	Normed Fit Index
OR	Odds Ratio
PCLOSE	p of Close Fit
PHC	Primary Health Centre
REM	Rapid Eye Movement
RFI	Relative Fit Index
RHHI	Revised Health Hardiness Inventory

RMSEA	Root Mean Square Error of Approximation
SBP	Systolic Blood Pressure
SE	Sleep Efficiency
SEM	Structural Equation Modelling
SOL	Sleep-Onset Latency
SPSS	Statistical Package for the Social Sciences
STSs	Senior Treatment Supervisors
SWS	Slow Wave Sleep
TLI	Tucker-Lewis Index
US	United States
VIF	Variance Inflation Factor
WHO	World Health Organization

Chapter I

INTRODUCTION

Chapter I

Introduction

The lack of immunity against the silent global epidemic of hypertension is a frightening reality. The augmenting prevalence of hypertension is not only an expensive affair to deal with but also results in an increase in the number of years lost due to ill health, known as disability adjusted life years (DALYs). This non-communicable disease is a call for global attention towards the well-being of a very valuable system in the human body – the cardiovascular / circulatory system. Concern for the asymptomatic nature of hypertension assumed new significance and relevance when hypertension was identified as one of the risk factors for the severity of COVID-19 infection since December 2019. The focus on the effective management of hypertension has gained relevance and priority since the outbreak of the COVID-19 pandemic.

During the pandemic, the perception of severity and susceptibility to the adverse effects of hypertension as well as to COVID-19 was high. This placed a high demand on COVID-19 preventive care on the one hand, and effective hypertension management on the other. This had to be accomplished under an unprecedented and highly challenging physical and social environment imposed by the nationwide lockdowns and social isolation, both of which curbed the individual's control and introduced unforeseen barriers to hypertension management. The reasons for this were non-availability of medical consultation, barriers to procuring medicines from the pharmacist, and enhanced levels of anxiety induced by the progressive increase in the incidence and mortality of COVID-19 cases. When the various psychosocial components contributing to health-promoting behaviour were thus working in a reverse direction, it is the researcher's inquisitiveness to explore and investigate what other psychosocial factors facilitate health-promoting behaviours such as hypertension management during the peak of a pandemic.

To understand this, it is essential to first understand the concepts and characteristics of hypertension, its management, and psychosocial factors.

Hypertension

The three components which make up the cardiovascular system are: the heart, the blood vessels and blood. The purpose of this system is to vitalize the body by delivering nutrient and oxygen-rich blood to over 35 trillion cells and parallelly also carry the discarded materials from the cells back to the heart and lungs for purification. In order to facilitate the smooth transport of oxygen and nutrients, the flowing blood exerts pressure against the walls of the arteries. When this pressure rises above the normative level and is sustained for a particular period, the condition is known as hypertension (or high blood pressure (BP)) (Hariharan, 2020). Hypertension creates tension within the artery walls. Moreover, blood pressure is also determined by cardiac output (the volume of blood ejected by the heart per minute), vascular resistance and total blood volume. Increased blood pressure may be the result of an increase in any one of these variables (Joeke & Boersma, 2007). Popularly known as a ‘silent killer’, hypertension seldom shows any signs or symptoms. However, some commonly reported symptoms include chest pain (angina), palpitations, dizziness, headaches, weakness, anxiety, nosebleeds, blurred vision, etc. (Wolff, 1996).

Further, hypertension can also be classified into primary hypertension and secondary hypertension. Also known as essential hypertension, primary hypertension is idiopathic in nature and may have a range of modifiable risk factors such as heredity, age, obesity, an unhealthy diet, a sedentary lifestyle, lack of exercise, substance use and chronic stress (Neighbors & Tannehill-Jones, 2022). On the contrary, secondary hypertension occurs due to an underlying medical cause such as renal diseases, thyroid dysfunction, obstructive sleep

apnoea, Cushing's syndrome, pheochromocytoma, etc. This is potentially reversible in nature and affects around 5% - 10% of all hypertensive cases (Charles et al., 2017).

Hypertension Prevalence

Despite the fact that the circulatory system is a valuable system in the human body and taking care of it is of utmost importance, this rarely occurs. Unsolicited illnesses like hypertension occur as a result of this. Nearly 30% of the world's population is affected by hypertension (Pan American Health Organization, 2020). According to World Health Organization (2021) estimates, approximately 1.28 billion adults in the age bracket of 30-79 years suffer from hypertension worldwide. A report by the NCD Risk Factor Collaboration (Zhou, 2017) reported an increase in the number of adults with hypertension, from 594 million in 1975 to 1.13 billion in 2015. Additionally, this increase was more prevalent in low-income and middle-income countries. It is even more appalling to learn that 46% of hypertensive adults across the world are unaware that they live with this condition (World Health Organization, 2021).

It is estimated that at least one in four adults in India has hypertension (Geldsetzer et al., 2018). Hypertension has been found to be more prevalent in urban populations than the rural (Gupta, 2018). However, compared to urban areas, hypertension has increased more rapidly in rural areas (Gupta, 2016). Data from the past 15 years show that in India, the prevalence of high blood pressure has increased from 31.2% in 2004 to 31.6% in 2019 in men, whereas in women it has decreased from 31.7% in 2004 to 30.5% in 2019. These ratios would indicate a humongous number of men and women suffering from hypertension in the nation (Gupta, 2016). Recent US recommendations for high blood pressure have lowered the cut-off point for defining hypertension to 130 systolic BP and/or 80 diastolic BP mmHg (Whelton et al., 2017). Given the large prevalence of prehypertension in our country, if these new criteria

were to be implemented in the Indian subcontinent, the prevalence of hypertension would rise sharply (Gupta et al., 2017; Pednekar et al., 2009). Projections to 2030 show an increase in the prevalence of hypertension to 44% (Gupta et al., 2018).

Public health initiatives for hypertension control have been developed in India and several other countries. The India Hypertension Control Initiative (IHCI) is a multi-partner initiative of the Government of India's Ministry of Health & Family Welfare, Indian Council of Medical Research (ICMR), WHO Country Office for India (WHO India), and Resolve to Save Lives (technical partner). According to a report (WHO, 2022) on the progress made under IHCI released on May 9, 2022, blood pressure control was highest (55%) at Health and Wellness Centres (HWC), second highest (48%) at primary health care (PHC), followed by 44% in hospitals and 37% in Community Health Centre (CHC) facilities. Under IHCI, a team of Cardiovascular Health Officers (CVHOs) and Senior Treatment Supervisors (STSs) from the WHO supports the state governments in developing and adopting treatment protocols; forecasting and procurement of antihypertension medicines; building capacity of health care providers; and monitoring patients through effective information systems including digital apps (Kaur et al., 2021). It is saddening to note that although the IHCI constitutes a team of trained medical doctors and nurses, the involvement of a Behavioural Cardiologist is missing. The involvement of a behavioural cardiologist is crucial in view of the lifestyle changes that the management of hypertension calls for. Lifestyle changes involve a behavioural component that meets with several restraining forces such as resistance to change, clinging to the comfort zone, lack of cognitive base, etc.

Impact of Hypertension

Non-communicable diseases like hypertension are progressive in nature. Left untreated, this silent killer will give rise to plenty of adverse health consequences. Worldwide, elevated

systolic blood pressure is estimated to cause 10.2 million deaths, accounting for 208 million disability adjusted life years (DALYS) (Global Burden of Disease (GBD) Study, 2016). A similar trend has been observed in India, where hypertension stands as the leading risk factor of mortality and disability (Gupta, 2018). In fact, India has one of the highest rates of hypertension-related death and morbidity in the world, and these numbers continue to rise. According to the Global Burden of Diseases survey, hypertension contributed to 1.63 million deaths in India in 2016 versus 0.78 million in 1990. (GBD Study, 2015). With respect to DALYs, hypertension is responsible for 90 million DALYs in women and 125 million in men (GBD, 2016). Further, hypertension-related disease burden (DALYs) was found to have increased from 21 million in 1990 to 39 million in 2016 (Gupta et al., 2019).

It is widely established that untreated hypertension leads to cardiovascular disease, myocardial infarction, stroke, dementia, cognitive impairment, kidney failure, retinopathy, as well as premature death (WHO, 2021). However, its effects extend beyond acute physical issues and exert an influence on different aspects of daily life functioning. A qualitative inquiry by Shamsi et al. (2017) revealed that hypertension and its symptoms brought problems related to reduced physical activity and nutritional constraints in a sample of hypertensive adults. Men reported experiencing a decreased sexual drive and sexual function, which in turn resulted in impaired interpersonal relations with their spouses.

Apart from its impact on mortality, disease burden and daily functioning, hypertension is also a significant risk factor for the development of comorbidities such as diabetes, cardiovascular diseases, kidney diseases, chronic obstructive pulmonary disease, etc. (Gordon, 2023) which have an adverse impact on quality of life (Wang et al., 2009). Abougambou and Abougambou (2013) found that the chances of prevalence of hypertension in type 2 diabetes patients is around 92.7%. Moreover, those hypertensive individuals aged 60 years and above, have a 50% higher chance of developing a comorbid condition (Moser et al., 2001).

Comorbidities of hypertension differ on the basis of gender and age. For e.g., one study found that men with uncontrolled hypertension have a higher chance of suffering from cognitive impairment as compared to untreated hypertensive women (Kilander et al., 1998).

Hypertension may be a risk factor for the development of acute illnesses on account of the immunocompromised state of the body. The biggest example of this phenomenon could be seen during the COVID-19 pandemic that shook the global healthcare system to its depths. Lippi et al. (2020) found a strong association between hypertension and the risk of COVID-19. Apart from high vulnerability and high mortality, COVID-19 was found to have resulted in disequilibrium in BP levels post recovery from the infection among the hypertensives as well. Akpek (2022) has found an increase in systolic and diastolic blood pressure in patients who had recovered from COVID-19 as compared to before their COVID-19 diagnosis.

With regard to psychosocial functioning, hypertension has been found to lower general as well as health-related quality of life (Carvalho et al., 2013; Trevisol et al., 2011). Anxiety and depression are some common responses brought on by the chronic and progressive nature of hypertension (Bajkó et al., 2012). Shamsi et al. (2017) report that fear and a sense of shock were observed in those diagnosed at an early age, as such people were anxious about the course of their health in the future and also about their offspring's health owing to the hereditary nature of hypertension. Furthermore, this chronic illness negatively affects spiritual and religious experiences by thwarting the practice of religious customs such as fasting, travelling to places of religious importance and so on. Hypertension also causes financial difficulties, social problems, feelings of inadequacy, and weakened interpersonal relationships (Mills et al., 2020; Shamsi et al., 2017).

Hypertension Management

Effective management of hypertension is reflected in blood pressure readings (BP readings), manifestation of clinical symptoms and quality of sleep, while the actual hypertension management is achieved through compliance behaviour. Therefore, all the four components are important in measuring hypertension management. In this study, hypertension management refers to BP readings, compliance behaviour, hypertension clinical symptoms, and sleep quality, where each one constitutes a significant component of hypertension management.

Blood Pressure Reading

Blood pressure is measured in terms of systolic blood pressure (SBP) – the pressure when the heart contracts to pump blood – and diastolic blood pressure (DBP) – the force of the blood between contractions when the heart is in a resting state. Measurement of blood pressure is performed through an electronic or manual blood pressure monitor (called sphygmomanometer) in millimetres of Mercury (mm Hg). A measurement of 120/80 mm Hg (SBP/DBP) or below is regarded as the standard value of normal blood pressure. A state of high blood pressure develops when the blood pressure reading rises above 140 / 90 mm Hg. However, in order to be clinically diagnosed with hypertension, the average of BP readings from two or more clinical visits on two or more distinct occasions should be at elevated levels (Shah et al., 2020; Whelton et al., 2018).

Guidelines regarding the classification of blood pressure differ across the world. Whereas, the American Heart Association / American College of Cardiology follows a benchmark of 130-139/ 80-89 mm Hg for a diagnosis of hypertension, the European Society of Cardiology / European Society of Hypertension declares a standard of 140 / 90 mm Hg (Whelton et al., 2018; Williams et al., 2018). According to the Indian Guidelines on Hypertension – IV (2019) (Shah et al., 2020), a hypertension diagnosis requires an office

measurement of greater than or equal to 140 / 90 mm Hg and a self / home blood pressure reading of greater than or equal to 135 / 85 mm Hg. It is strongly recommended that the Indian guidelines lower the benchmark of hypertension diagnosis for an early identification of hypertensive cases, thereby reducing the risk of cardiovascular complications. Table 1.1 shows the categorization of blood pressure based on the Indian Guidelines on Hypertension – IV (2019) (Shah et al., 2020).

Table 1.1

Categorization of Blood Pressure Based on the Indian Guidelines on Hypertension – IV (2019) (Shah et al., 2020)

Category	Systolic (mmHg)		Diastolic (mmHg)
Optimal	<120	and	<80
Normal	<130	and	<85
High Normal	130-139	or	85-89
Hypertension			
Stage 1	140-159	or	90-99
Stage 2	160-179	or	100-109
Stage 3	≥180	or	>110
Isolated Systolic Hypertension			
Grade 1	140-159	and	<90
Grade 2	>160	and	<90

Note. Retrieved from “Indian guidelines on hypertension-IV (2019),” by S. N. Shah et al., 2020, *Journal of Human Hypertension*, 34(11), 745-758. Copyright 2020 by the Journal of Human Hypertension.

Hypertension management entails an amalgamated plan of pharmacological and non-pharmacological treatment options which requires lifelong sustenance. The primary index of effective management of hypertension is maintaining the BP level within the range of 90/60 mmHg – 120/80 mmHg. This is possible through strict compliance behaviour.

Compliance

In the present study, compliance was operationalized as, the extent to which a hypertensive adult follows the prescribed medication, diet, and exercise as well as monitors BP levels on a regular basis, along with attending regular doctor consultations.

Compliance is one of the major components of hypertension management. The COVID-19 pandemic posed a great challenge to this component of hypertension management. Compliance, which was even more essential during the coronavirus pandemic, had to encounter several hurdles such as restricted access to medical facilities for monitoring BP or getting prescriptions, scarcity of medication supply, low adherence to diet and exercise owing to several psychosocial factors.

Compliance is a behaviour that demands discipline from the patients. Even in the face of challenges like the COVID-19 pandemic, it may be difficult but not impossible to comply with hypertension management behaviour. Some psychosocial variables may play a significant role in driving the patients to adhere to the discipline of hypertension management.

Compliance in the context of hypertension management, encompasses following the recommendations, including the monitoring of BP and pharmacological and non-pharmacological therapies (Kulkarni & Graggaber, 2022). It includes taking medications as prescribed, consuming a low fat, low sodium diet, exercising regularly, monitoring BP as well as symptoms regularly and persisting on therapy long-term. The major part of compliance behaviour is drawing a pharmacological treatment plan. This is done by the physician keeping

in view the unique requirements of the patient to lower blood pressure. Primary hypertension is a condition for which the cause is not specifically known. Hence some patients require vasodilators, some need beta blockers, others require diuretics while yet others' condition demands ACE inhibitors. Thus, the same medication will not suit all. Medications include alpha blockers, angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), beta blockers, calcium channel blockers, central alpha agonists, diuretics, renin inhibitors and vasodilators which are prescribed by a qualified healthcare professional after a thorough assessment of the patient. In some cases, hypertension patients can be prescribed a combination of multiple drugs based on individual needs (Guerrero-García & Rubio-Guerra, 2018).

Apart from drug therapy, hypertension is also treated via non-pharmacological supplements which include lifestyle modifications, stress management and self-monitoring strategies. Modifying poor lifestyle choices play an important role in controlling blood pressure levels and go a long way in preventing hypertension-related complications. The Seventh Report of the Joint National Committee (JNC-7) endorses lifestyle modifications for all patients with prehypertension or hypertension. These modifications include weight loss, reduced sodium intake, physical activity, limiting alcohol consumption, and incorporating the Dietary Approaches to Stop Hypertension (DASH) eating plan (Nguyen et al., 2010).

With the development of novel public health schemes, it is expected that hypertension management will improve gradually. However, a nationally representative cross-sectional study estimates that only around 12% of Indians diagnosed with primary hypertension have it under control (Prenissl et al., 2019). Uncontrolled hypertension has the potential to cause several adverse health complications such as heart attacks, cardiac arrest, stroke, kidney disease, retinopathy, cognitive decline and even sleep problems such as nightmares, and sleep deprivation (Shamsi et al., 2017). As a result of chronic blood pressure elevation, a collection

of changes in the left ventricle, left atrium, and coronary arteries may occur. This is called hypertensive heart disease (HHD). These adverse effects do not just happen suddenly. The patient manifests several clinical symptoms that ring an alarm that one's BP is not under control.

Clinical Symptoms

The clinical symptoms of hypertension include palpitations, exhaustion, headaches, dizziness, sleeplessness, irritability, pain in the chest, problems in breathing, etc. These symptoms, if ignored repeatedly, may result in serious adverse effects of hypertension. Patients with adequate knowledge levels are likely to identify these symptoms and address them immediately. Patients ignorant of the nature of the disease are likely to neglect these biological alarms as minor and temporary setbacks that stabilize in due course. People with prior knowledge about the clinical symptoms of hypertension take remedial measures such as checking the BP levels immediately and consulting the physician, taking the prescribed medication to bring BP under control, taking adequate rest, managing stress appropriately, practicing relaxation, etc. as suggested by the healthcare professional in order to restore equilibrium. In case the BP does not come under control even after taking all the measures, the physician may even suggest hospitalization for a closer monitoring and management of the condition. In the absence of the last option during the COVID-19 pandemic, some patients might have taken adequate preventive steps to not allow their BP to shoot up. Yet others might have adopted unique measures like video consultation with their physician to address the alarm signals of hypertension. The identification of psychosocial factors that enable some patients to effectively manage their BP during challenging times sets a benchmark for hypertensives across the globe.

Sleep Quality

The clinical symptoms of hypertension are closely related to sleep quality, where they impact each other. Sleep was one of the major casualties during the COVID-19 pandemic, due to high levels of anxiety and panic aroused by the unknown nature of the virus, its rapid spread, fatality associated with the virus, unpreparedness of the health care system, worry about the loved ones staying away, and more importantly mourning for the loved ones who lost their lives and anxiety over those loved ones who contracted and were fighting the virus, not to mention the anxiety over the susceptibility of one's own self towards the virus. The negative impact of stress and anxiety on sleep quality has the potential to disrupt the equilibrium of BP levels in hypertensive individuals. It may be appropriate to state that apart from BP levels, clinical symptoms and compliance, sleep quality constituted a major parameter in measuring hypertension management. Those who were able to regulate and have adequate sleep may be known for managing this component of hypertension effectively. In this study, poor sleep quality was operationally defined as the extent to which an individual experiences daytime dysfunction due to lack of sleep, difficulty initiating sleep, difficulty maintaining sleep, difficulty waking up from sleep, lack of restoration after sleep and lack of satisfaction with sleep.

There is a strong link between sleep and hypertension. Sleep is important for regulating blood pressure, and lack of sleep or poor quality of sleep can lead to higher blood pressure levels. BP decreases by approximately 10%–20% during sleep, increases just prior to waking, and peaks shortly after waking. The decrease in BP during sleep is termed “dipping,” and the increase in BP upon waking is termed “morning surge.” A nondipping BP pattern is defined as a nocturnal decline in systolic BP <10% from daytime systolic BP and is associated with increased risk for cardiovascular morbidity and mortality. An extreme form of non-dipping is “reverse dipping,” wherein systolic BP during sleep is higher than during wakefulness

(Thomas & Calhoun, 2017). During sleep, the body undergoes a natural decrease in blood pressure (nocturnal blood pressure dipping), which allows the cardiovascular system to rest and recover. When sleep is disrupted or inadequate, this natural decrease in blood pressure may not occur, leading to higher blood pressure levels over time. In order to address this, it is essential to maintain good sleep quality (Bathgate, 2018).

Sleep quality can be defined in different ways. By using objective measures of sleep, such as polysomnography, sleep quality can be characterized by the amount of slow wave sleep (SWS) and rapid eye movement (REM) sleep one gets at night. These two stages of sleep occur with greater duration as sleep progresses. SWS is deep sleep and has a restorative function, whereas both REM and SWS function toward memory consolidation. By using polysomnography and actigraphy, sleep quality can be defined by sleep efficiency (SE), or the amount of time in bed spent asleep, as well as sleep-onset latency (SOL), the amount of time one takes to fall asleep at night. Low sleep efficiency (generally <85%) and long sleep onset latency (>20–30 min depending on age) typically characterize poor sleep. Finally, subjective measures of sleep quality can be obtained based on self-report, which constitutes the following components: sleep initiation, sleep continuity, number of awakenings, depth of sleep etc. (Thomas & Calhoun, 2017).

Ran et al. (2021) have suggested that improving sleep quality can improve hypertension compliance. Poor sleep quality can negatively impact hypertension management by increasing stress, contributing to weight gain, and decreasing physical activity levels along with impairing cognitive functioning (Almojali et al., 2017). The COVID-19 pandemic has had a significant impact on sleep quality for many people. The stress and uncertainty of the pandemic, as well as changes in daily routines and social isolation, have all contributed to poor sleep quality for some individuals. Several studies have found that during the pandemic, people have reported increased levels of insomnia, nightmares, and other sleep disturbances (Pappa et al., 2020;

Voitsidis et al., 2020; Jahrami et al., 2021; Mandelkorn et al., 2021). Factors such as increased screen time, disrupted work and school schedules, and heightened anxiety and stress levels can all contribute to poor sleep quality. In addition, the pandemic has led to an increase in unhealthy sleep behaviours such as napping during the day, staying up late, and consuming more caffeine and alcohol. These behaviours can further disrupt sleep patterns and lead to poor sleep quality. Hence, sleep quality was considered to be an important factor affecting hypertension management during the pandemic.

The COVID-19 Pandemic and Hypertension Management

Management of chronic illnesses require regular and comprehensive care. The outbreak of the pandemic created significant barriers to diagnosis, treatment, and follow-up of chronic diseases. It affected the processes of routine comprehensive treatment for chronic patients due to disrupted delivery care. In-person, face-to-face consultations had ceased due to government restrictions, instilled fear of contracting the virus, and the shift of focus towards the care of those diagnosed with COVID-19. Worldwide, the pandemic adversely affected clinical decision-making by limiting laboratory testing and physical examination. During the outbreak of the pandemic, hospitalization rates, emergency department visits and outpatient clinic visits of chronic patients were significantly reduced. Delivering regular and routine comprehensive care for chronic patients was disrupted due to closures of healthcare facilities, lack of public transportation or reductions in services (Fekadu et al., 2021). These barriers created by the pandemic drove the hypertensive patients to enhance self-management measures.

Hypertension Management: Role of Psychosocial Factors

The term ‘psychosocial’ connotes psychological and social factors. Theories of health behaviour examine the role of psychosocial factors in promoting health behaviour. The various psychosocial factors identified by these health behaviour models can be broadly summarised

into the heads of: perception of the disease condition, perception of one's ability to manage the disease, perception of the impact of the health behaviour on significant others, perception of control over the situation, perception of the barriers to attain the behavioural goal, perception of benefits of engaging in the particular health behaviour, motivation that drives to execute the health behaviour, knowledge about the health condition, attitude towards the health behaviour, emotions of fear and anxiety related to the health condition, outcome expectations of the health behaviour and social norms linked to the health behaviour. Each theory has been proposed with its own assumptions and limitations. The common assumption of the theories is the intention of an individual to execute a health behaviour during the normal period.

The COVID-19 pandemic was a clear deviation from the norm. During this time, the perceptions of a disease like hypertension assumed a new significance, severity and susceptibility, emotional arousal and anxiety were high, social norms and subjective norms changed, attitude towards the disease underwent a sudden change from complacency to seriousness, perception of benefit from health behaviours were enhanced along with the perception of barriers, motivation to comply was likely to have changed either in a positive direction or towards learned helplessness, the perception of the behavioural outcome also would have shown leanings towards a positive direction. Such changes occurred as a result of the risk factor (COVID-19 infection) associated with the disease condition (hypertension) was of high seriousness involving fatality that was glaring and real. Given these changed circumstances, there is only a possibility of exploring which psychosocial factors play a significant role in managing hypertension effectively. A selected range of psychosocial factors was tested for their relationship with disease management among hypertensive patients.

Hypertension Knowledge

Hypertension Knowledge is defined as the individual's knowledge about the disease condition. What constitutes hypertension knowledge is systematically structured and organized

information about the nature of hypertension, its aetiology, symptoms, treatment, prevention, protection in terms of management behaviour that includes medication and lifestyle factors. In this study, hypertension knowledge was operationally defined as the information one has about the concept and nature of hypertension, prescribed lifestyle modifications, causes, consequences, and treatment of hypertension as well as the medications prescribed to hypertensive individuals.

The knowledge of a disease is an important cognitive factor that determines one's compliance with the prescribed treatment, which in turn, affects disease management. Awareness about the chronic condition creates a cognitive base that propels an individual towards action – health promoting behaviours – such as hypertension compliance, self-monitoring, etc. This ultimately has an indirect impact on lowering blood pressure levels (Andrew et al, 2022; Asnani, 2017). Knowledge is believed to be one of the prominent factors to bring good adherence status (Wolde et al., 2022). Knowledge or information helps in creating a conviction for the necessary action. This conviction functions as the trigger or the drive for the behaviour. Deeper the knowledge, higher the conviction.

When the conviction is strong, the motivation for the behaviour is high and the individual prepares to circumvent any hurdle to attain the goal of health behaviour. Extrapolating it to hypertension management during the COVID-19 pandemic, one may say that a strong knowledge level constituting good health literacy establishes a sturdy cognition that gives rise to a strong conviction about the need to manage hypertension effectively so as to insulate oneself from susceptibility to the virus (COVID-19). This strong conviction lays the path for high level of motivation for sustaining the compliance behaviour even in the face of multiple hurdles brought in by the coronavirus pandemic. This ensures an effective management of hypertension during the pandemic. Thus, it is possible that hypertension

knowledge constituted the basis for effective hypertension management during the COVID-19 pandemic.

Health Hardiness

Health hardiness is a term that refers to the ability of an individual to maintain good physical and mental health in the face of stress and adversity. It encompasses the ability to cope with the challenges of life, maintain a positive outlook, and engage in healthy behaviours that promote well-being (Hull, 1987). In the present study health hardiness is operationalized as, the value one attaches to their health in the face of unprecedented adversities, and pursues the same, encountering challenges; attribution of health locus of control, whether internal or external and the perceived health competence of an individual. Given the limitations, restrictions and constraints posed by the COVID-19 pandemic, health hardiness may be one personality component that contributes positively to hypertension management.

The concept of health hardiness was first introduced by psychologist Suzanne Kobasa in the 1970s, who identified three key components of health hardiness: commitment, control, and challenge (Kobasa, 1982). Commitment refers to a person's sense of purpose and motivation to achieve their goals, while control refers to their ability to influence their environment and take action to improve their situation. Challenge refers to a person's willingness to see difficulties as opportunities for growth and development. Research has shown that people with high levels of health hardiness tend to experience less stress, have better physical health, and enjoy greater psychological well-being than those with low levels of health hardiness. They are found to be more likely to engage in health-promoting behaviours and have better treatment compliance.

Social Support

Social support refers to the help, assistance, and resources that individuals receive from their social networks, such as friends, family members, and community organizations. Social support can take many different forms, including tangible support; emotional support, which involves providing comfort, empathy, and encouragement to individuals who are going through a challenging time; informational support in the form of advice, guidance, and information on a specific issue; and appraisal support that involves validation on an individual's thoughts, feelings, and behaviours (Piferi & Lawler, 2016). The impact of social support can be seen as a buffer that protects one from the negative effects of stressful experiences or as a phenomenon that enhances wellbeing through providing a sense of comfort and security in general. In this study, social support was operationalized as the support received from one's social network in the form of affection, information, emotional support, tangible assistance as well as positive interactions with others.

One of the positive factors for good prognosis and management of a chronic condition is social support. Social support can play an essential role in improving hypertension management. Social support can positively influence medication adherence, dietary changes, physical activity, and self-monitoring, all of which are key components of hypertension management. Having a supportive social network, such as family or friends, can provide emotional and instrumental support, such as reminders to take medication, encouragement to maintain a healthy lifestyle, and help with managing stress. Furthermore, social support can also provide a sense of accountability, as individuals may feel more motivated to comply with their hypertension management plan if they know they have the support of their social network. Social support may also buffer the negative psychological effects associated with hypertension, such as anxiety and depression, which can decrease blood pressure levels and symptoms of hypertension (Nyaaba et al., 2019).

The COVID-19 pandemic has been challenging and stressful with the need for physical distancing and isolation measures affecting social connections and support networks. The lack of social support during the pandemic was likely to exacerbate stress, anxiety, and depression. This was also likely to negatively impact hypertension management. Hence, social support was considered as an important social factor to be examined in relation to hypertension management during the COVID-19 pandemic.

Hypertension is the leading non-communicable disease as well as the foremost cause of mortality in the world. Therefore, it is essential to manage this irreversible health condition. The advent of the COVID-19 pandemic created new challenges in disease management which added to the pre-existing barriers of treatment compliance. One may wonder the academic and practical value of studies of this sort which report about an unprecedented pandemic that was not witnessed in the past century. The relevance of the study can be explained by the fact that the pandemic of COVID-19, though officially declared as over, will still remain with us for several years, as per experts. The probability of future waves is still being discussed and debated (McKie, 2023).

Although the World Health Organization Emergency Committee on COVID-19 has declared an official end to the Public Health Emergency of International Concern (PHEIC) status of the COVID-19 pandemic, the virus continues to remain a threat. This means that the coronavirus pandemic in itself is not over however, the state of global emergency that was a result of this virus, has now concluded (WHO, 2023).

According to scientists and World Health Organization advisors, there may yet be a devastating wave in China before the Covid-19 pandemic emergency is officially declared to be over. Their opinions reflect a shift since China started to abandon its zero-Covid policy in the recent past in response to an increase in infections and nation-wide public demonstrations.

According to projections, the abrupt course change might result in more than a million deaths in 2023 in the second-largest economy in the world (Yu, 2022). Experts fear the emergence of a fourth wave of the COVID-19 pandemic in India (India TV, 2022). Due to the surge in COVID-19 cases, Indian state governments had issued mask mandates and testing of people with symptoms of the coronavirus, in the states of Haryana, Uttar Pradesh, Rajasthan, Kerala and Puducherry as well as in Mumbai and Delhi as of April 11, 2023 (Express Web Desk, 2023; NDTV, 2023). All these suggests that the country is gearing up to fight yet another wave. In the context of these developments, the present study assumes contemporary relevance so that the findings related to the psychosocial correlates of effective hypertension management can be translated into relevant interventions, should the third and fourth wave pose a threat to the nation.

This thesis is a scientific account examining the psychosocial contributors of hypertension management during the COVID-19 pandemic. The thesis follows the guidelines laid down by the APA Publication Manual (7th ed.). The report of the study carried out is portrayed through five chapters of which, this is the first one. Chapter II reviews recent literature pertaining to the topic of study, research questions, objectives, and hypotheses. Chapter III lays out the method of study. Chapter IV consists of results containing statistical analyses, tables, and figures. Chapter V discusses the findings of the study, its limitations, and implications, followed by two independent sections—References and Appendices.

Chapter II

REVIEW OF LITERATURE

Chapter II

Review of Literature

An elaborate review of the available literature related to hypertension management and the psychosocial factors associated with it was undertaken to construct a conceptual framework that serves as the foundation of this study. This chapter thematically chronicles the empirical findings related to the psychosocial factors associated with hypertension management by explaining them in a detailed manner as well as critically and systematically analysing them. The review of literature begins through an understanding of the recent trends and projections in the management of hypertension, followed by the impact of the COVID-19 pandemic on hypertension management, proceeding to reviewing literature specific to each psychosocial variable under study, in connection with hypertension management. The studies presented here are dated within the past 20 years (2002 – 2022). However, literature prior to 2002 has also been cited in order to support the historical perspective of a concept. Although special efforts have been made to pay more attention to Indian studies, due to the paucity of documented studies available, the citation of Indian studies could not reach the desired level.

Hypertension Management: Recent Trends

Before scrutinising the recent trends in hypertension management, it is pertinent to understand what goes into hypertension management. Managed efficiently, the blood pressure levels reach their goal between 120-130 mm Hg systolic and 80-90 mm Hg diastolic. This management is possible with strict clinical adherence. Clinical adherence refers to taking the prescribed medication regularly without fail, complying with the diet and exercise regimen advised by the doctor, monitoring the blood pressure regularly and being vigilant to any alarm signals. It is known that hypertension or high blood pressure is incurable in nature but can be tackled if managed optimally (World Health Organization, 2021). Optimally

managed hypertension is an effective preventive measure from irreversible cardiovascular events. According to recent projections, increasing hypertension treatment to 70% might prevent over 40 million deaths caused by the condition over the course of the next 25 years (Kontis et al., 2019). Hypertension management involves adhering to the prescribed medication, diet, and exercise regimen along with regular blood pressure monitoring and stress management (WHO, 2021). Although persons with hypertension are expected to comply with their prescribed treatment for hypertension, suboptimal adherence of hypertensive adults has been reported in several studies (Burnier & Egan, 2019; Poulter et al., 2020; Vrijens et al., 2017).

Only one-third of hypertensive adults who receive treatment attain optimal blood pressure control, according to literature (Silveira et al., 2019). One year after starting medication for hypertension, compliance is commonly reported at 50%. (Burnier & Egan, 2019). More recent data indicate that, at least in some nations, adherence has been increasing. For instance, during 2007 to 2008, around 70% of treated patients in the United States have had their blood pressure regulated to less than 140/90 mmHg, a level also attained in Germany between 2008 - 2011. In Canada, an astounding 85% of patients under treatment had their condition under control in 2013 (Burnier & Egan, 2019).

In India and Nepal, according to a study by Rauniyar et al. (2020), less than one-third of the hypertensive population received therapy, and only 20% or lesser achieved prescribed blood pressure levels. With respect to India, a recent nationally representative cross-sectional survey conducted by Prenissl et al. (2019) found that, out of an approximate 220 million people diagnosed with hypertension, a trivial 12% people have controlled blood pressure levels.

Medication Management

An analysis of 195,930 electronic prescriptions revealed that up to 28% of patients fail to fill prescriptions when new drugs are begun. (Fischer et al., 2010). Nearly 40% of participants in a cohort of 16,907 patients who were offered oral drugs for one of many different medical illnesses in 95 studies had stopped treatment after one year, and 4% had never started treatment (Blaschke et al., 2012). Medications, when not taken as prescribed may start working partially, cause harm, or stop working altogether. Drug-specific problems such as sporadic toxicity, periodic loss of effectiveness, and eventually apparent drug resistance are also brought about as a result of inconsistent adherence (Blaschke et al., 2012).

A major contributing factor towards uncontrolled hypertension is poor adherence (Burniers & Egan, 2019). A longitudinal study of 4783 individuals' electronically generated dose histories found that almost half of those who were prescribed an antihypertensive medicine stopped taking it after a year, raising concerns about adherence (Vrijens et al., 2008). Even if it is acknowledged that adherence awareness has grown recently, there is still a long way to go.

Medication non-adherence is an increasing issue that is linked to poor prognosis. As a result of non-adherence, the majority of hypertension patients (almost three-quarters) do not attain ideal blood pressure control (Burnier, 2017). A meta-analysis studied 13,688 hypertensive patients in a total of 28 studies from 15 different countries (Abegaz et al., 2017). A large portion (45.2%) of the hypertension patients and one-third (31.2%) of the hypertensive patients with comorbidities from 25 trials did not take their medications as prescribed. Individuals with uncontrolled blood pressure had a larger percentage of medication nonadherence (83.7%) than those with regulated BP. Males had a 1.3 times higher risk of non-adherence than females, with a relative risk of 0.88, despite females having a

higher percentage (54%) of non-adherence to antihypertensive drugs ($p < 0.001$). Africans and Asians (43.5%) made up over two thirds (62.5%) of those who did not take their medications as prescribed.

Majority of studies focus on adherence to pharmacotherapy, keeping diet and exercise adherence at the backseat. When the adherence to medication is low during the normal time, it is bound to suffer higher non-adherence during COVID-19 pandemic due to various pandemic-associated factors.

Adherence to Diet

Diet prescription to hypertensive patients emphasises on low fat, low carbohydrate and low salt meals with high protein and fibre intake through pulses, vegetables, and fruits. In India, hypertensives are advised to reduce certain items in the meals such as pickles, *papads*, deep fried items, red meat etc. because of the large content of fat and salt in them. Adherence to this prescription is found difficult for many patients for various psychosocial reasons that include satisfaction of the palate, inconvenience to separate patient meals from the family meals, social pressure, complacency and so on. For people with hypertension, diet prescribed by the Dietary Approaches to Stop Hypertension (DASH) is strongly advised. It has been demonstrated that following the DASH diet will help one control their blood pressure. The DASH diet plan offers daily and weekly nutritional goals instead of following peculiar food habits. Eating vegetables, fruits, and whole grains are recommended in this diet plan along with dairy items with zero or low fat, fish, poultry, beans, nuts, and vegetable oils (National Heart, Lung and Blood Institute, 2021). The DASH diet has been found to be followed less systematically by people with hypertension than by those without the diagnosis (Kim & Andrade, 2016). Another study by Mellen et al. (2008) revealed that the dietary quality of adults with hypertension has declined since the DASH diet's promotion and that the dietary

profile of persons with hypertension in the United States has a low concordance with the DASH dietary pattern.

With reference to India, Kumbla et al. (2016) revealed that adults with hypertension and dyslipidaemia used more salt in their diet than was the recommended level. Overall, on an average, 10.9 grammes of salt was consumed daily. The average daily salt intake in the North, East, West, and South of India, respectively, was 14.13, 9.81, 10.12, and 9.38 grammes. The North notably consumed more salt on a daily basis than the other regions ($p = 0.01$). In comparison to the West, South, and East, the daily consumption of saturated fats (total saturated fat, ghee, and butter) among people in the North was higher which had a statistically significant difference ($p < 0.05$). Further, only 19.4% of hypertension patients in the National Health and Nutrition Examination followed the dietary recommendations of the Dietary Approaches to Stop Hypertension (Mellen et al., 2008). Compliance with prescribed diet during COVID 19 pandemic has many obstacles such difficulty in maintaining the grocery supply for the family, all family members confined to home during the lockdown, raising the tendency to pamper the palate more than complying to the dietary prescription. Thus, the possibility of deviations leading to progressive decay curve in compliance with diet was high.

Exercise- A Contributing Factor to Hypertension Management

One of the major medical advices for effective management of hypertension is physical exercise. Physical exercise helps in dilating the blood vessels, increases supply of oxygen to the heart and lungs, contributes to digestion, converts the fat into energy and contributes overall to the cardiac health. The prevention and treatment of chronic diseases like hypertension have been linked to increased physical activity (Hu et al., 2004; Padilla et al., 2005). For instance, despite the relatively small effects, patients who were physically

active had greater cardiovascular recovery than those who were inactive, according to a meta-analysis of 69 research studies (Schuler & O'Brien, 1997).

Exercise has been shown to lower the risk of developing hypertension and other non-communicable diseases (Hu et al., 2004). As a result, accumulation of moderate physical activity on most days of the week, if not all of them, has been suggested as a form of self-management for hypertension (Padilla et al., 2005). People still struggle to reach the required levels of physical activity, despite the fact that there is evidence to suggest that it can help both prevent as well as treat hypertension. It has been demonstrated that psychosocial variables have an impact on healthy adults' achievement and maintenance of exercise behaviour (Ayotte et al., 2010; McNeil et al., 2006).

Exercise prescription for hypertensive patients is shockingly low, such as adherence to exercise training programmes and maintenance rates, despite the incontestable positive effects of exercise on the prevention and treatment of hypertension. Despite the growing body of research demonstrating the advantages of exercise in the treatment of hypertension, exercise training is currently neglected (Lopes et al., 2021). Surprisingly, barely a third of primary care doctors advise their patients to engage in regular exercise as a kind of lifestyle therapy (Barnes & Schoenborn, 2012). Even in such cases where patients are exposed to exercise training programmes, regular maintenance of the routine tends to reduce with time. Within the first year of participating in such programmes, more than 50% of patients stop exercising regularly (Resurreccion et al., 2017; Saida et al., 2017). These rates emphasize the need to deepen our knowledge on modifiable personal, social, psychological, and environmental factors that help explain exercise participation among people with hypertension (Moore et al., 2006; Russell & Bray, 2010).

Self-Monitoring- An Essential Requisite for Hypertension Management

A crucial component of the diagnosis and treatment of hypertension is the monitoring of blood pressure. Self-monitoring of blood pressure by patients at home is one method by which they can take charge of their own health which results in modest but significant drops in blood pressure (Fahey et al., 2005). Although blood pressure control has gradually improved according to national surveys of adults in the United Kingdom after the 1990s, many patients are still uncontrolled, and the situation is worse for those who are most at risk, such as those with other comorbidities (Craig & Mindell, 2008).

In their study, Baral-Grantet et al. (2012) reported that only 293 of the 955 hypertensive patients from England undertook self-monitoring of blood pressure at home. This translates to a crude 30.7%. In comparison to those who did not self-monitor, those who did so were found to be younger (18–60), employed (full- or part-time), and of a minority ethnic origin (Asian, Black, or other ethnic groupings). Additionally, it was discovered that among people who had type 2 diabetes mellitus as a co-morbid condition, those who checked their blood glucose levels were more likely to monitor their blood pressure than those who did not. People between the ages of 18 and 60 were 1.5 times more likely than those older than them to monitor their own blood pressure.

In Asia, little investigation has been done on home blood pressure monitoring. In a cross-sectional survey of 1915 hypertensive patients in Shanghai, China; 1011 (52.8%) people reported using home blood pressure monitoring (Wang et al., 2014). Although hypertension is the most prevalent modifiable risk factor for cardiovascular disease, managing hypertension is still a significant concern across Asia. Despite this evidence, Asia has been slow to adopt it. Japan and Korea have invested heavily in home blood pressure monitoring research, but there is a dearth of data elsewhere in the eastern countries. This may

be because healthcare provision varies across countries in Asia, and research funding also fluctuates (Chia et al., 2017).

Hypertension is known as a *silent killer*. Failure to monitor blood pressure regularly places the patient at risk. This can happen even though the patient has complete medication adherence because, sometimes the medication may not be successful in controlling high blood pressure. Left unmonitored, such sudden raise can go unnoticed due to the asymptomatic nature of the disease leading to a sudden adverse event such as a paralytic stroke or a cardiac attack which could even turn out to be fatal.

Uncontrolled blood pressure leads to increased end organ damage, cardiovascular events, dementia, loss of quality of life, disability, and death (Burnier & Egan, 2019). Thus, to effectively control blood pressure, proper adherence to long-term hypertension treatment should be monitored (Hennein et al., 2018). Home monitoring of blood pressure should not have been a problem during COVID 19 pandemic for those who have an electronic Blood Pressure monitoring apparatus at home.

Hypertension Management Through Stress Management

According to previous literature, long-term stress exposure may contribute to elevated blood pressure. Uncontrolled blood pressure has a substantial correlation with psychological stress. During three to seven years of follow-up, chronic stress caused by financial difficulty has been shown to predict high blood pressure (Steptoe et al., 2005). According to Rosengren et al. (2004), there are significant correlations between myocardial infarction cases and increased recurrent home stressors, a higher number of severe financial stressors, and higher stressful life events when compared to controls. The study included 11,119 cases and 13,648 controls from 52 different countries. Psychosocial stress had a same degree of impact on myocardial infarction risk as conventional cardiovascular disease risk factors such as

smoking, obesity, diabetes, and hypertension. Stress may also elevate blood pressure indirectly through another route. Blood pressure may raise as a result of stress being linked to risk factors like obesity, smoking, alcoholism, and a sedentary lifestyle (Gasperin et al., 2009).

A thorough review and narrative synthesis of 53 qualitative studies from 16 countries was performed by Marshall et al. in 2012. The countries included were the United States, the United Kingdom, Brazil, Sweden, Canada, New Zealand, Denmark, Finland, Ghana, Iran, Israel, Netherlands, South Korea, Spain, Tanzania, and Thailand. A majority of the participants believed that stress was the primary cause of hypertension and that this condition was characterised by symptoms including headache, dizziness, and perspiration. Intentionally reducing or stopping treatment without contacting a healthcare professional was common among participants. Participants frequently believed that treatment was unnecessary when symptoms subsided or when they were not under stress because their blood pressure naturally improved during these periods. Further, participants feared addiction and disliked the treatment's adverse effects. These results held true across nations and racial groups. The cost of clinician visits and healthy food, the inability to find time to take the medication or visit the doctor, a lack of health insurance, forgetfulness, and a lack of funds were some other external reasons mentioned by participants as barriers to adherence.

According to a qualitative study by Krishnamoorthy et al. (2019), psychological issues and stress that causes forgetfulness, social isolation, and neglect are key obstacles to treatment adherence in non-communicable diseases. Another Indian study identified stress as a significant impediment to hypertension management. In their qualitative investigation, Dey et al. (2022) discovered that the majority of hypertensive cases were linked to unexpressed and permanent emotional burdens and worries about personal or financial troubles. Women were typically under more stress than men because of issues with their families. A review of

the patients' medical records also showed that the patients' blood pressure and blood sugar levels significantly increased when stressful life events occurred.

Chronically high cardiovascular reactivity has been linked to coronary heart disease, hypertension, and stroke development, according to research (Everson et al, 2001; Henderson & Baum, 2004; Manuck, 1994). Studies have consistently looked at various common work-related factors such as job instability, strain and control (job quality), contentment, salaries, work hours, and perceived workplace unhappiness and have found that work-related stress is linked to the development of hypertension. Previous studies have also demonstrated how stress could affect blood pressure, lipids, haematocrit (quantity of red blood cells in blood), fibrinogen (a protein that helps in the formation of blood clots in the body), and blood fluidity. The sympathetic nervous system may become abnormally activated as a result of mental stress, which can lead to hormonal cascades that interfere with blood pressure, enhanced coagulation, and platelet activity—factors that might serve as "triggers" of cerebrovascular events (Hirokawa et al., 2016; Jönsson et al., 2015; Marazziti et al., 1990/). A recent review of the literature highlighted the connections between higher risk of hypertension and factors like unemployment, long work hours, job instability, low pay, and stress at work (Cuffee et al., 2014).

Impact of Stress on Adherence:

Patients' adherence to both pharmacological and non-pharmacological therapy is essential to the management of hypertension, and it has been discovered that unpleasant emotions may negatively affect this behaviour (Duvdevany et al., 2011). The stress related to a chronic medical condition may have an impact on how adherent individuals are to their medications (Kretchy et al., 2014). Chronic stress may accelerate biological ageing, physiological changes, and premature health deterioration, sometimes known as

"weathering," in people (Geronimus et al., 1991). Allostatic load, which is the chronic over- or under-activity of allostatic systems, may be exacerbated by long-term stress (McEwen, 1998). The continuous circulation of stress hormones and inflammatory cytokines (molecules that promote inflammation) in the body brought about by the repeated activation of these systems raises the risk of cardiovascular disease by fluctuating blood lipids, blood pressure, and inflammation in the human body.

There is a paucity of data linking stress and medication adherence in the management of essential hypertension, despite empirical evidence demonstrating the significance of stress in the initiation and progression of the condition (Kulkarni et al., 1998). Kretchy et al. (2014) discovered in their study on hypertensive adults that anxiety symptoms were experienced by 56%, stress symptoms by 20%, and depressive symptoms by 4% of the hypertensive patients. Among the participants, stress was also linked to medication non-adherence ($p = 0.03$). Individuals who were under stress had a higher likelihood of not adhering to their medications than patients who were under little or no stress.

In a study of Black women with hypertension ($n = 561$), Kang et al. (2018) discovered a correlation between stress and higher systolic blood pressure ($p = .02$) and poor blood pressure control ($p = .04$). Women who experienced more stress also showed less non-pharmacological adherence, such as adherence to a healthy diet and regular exercise ($p = .042$). Additionally, it was discovered that non-pharmacological adherence mediated the link between stress and blood pressure regulation. Although there was a negative correlation between stress and non-pharmacological adherence, there was no correlation between stress and pharmacological adherence, presumably emphasising the impact of stress on the recommended antihypertensive diet and exercise as opposed to medication.

Hypertension Management During the COVID-19 Pandemic

While under normal conditions, managing the intricacies of chronic disease management is rarely effortless, the unique obstacles imposed by the COVID-19 pandemic significantly heighten this challenge. The pandemic has limited ancillary testing (such as blood work, imaging, and physical examinations) and other clinical processes, placing a pressure on healthcare systems around the world. Governments all over the world also imposed restrictions on the use of hospital and ambulatory services since March 2020 by discontinuing all elective, routine, and non-urgent patient procedures, enforcing stricter physical distancing measures, and implementing remote care to redirect resources to the urgent care of COVID-19 patients (Eccleston et al., 2020). This has made it more difficult for those with chronic diseases to seek primary and specialist treatment in a timely and efficient manner (Deer et al., 2020; The Lancet Respiratory Medicine, 2020; Weinstein et al., 2020). There is still a great deal of uncertainty around the care and treatment of people with chronic diseases as the COVID-19 pandemic continues to progress (Hacker, 2021).

Low Priority for Routine Check-Ups and Monitoring

Daily living as well as normal medical care, particularly the management of chronic disorders like hypertension, have been interrupted by the coronavirus disease (COVID-19) pandemic (Laffin et al., 2022). With a higher number of chronic illnesses present, especially in the elderly population, the risk of hospital admission for an adverse event rises (Hajat & Stein, 2018). Undeniably, hospitals have noted a decline in the number of people suffering from myocardial infarctions and cerebrovascular accidents who visit emergency rooms (Garcia et al., 2020; Morelli et al., 2020). Given the reports of individuals with acute myocardial infarctions presenting themselves later than expected, it is likely that people are avoiding the hospital out of fear of contracting the virus while exposed to the hospital

environment (Tam et al., 2020). We must focus on the coronavirus while also keeping these other, potentially fatal chronic conditions in mind. Management of chronic illnesses like diabetes and hypertension have been impacted, in addition to the acute disorders during this pandemic and therefore, it is crucial to regularly check blood pressure and blood glucose levels. This is even more crucial since COVID-19 complications may be more likely to develop in persons with diabetes and hypertension (Richardson et al., 2020).

The nature of hypertension is such that it is affected by stress. The vulnerability to COVID-19 among hypertensives has been one of the major sources of stress during the pandemic. Thus, with higher likelihood of fluctuations in blood pressure due to such stress called for a higher need for medical care which was in fact not available to the patients. Higher stress has been linked to an increased risk of atherosclerosis, hypertension, and recurrent coronary heart disease in people with chronic cardiovascular disorders (Black & Garbutt, 2002; Lovallo & Gerin, 2003), especially given the 40–50% higher frequency of recurrent coronary heart disease (Steptoe & Kivimaki, 2012). According to a US cross-sectional study, people with chronic diseases experience higher levels of stress than the general public because they are more likely to suffer negative health effects from a COVID-19 infection (Umucu & Lee, 2020).

The fluctuations in blood pressure were evident from some of the studies that compared the blood pressure during and pre-COVID-19 phase. In a recent study by Gotanda et al. (2022) in the United States of America, the level and trend of blood pressure outcomes among adults with hypertension (n=137 593) were compared before the public health emergency declaration of COVID-19 (pre-pandemic period: August 2018 through January 2020) and after the stay-at-home orders (pandemic period: April 2020 through November 2020). An interrupted time series analysis showed worsening blood pressure outcomes during the COVID-19 pandemic. Early in the pandemic, the number of BP measures significantly

decreased, and subsequently it steadily increased. Systolic and diastolic blood pressure increased throughout the pandemic period compared to the pre-pandemic period by 1.79 mmHg ($p < 0.001$) and 1.30 mm Hg ($p < 0.001$), respectively. Similar to this, there was a 3.43 percentage points ($p < 0.001$) drop in patients who had regulated blood pressure.

In a study by Laffin et al. (2022) participants in a US employer-sponsored wellness programme were studied to examine blood pressure variations during the pandemic. Employees and their spouses/partners from all 50 states and the District of Columbia were included in this longitudinal study. In all the three years examined, participants had to have their blood pressure tested by healthcare professionals (2018–2020). For comparisons between the pre-pandemic (January 2019–March 2020) and pandemic (April–December 2020) periods, the yearly blood pressure changes for 2019 versus 2018 and January to March 2020 versus 2019 and April to December 2020 versus 2019 were measured. Systolic and diastolic blood pressure changes did not differ between 2019 and January to March 2020 ($p = 0.8$ for systolic and $p = 0.3$ for diastolic BP). In contrast, the annual increase in blood pressure from April to December 2020 was significantly larger than it was in 2019 ($P < 0.001$ for both systolic and diastolic BP). Systolic and diastolic blood pressure increases occurred in both men and women and across all age groups during the pandemic period; larger increases were seen in women for both systolic and diastolic BP, in older participants for systolic BP, and in younger participants for diastolic BP ($p < 0.001$ for all).

Hypertensives Identified as a High-Risk Group for COVID-19

According to preliminary statistics from China and the United States, at least 30% to 49% of patients admitted with COVID-19 had hypertension, making it the most common concomitant condition among them (Richardson et al., 2020; Zheng et al., 2020). Patients with hypertension who acquire COVID-19 are more prone than those with normotension to

be hospitalised (Garg et al., 2020). Additionally, it appears that having hypertension is linked to adverse COVID-19 outcomes (Li et al., 2020). Since data have shown that individuals with multiple comorbidities are likely to fare poorly, it is unclear if hypertension itself causes the increased morbidity or whether people with hypertension have more underlying health issues (Yao et al., 2020).

Chronically ill people have been shown to have a greater prevalence of comorbid mental disorders like depression, anxiety, and chronic stress (Cohen et al., 2020; DeJean et al., 2013; Hajat & Stein, 2018; Roberts et al., 2015). Consistently, they describe increased social isolation, future uncertainty, and guilt related to the actual or perceived physical and psychosocial limitations of their illness. These three consequences, which the COVID-19 pandemic may worsen, can increase the morbidity of their chronic illness, resulting in a vicious pattern (DeJean et al., 2013; Shanthanna et al., 2020).

The COVID-19 Pandemic and Adherence Among Hypertensives

Multiple studies have indicated the deterioration in adherence in hypertensive persons during the COVID-19 pandemic. During the COVID-19 pandemic, a study by Shimels et al. (2021) looked at the extent and contributing factors of poor medication adherence among diabetic and hypertensive patients accessing public health centres in Ethiopia. A sample of 409 patients were included in the study. Findings indicated that 40% of the patients were of the opinion that the COVID-19 pandemic had negatively impacted their access to medications and follow-up appointments, while 39% thought that the cost of medications had increased or had become unaffordable as a result of the global health emergency. In addition, 72% of the sample had poor drug adherence. Contrary to the likelihood of visiting a health centre (Adjusted Odds Ratio (AOR): 1.71), the existence of comorbid conditions (AOR: 2.05), and recent history of drug abuse (AOR: 11.57), patients with extreme poverty were

more likely to have good medication adherence (AOR: 0.59). This may be due to the fact that all patients in Ethiopia currently living below the poverty line (45.7% of respondents) are exempt from paying insurance premiums, which may increase their likelihood of using healthcare services and increase their access to medications.

Another study from Eastern Ethiopia (Abdisa et al., 2022) examined the causes of poor medication adherence in a sample of 402 hypertension patients during the COVID-19 pandemic. In this study, there was a significant proportion of inadequate antihypertensive medication adherence among the participants (63%). Lack of formal education, comorbidities, the cost of medication, a lack of understanding of hypertension and its treatment, a poor patient-physician relationship, and the inaccessibility of medication during the COVID-19 pandemic were all factors that were significantly linked to poor adherence to antihypertensive medication.

D'Addario et al. (2022) discovered that antihypertensive lifestyle adherence had decreased during the COVID-19 pandemic in a study of hypertensive older persons in Italy (mean age = 70 years). About 70% of the sample reported a decrease in their physical activity. Regarding dietary modifications, there were two distinct behaviours seen: approximately 31% of the sample paid more attention to the quality of their food, whereas 21% of the individuals made worse dietary choices. Similar changes were found for alcohol consumption. Some participants increased alcohol intake (23%), while others reduced it (16%).

During the COVID-19 pandemic, da Luz Pádua Guimares et al. (2022) studied 281 hypertensive adults in Brazil to determine the rate of nonadherence to antihypertensive medication. They discovered that 48.4% of the people had uncontrolled blood pressure, and 41.3% had poor adherence to antihypertensive medication. Further, adherence was worse

during the pandemic than it had been previously. Another Brazilian study indicated that people with non-communicable diseases had more struggle fixing and keeping appointments with doctors, seeking medical care and medicines, and going through examinations and scheduled procedures / tests (Malta et al., 2021).

Though there is a paucity of research in India with respect to hypertension management during the COVID-19 pandemic, one study by Singh et al. (2021) attempted to evaluate the health, psychosocial, and economic implications of the COVID-19 pandemic on people with chronic diseases. Data from 1734 hypertensive and diabetic individuals were collected through telephonic surveys nationwide. Multivariable logistic regression analysis revealed that 83% of participants reported difficulty accessing healthcare during the COVID-19 lockdowns, 17% had trouble accessing medications, 59% reported loss of income, 38% reported loss of jobs, and 28% reduced fruit and vegetable consumption. A deterioration in diabetes or hypertension symptoms was linked to lack of access to medications and job loss. Qualitative results indicate that the majority of participants had trouble getting in-patient services and reported psychosocial distress as a result of losing their jobs or sources of income.

Stress Among COVID-19 Infected Hypertensives

Prior literature has indicated that COVID-19 causes more complications and mortality, especially in elderly people and people with diabetes, hypertension, and cardiovascular disease than in the general population (Pal & Bhadada, 2020). Moreover one-third of COVID-19 patients were found to have underlying comorbidities, the most prevalent of which were cardiovascular disease (14.4%), hypertension (18.6%), and diabetes (11.9%), according to a recently published meta-analysis (Rodriguez-Morales et al., 2020). Due to their immunodeficiency, individuals with these comorbidities may be more susceptible to

COVID-19-related problems than others (Guo et al., 2020; Renu et al., 2020; Yang et al., 2020). This underlines the necessity for people with hypertension to manage their chronic illness better, particularly in light of the current COVID-19 pandemic.

Research evidence shows that heightened levels of anxiety (Petzold et al., 2020; Rodríguez-Rey et al., 2020; Zhang et al., 2020), depression (Jacob et al., 2020; Pierce et al., 2020), and stress (Vindegaard et al., 2020) are common responses to the COVID-19 pandemic and the protection measures against it (Vindegaard et al., 2020). Women and those with chronic diseases are more likely to experience heavier psychological distress during the coronavirus pandemic. When infected with COVID-19, those who considered themselves to be in a high-risk group also displayed higher levels of anxiety, despair, and stress symptoms (Rodríguez-Rey et al., 2020). Additionally, high-risk patients took extra precautions and isolated themselves, which could ultimately lead to physical deconditioning (Jacob et al., 2020; Pierce et al., 2020; Vindegaard et al., 2020).

A study by Sensoy et al. (2021) showed a significantly higher average level of depression (24%) and a higher incidence of anxiety (44%) among persons with a history of the Covid-19 virus. Further, the presence of anxiety was associated independently with hypertension in the sample. It was also found that the described socio-demographic parameters and clinical characteristics had no impact on the symptoms of depression and anxiety.

During the COVID-19 state of emergency announced in Japan from 7 April to 31 May 2020, Kobayashi et al. (2022) studied 748 hypertensive individuals with respect to their blood pressure, diet, exercise, medication adherence, and stress levels in an effort to investigate a potential link between changes in daily stress and blood pressure in Japanese patients. It was found that blood pressure considerably raised from 136.5/78.2 to 138.6/79.0

($p < 0.001$) during the emergency. Around 58% of patients were concerned about the negative impact of hypertension as a condition contributing to the severity and weak prognosis of COVID-19. Further, 39% and 17% of patients, respectively, reported decreased physical activity and deteriorated diet compositions. However, with respect to medication adherence, no alterations were found.

Role of Social Support in Hypertension Management

Social support refers to the perception, reception as well as provision of care, love, and support from members of one's social network, that makes an individual feel valued and creates a sense of belongingness. Social support can be in the form of tangible material, financial assistance, emotional support (empathy), positive regard and / or providing information. Social support can be classified into formal support and informal support. Formal social support refers to the tangible / material or informational support provided by structured institutions such as the government, support groups, religious communities, etc. On the other hand, informal social support is provided by informal organizations, family members, friends, neighbours, etc. Indian culture has a strong inclination towards informal social support (Lu et al., 2020).

Ample social support and interaction between patients and their families has been shown to support the adoption of positive health activities and improve the quality of patients' lives, beyond the effective communication between healthcare providers and patients that plays a major role in medication adherence (Turan et al., 2018). Social support can come from friends, healthcare experts and organisations in addition to the support provided by family members (Ford et al., 1998). Due to its diverse nature, social support can assist patients in staying engaged in their care when they are faced with physical, social, or financial vulnerabilities (Adisa et al., 2017). Social support plays a crucial role in enhancing

the adherence behaviour of hypertensive patients which constitutes the major factor in management of the disease. Constant reminders, encouragement and imposition of restrictions and sanctions function as positive and negative reinforcement for strengthening adherence behaviour. In a sample of 538 hypertensive individuals in the Gaza Strip, Khadoura et al. (2021) sought to determine the prevalence of and identify the factors related with non-adherence to hypertensive treatment. The proportion of not taking medications as prescribed was 65.8% overall. After controlling for age, education level, quantity and frequency of antihypertensive medication doses per day, and comorbidities, only participant self-efficacy and social support remained substantially linked with medication non-adherence.

A study was undertaken in Central Ethiopia by Berhane and Worku (2020) to evaluate treatment adherence and associated variables. The study included 989 hypertension patients in total, of whom 36.0% had high adherence, 31.7% had medium adherence, and 32.3% had low adherence. Having family support, having a high perception of the severity of the disease, and having a high perception of the implications of hypertension were all found to be significantly and favourably correlated with treatment adherence.

Family Support

Family members can assist hypertension patients in several ways, such as encouraging them positively, monitoring their health, providing health-related information, assisting in times of crisis, and supporting their overall health care, including nutrition, exercise, and medication adherence. Additionally, family members can provide patients with strength and bravery, which helps them feel secure and supported during their chronic condition (dos Santos Costa & Nogueira, 2008). Family support can help patients feel more confident about their treatment and increase their sense of self-worth (Thomas et al., 2017). Family members

control one another's behaviour, provide advice and encouragement to act in a healthier manner, and help one another make better use of healthcare services as well (Cohen, 2007).

In a sample of 259 hypertensive patients from Turkey, Turan et al. (2019) discovered that adherence to pharmacological therapy increased favourably as patients' social support increased. Another Turkish study by Asilar et al. (2020) found a significant positive relationship between self-efficacy towards medication adherence and perceived social support. Kurniawati et al. (2019) sought to examine the connections between family support, medication adherence, and blood pressure control in hypertension patients. The findings demonstrated a strong correlation between family support and medication adherence, medication adherence and systolic blood pressure, and medication adherence and diastolic blood pressure. Thus, it is evident that family support is related to patient compliance with medication adherence and blood pressure.

Numerous advantages of both physical and mental health in the management of chronic illnesses have been associated with family social support (Gallant, 2003; Rosland et al., 2008). Family social support was positively associated with taking medication and keeping track of blood pressure levels in a study by Hu et al. (2015). According to Padhy et al. (2016), Indian women who were hypertensive had stronger overall social support than their male counterparts. Kapoor et al. (2021) report that participants with deceased spouses and those who lived alone had higher uncontrolled blood pressure, indicating a lack of social support. Patients in this group stated that their spouse or partner and adult children served as their primary sources of support. These results were consistent with those from earlier Chinese investigations (Wang et al., 2010; Zhu et al., 2012). The elderly is mostly supported by their family, with the spouse and adult children holding key responsibilities. In addition, patients feel that they receive little assistance from people apart from their family members, besides professional organisations. This could be as a result of the elderly not having access

to enough formal support services, which forces patients to rely on their children or spouse for informational, instrumental, and emotional sources of support (Zhu et al., 2012).

Furthermore, children's role as passive change agents in the efficient management of hypertension have been underlined by Monteiro and Hariharan (2019). Children are capable of implementing strategies, influencing circumstances in their favour, and adjusting to the resources and constraints that are available to them as agents of change.

The relationship between gender, dietary social support, compliance with a low salt diet, and blood pressure was explored by Wilson and Ampey-Thornhill (2001) in a cohort of African-American teenagers who are more likely to develop hypertension. According to the findings, adolescent girls who complied reported higher levels of dietary support from family members than did boys. On the contrary, boys who were compliant, as opposed to those who weren't, reported receiving less dietary support from family members. Participants that were compliant to a low sodium diet showed a tendency toward lower systolic blood pressure. These findings imply that stronger emotional support for diet from family members is linked to improved adherence, particularly in adolescent females at risk for developing hypertension.

Idowu et al. (2013) investigated the relationships between exercise and social support and self-efficacy in a sample of 212 hypertension patients in Nigeria. Most hypertension patients had low levels of physical activity when they were first diagnosed. Results revealed that self-efficacy and social support were positively correlated with physical activity, suggesting an increase in physical activity, as self-efficacy and social support increased. Among elderly people with hypertension, Putri et al. (2018) discovered a significant association between adherence to physical activity and family and social support. The strongest determinant of adherence to physical activity in older people with hypertension is family support.

It has been demonstrated that social support has a positive impact on the maintenance of exercise in people with chronic illnesses (Hu et al., 2015; Roessler & Ibsen, 2009; Sweet et al., 2012). Positive experiences and social engagement are provided to patients through professional and peer support.

Physician support

Patients with chronic illnesses such as hypertension who visit their physician at regular intervals establish a rapport with them. In affiliation-oriented cultures like India, the patients' relationship and dependence on the physicians go beyond the professional level where the advice or knowledge from the doctor is highly valued. Hence, the support from the physician constitutes a strong component in their health behaviour. More often than not, the informational support from the physicians helps in providing a strong cognitive base about the disease which plays an effective role in invoking and sustaining adherence behaviour.

These have been demonstrated to be crucial in behavioural change by fostering a welcoming environment and motivating patients to exercise (Roessler & Ibsen, 2009; Dunn et al., 2014; Martin et al., 2008). Receiving advice from doctors on healthy lifestyle behaviours tends to predict greater adherence to these behaviours in older people with hypertension (Alefian et al., 2019; Andjelkovic et al., 2017). The key to effective adherence is good communication and a strong doctor-patient connection.

Swain et al. (2015) looked at the impact of the communication between doctors and patients in relation to adherence to treatment for hypertension. They found that the effectiveness of communication had a significant impact on prognosis and adherence. The doctor's explanations of how anti-hypertensive drugs function to dilate blood vessels and how diuretics function to lower blood pressure aid patients develop a knowledge base, which in turn gives a rational basis for adherence behaviour. Strong motivation that results in good

medication adherence is generated by the informational support offered by healthcare providers. The most crucial aspects for patients in doctor-patient communication appear to be: letting them speak without interruption, speaking in a language they can comprehend, and paying attention to them (Witoniowska-Lonc et al., 2020). According to Alefan et al. (2019), patients' compliance with lifestyle advice like physical exercise was found to be predicted independently by lifestyle and self-management counselling.

According to the MOBILE study (Duclos et al., 2015), patients with an active doctor had controlled blood pressure levels that were four times higher than those of patients with an inactive doctor. This might be because active doctors encourage their patients to exercise. In addition to reassuring patients about potential health problems and showing interest in the patient's exercise training programme, the doctor encouraged active participants to exercise in this study. The importance of clinicians' informational support and doctor-patient communication has been highlighted by Andrew et al. (2014). They claim that good doctor-patient communication, including explanations, criticism, and the sharing of medical information, improves patients' adherence. Patients with low adherence received less information from their clinicians concerning their chronic condition. The health status of patients is negatively impacted by non-adherence due to communication gaps between doctors and patients, such as unidimensional decision-making and physicians' lack of patient knowledge.

In a sample of 180 healthy people, Bowen et al. (2014) sought to investigate the stress-reducing effects of functional social support on ambulatory blood pressure. The findings showed that the effects of temporary stress on predicting ambulatory blood pressure were mitigated by global support, emotional support, tangible support, and informational support. Informational support, which predicted both ambulatory systolic and diastolic blood pressure was the most consistent stress-buffering predictor of ambulatory blood pressure.

Hypertension Knowledge and its Contributions to Hypertension Management

Hypertension knowledge refers to the awareness of the aetiology, symptoms, risk factors, casualty, and treatment of the non-communicable disease – hypertension. Disease knowledge is useful in developing a robust cognitive base which provides a strong conviction for the effective management of a chronic illness (Andrew & Hariharan, 2017).

Numerous clinical, cognitive, emotional, behavioural, and demographic aspects might affect how a chronic illness is managed. When an individual receives a diagnosis of an illness or develops a health condition, they make an effort to understand it by gathering information about it. Subsequently, they manage the illness by drawing on their own prior experiences, knowledge, and beliefs as well as those of others in their social network (home, work, and other social settings) (Petrie & Weinman, 2006). Patient understanding of the health condition is crucial for improving compliance. Lack of information and awareness of blood pressure are significant barriers to adhering to antihypertensive medications, which can increase the prevalence of uncontrolled blood pressure. A patient's motivation to monitor their blood pressure increases when they are well-informed about their condition, which also promotes medication compliance and blood pressure control (Ogedegbe & Schoenthaler, 2008). Therefore, awareness of high blood pressure helps manage and prevent the impediments that it may give rise to (Malik et al., 2014).

Knowledge of Hypertension Among Patients

Being an asymptomatic condition, many hypertensives do not have the knowledge about their condition. The findings on Indian population in this aspect is alarming. It was found that 67% of hypertensives in South India are unaware of their condition (Mohan et al., 2007). More than 50% hypertension population are ignorant of their condition (Chockalingam, 2008; Witten et al., 2013). According to a US population survey (Abu et al.,

2018), more than two-thirds of people are unaware that once diagnosed, hypertension lasts a lifetime and that it can cause kidney disease in one-third of the sample.

According to a study by Jankowska-Polaska et al. (2016) on Polish hypertensive people, it was found that, 63% of the sample had little to no knowledge of the condition. Patients who had less knowledge of hypertension were more likely to be living alone (83.7%). The prevalence of ischemic heart disease was greater in the group with limited knowledge. Around 56.5% of patients with low knowledge levels had higher blood pressure (systolic > 140 mmHg and/or diastolic > 90 mmHg). Individuals with poor knowledge reported owning a blood pressure monitor less frequently than patients with high knowledge. The items on non-pharmaceutical treatments for hypertension received the highest percentage of incorrect answers from the group with poor knowledge levels.

With respect to investigation in Asia, one study by Rahmavati and Bajorek (2018) examined the levels of hypertension knowledge in an Indonesian sample and discovered that only 15% of individuals had strong hypertension knowledge (scoring 8 out of 10). Knowledge of hypertension was a good indicator of drug adherence. Busingye et al. (2019) made an attempt to study awareness of a rural South Indian population on the causes, symptoms, and risk factors of hypertension. Only 31% of the sample of 641 hypertensive adults recognised that having high blood pressure had a negative impact on one's health, and only 7% were aware of the advantages of treating high blood pressure. A total of 48% of participants and 30% of those who were aware of their hypertensive status did not know any of the risk factors for hypertension. Better understanding of the risk factors for hypertension was linked to being aware of one's hypertensive status, receiving treatment for it, being male, being younger, having education, being obese, and being physically inactive. In another Indian study, after controlling for age and sex, a large-scale study conducted in rural South

India (Ragavan et al., 2021) revealed that both knowledge and awareness were linked to the use of hypertensive treatment.

Hypertension Knowledge and Adherence

High levels of knowledge of hypertension have been linked to good lifestyle habits including reducing salt intake in food. A study by Karakurt and Kasikci (2012) demonstrated a statistically significant correlation between not adhering to prescribed medications and patients' ignorance about the complications of hypertension. Participants with less knowledge have been found to take their antihypertensive medications less consistently (Jankowska-Polaska et al., 2016). According to correlation analysis, factors with a significant impact on adherence were regular in blood pressure monitoring, keeping a self-control journal, adhering to non-pharmaceutical treatments (lifestyle modifications) for hypertension, and having a high degree of awareness about the condition.

The patients' understanding of treatment options, preventative measures, and complications of arterial hypertension was assessed by Paczkowska et al. (2021). The study examined the impact of this knowledge on treatment adherence for hypertension. A sample of 488 people with hypertension who were receiving treatment participated in the study. Results showed that education level and the location of medical care had a substantial impact on how much people knew about the disease. A high level of education was strongly linked to controlled blood pressure, the use of antihypertensive medications, the frequency of hospitalisations, medication compliance, and healthy lifestyle choices.

In another study, Geaney et al. (2015) investigated whether employees with greater nutrition knowledge had better diet quality and lower prevalence of hypertension. They found that, after controlling for age, gender, health status, lifestyle, and sociodemographic factors, nutrition knowledge was significantly correlated with diet. In the group with the highest

nutrition knowledge compared to the group with the lowest knowledge, the odds of having a high DASH score (better diet quality) were 6 times greater (OR = 5.8). When compared to employees with the lowest nutrition knowledge, those in the highest group had a 60% lower likelihood of developing hypertension.

Knowledge-based interventions have been found to enhance adherence in hypertensive populations. In a pilot study, Marseille et al. (2021) investigated the viability of a culturally specific education programme for Haitian immigrants with hypertension. A Haitian experienced advanced practise nurse dealing with Haitian immigrant communities gave a 45-minute-long one-on-one educational session to each participant as part of the intervention. The participants received knowledge about the definition of hypertension, its consequences, risk factors for cardiovascular disease, and knowledge on how to treat and manage the condition. The advanced practise nurse placed a strong emphasis on the necessity of adhering to the American Heart Association guidelines for controlling hypertension with regard to food, physical activity, medication adherence, and at-home blood pressure monitoring during these sessions. To encourage self-monitoring, the participants were instructed on how to use the at-home monitors and given the recommendation to test and report their blood pressure once day. Within six weeks of receiving the educational intervention and the at-home blood pressure monitor, a follow-up appointment was scheduled. As a result of the intervention, participants' systolic and diastolic blood pressure significantly decreased from 143.29 to 126.5 ($p < 0.01$) and 85.43 to 78.50 ($p < 0.01$), respectively. Additionally, there was an increase in medication adherence and awareness of hypertension as well.

In order to evaluate the varying effects of the form and frequency of a knowledge intervention on the management of primary hypertension, Andrew et al. (2022) conducted a study involving 256 hypertension patients who were selected through purposive sampling

from medical facilities in Hyderabad, India. The study used a quasi-experimental pre-test-post-test control group design. The intervention was delivered in two different formats: "Direct Interaction" (provided by the doctor) and "Audio-Visual" (delivered through an audio-visual presentation). Every form was shown at two different frequencies, single exposure, and double exposure. The knowledge intervention included key ideas from the Joint National Committee's (JNC-8) recommendations for managing hypertension. Overall adherence and its components (medication, diet, exercise, and self-monitoring) were shown to differ significantly amongst the groups. Regarding total adherence, adherence to medication, diet, and exercise, the control group significantly varied from all of the intervention groups. The adherence and blood pressure readings improved as a result of the knowledge intervention. It was also found that the blood pressure readings of the group that had double exposure in audio-visual form was ineffective, whereas on those who had double exposure through direct interaction was effective.

While ignorance is found to have an adverse effect on adherence, wrong information is also found to be a cause of low or no adherence. In India, a few studies on hypertension knowledge have been carried out. A sample of 833 individuals diagnosed with hypertension were studied by Sudharsanan et al. (2021) to examine the knowledge and beliefs about hypertension and the reported reasons for not using therapy. Around 28% of those with hypertension admitted to skipping daily medication. People primarily reported stopping daily use of medication because their blood pressure had stabilised. On the other hand, 43% of respondents thought that blood pressure drugs should occasionally be stopped. There were significant disparities in the consistency of antihypertensive medication use, which were closely related to one's understanding of antihypertensive drugs.

Low adherence and non-adherence are found to contribute to uncontrolled blood pressure and manifestation of clinical symptoms. Clinical symptoms include a list of

manifestations of which some of the most common are headache, palpitations, pain in the chest, nausea, and low sleep quality. Low sleep quality can be both the antecedent and consequence of raise in the blood pressure.

Sleep Quality and its Impact on Hypertension Management

Patients with hypertension have been proven to be more vulnerable to stroke and coronary heart disease, as well as other cardiovascular conditions (Faraco & Iadecola, 2013; Van den Hoogen et al., 2000). Inadequate sleep has been associated with hypertension and cardiovascular mortality (Cappuccio et al., 2011). A sufficient amount of sleep each night not only keeps the body functioning, but also guards against the negative effects of hypertension on the cardiovascular system. On the other hand, poor sleep may also steer an individual towards adopting health risk behaviours such as substance use, poor dietary choices, a sedentary lifestyle, etc. which may, in turn, have a negative impact on one's cardiac health. In fact, a recent study from Italy highlighted the association between poor sleep quality and engaging in unhealthy lifestyle practices (such as physical inactivity, avoiding fresh food, consuming caffeine, alcohol, and cigarette smoking) during the nation-wide lockdown at the time of the first COVID-19 pandemic wave (Bruno et al., 2022; Conroy & Arnedt, 2014).

The term "subjective sleep quality" refers to the individual's retrospective assessment of their sleep experience, which can be summed up as a global sleep status (Krystal & Edinger, 2008). Poor subjective sleep quality has been linked to considerably higher odds ratios (ORs) of hypertension, according to studies conducted in Asia (Lu et al., 2015) and Europe (Bruno et al., 2013; Kaya et al., 2014). In Asian (Liu et al., 2016; Osonoi et al., 2015) and European studies, inadequate sleep has also been linked to considerably higher levels of systolic blood pressure (SBP) and/or diastolic blood pressure (DBP) (Colbay et al., 2015; Van den Hoogen et al., 2000). Poor sleep quality may affect the dipping pattern of blood

pressure at night in addition, through its impact and disturbance of the circadian rhythm (Erden et al., 2010). The meta-analysis of Lo et al. (2018) found a strong correlation between poor sleep quality and a higher risk of hypertension. This association, when stratified by continents, was stronger in Asia but not in Europe.

The connection between poor sleep quality and its impact on blood pressure has been documented in previous literature. Studies have attempted to correlate sleep quality with resistant hypertension. It refers to the hypertension that is uncontrolled even after three antihypertensive medications of which one must necessarily be a diuretic. According to a study by Bruno et al. (2013), resistant hypertension is linked to poor sleep efficiency, increased sleep latency, and poor sleep quality. Women with resistant hypertension had a higher prevalence of poor sleep quality than women without non-resistant hypertension. Even after controlling for cardiovascular and psychological comorbidities, poor sleep quality remained an independent predictor of resistant hypertension in women.

In a study by Lu et al. (2015), a sample of 5461 Chinese adults were examined to see whether self-reported global sleep status, which included both qualitative and quantitative components, would be related to the prevalence of hypertension. The results of multivariate logistic regression showed that hypertension prevalence was associated with sleep status, which was defined as the combination of sleep duration and sleep quality, in males and in females aged 45 years or lesser, after controlling for cardiovascular parameters. In comparison to men with normotension, hypertensive men manifested more problems with sleep quality, and had a higher prevalence of sleep disorders as well. In comparison to normotensive female participants, hypertensive female participants showed poorer sleep quality and a higher prevalence of sleep disturbances. Male respondents' subjective sleep quality, sleep latency, sleep length, sleep disruption, use of sleep medicine, and daytime

dysfunction were all correlated with the prevalence of hypertension. However, this was not the case with female participants.

Karibam et al. (2022) conducted a study to compare sleep quality, oxidative stress levels, and heart rate variability (HRV) in Indian adults with and without hypertension. They discovered that people with hypertension had poor sleep quality and elevated levels of malondialdehyde - a marker of oxidative stress ($p < 0.001$). Lower parasympathetic activity ($p < 0.001$) and higher sympathetic activity were observed in the hypertensive patients. There was a considerably higher degree of oxidative stress, poorer sleep quality, and greater sympathetic nervous system activity in the hypertension group, exposing the participants to an increased risk of cardiac morbidity and mortality. In another study, Reddy et al. (2018) discovered that in an adult sample from Hyderabad, India, men with hypertension had poor sleep quality compared to those with normal blood pressure.

Sleep Quality and Adherence

Zhang and Tan (2019) are one of the few researchers who have investigated the role of compliance with treatment in the sleep quality of hypertensive individuals in China. The sample consisted of 551 hypertensive individuals (30-96 years) who completed assessments related to sleep quality and compliance. Pearson's correlation indicated that those with a healthy lifestyle and high compliance experienced better sleep quality.

The essential components of hypertension self-care include adherence to antihypertensive medication, a low-salt and low-fat diet, regular exercise and stress management. Each of these components has been found to be connected with sleep quality. In the recent past, Shalimova et al. (2021) have established that antihypertensive drugs like ACE inhibitors and diuretics promote sleep quality. Good sleep quality has also been associated with the consumption of a healthy diet and a Mediterranean diet (Flor-Alemany et al., 2020;

Godos et al., 2021). Furthermore, exercise and physical activity have also been found to result in improvements in subjective sleep quality (Kline, 2014).

The negative impact of stress on sleep quality has been well documented in the pre-pandemic years. A study by Herawati and Gayatri (2019) showed that students experiencing poor sleep quality were 4.7 times more likely to experience higher stress as compared to those with good sleep quality. Huang et al. (2011) found that nondipping hypertension (less than 10% reduction in night-time blood pressure) was strongly associated with poorer sleep quality, high stress, and an increased activation of the sympathetic nervous system. An emerging body of literature has identified a unique personality trait that helps in cushioning the adverse effects of high stress levels on individuals. The personality trait of hardiness has been found to provide protection in the face of severe stress (Stein & Bartone, 2020).

Health Hardiness and its Effect on Hypertension Management

Kobasa was one of the first researchers to discuss hardiness, which acts as a source of resistance to deal with stressful life circumstances (Sheard & Golby, 2007). Hardiness is useful for sustaining good health, enhancing performance under stress, and raising quality of life (Bahamin et al., 2012). Pollack developed the concept of health hardiness drawing from Kobasa's idea of hardiness. People with health hardiness employ appropriate coping mechanisms to deal with illness, make the most of their resources, and frequently re-evaluate health stressors as opportunities for learning and growth rather than as harmful threats. They also appraise events positively (Brooks, 2008).

Hardiness was identified by Kobasa and Maddi (1977) as a personality construct consisting of three key elements: commitment, control, and challenge. According to literature, those who are hardy, perceive stressful situations as less dangerous and more manageable, and they also employ more efficient coping mechanisms than their less hardy

counterparts (Maddi, 1999; Zakin et al., 2003). Kobasa suggested that hardy people have a clear sense of direction, an active response in stressful situations, and a sense of confidence and control that lessens the intensity of potential risks and dangers, after summarising the findings of more than two decades of study on hardiness (Zakin et al., 2003).

The personality trait known as "health-related hardiness" enables people to adjust to current or future health issues through control, commitment, and challenge (Pollock, 1989a). The first global personality trait found to moderate the stress-illness relationship was hardiness (Pollock & Duffy, 1990). In 1979, Kobasa discovered that people who encounter high levels of stress without falling sick have a different personality structure than others who become ill under pressure. Hardiness was the term used to define this personality trait (Kobasa, 1979). It is hypothesised that having the hardiness trait (control, commitment, and challenge) will help people stay healthy even when they experience situations that are typically thought of as stressful (Kobasa et al., 1982). Very few studies have looked at the connection between hardiness and treatment compliance in chronic illness, apart from Pollock's research on hardiness and adaption to a chronic illness.

Health hardiness is considered an important component in hypertension management because, the components of control, commitment and challenge are closely related to the patient's attitude, health beliefs and health behaviour, which are essential contributors to adherence or compliance. Hence, hardy personalities are likely to have higher clinical adherence and thus manage their illness better and minimise the impact on health, quality of life and wellness.

A meta-analysis carried out by Brooks (2003) reported that higher levels of hardiness had positive outcomes in patients with chronic illness. Pollock (1986) observed that the presence of the hardiness characteristic was significantly correlated with adaptation in a small

sample of adults with diabetes. People higher in hardiness reported significantly lower psychological distress levels, higher perceived quality of life, and more positive core personal beliefs than people lower in hardiness, in a sample of HIV-AIDS affected participants (Farber et al., 2000). Findings from a study by Nicholas and Leuner (1999) suggest that hardiness and social support were significantly related to perceived health status in older African-American and Anglo-American adults with heart disease and arthritis. Another study by Pollock et al. (1990) found that hardy adults with different chronic illnesses were reported to be more likely to participate in patient education programmes, and this was related to their better physiological functioning (Pollock et al., 1990).

It is evident that there is a paucity of contemporary work addressing the link between health hardiness and hypertension, however, prior literature does indicate the positive role of health hardiness in Type II Diabetes Mellitus. In a study by Trail Ross (1991), treatment compliance was investigated in a sample of 50 American patients belonging to the older population, with Type II Diabetes Mellitus. The study looked at whether the hardiness personality trait affects treatment compliance in diabetes. The outcomes showed a strong link between the compliance and hardiness measures. The overall health-related hardiness scores explained 36% of the variance in the compliance score. Despite being a homogeneous group, the study's sample size was too small to be regarded as representative of the overall population.

In order to ascertain the association between health-related hardiness, patient attitude toward compliance, and self-care adherence to physical activity among people (N=155) with diabetes, Navuluri (2001) carried out a correlational study. Significant positive correlations between health-related hardiness and adherence to physical activity were found. While the association between the control dimension of hardiness and adherence was not significant, there was a significant positive relationship between the commitment and challenge

components of health hardiness and adherence to physical activity. It was proposed the people who exhibit a higher level of commitment or challenge may follow medical professionals' advice more closely than people who exhibit a higher level of control.

Hardiness has been linked in very limited studies, to reduced blood pressure (Maddi, 1999). In a study by Hasel and Besharat (2011); physiological responses such as systolic blood pressure, diastolic blood pressure, and respiratory rate were all inversely linked with hardiness. Further, Kim (1998) studied the connection between compliance, self-efficacy, and hardiness in people with coronary artery disease. It was found that under stress, those with higher levels of hardiness had lower systolic blood pressure. It should be mentioned that more cross-cultural and randomised studies are needed to establish the association between hardiness and illness management and particularly hypertension management. However, the available research certainly indicates a positive relationship between the two.

Theoretical Framework

Hypertension is a serious non-communicable disease that can turn into a life-threatening condition in the absence of optimal management. Management, in this context refers to self-management, a health behaviour, that involves complying with the prescribed medication(s), diet, exercise and self-monitoring of blood pressure and its symptoms. The arrival of the COVID-19 pandemic created several challenges (such as shortage of medical supplies, closure of fitness centres, confinement in the house, restricted access to medical facilities, etc.) hindering the optimal management of hypertension. Hypertensives were classified as a vulnerable group during this time, owing to the likelihood of them developing severe complications if infected by the coronavirus. This necessitated extra self-care on their part.

As a result of hypertensives being labelled an ‘at-risk’ group during the coronavirus pandemic, the perceived severity and susceptibility increased. The perceived barriers of hypertension management were also high at this time. Parallely, the perceived benefits of engaging in hypertension management (health behaviour) were also high. These four factors (perceived severity, perceived susceptibility, perceived barriers and perceived benefits) determined the health behaviour (in this case, hypertension management) of an individual. On the basis of this, the Health Belief Model developed by Rosenstock (1966) has been adopted as the theoretical framework for this study.

The Health Belief Model (HBM) has been used in past studies to examine the factors that influence hypertension management and control (Kamran et al. 2014; Ma, 2018; Puspita et al., 2017). This theoretical framework that aims to explain and predict health behaviours by understanding individuals' beliefs and attitudes towards health and illness. The HBM proposes that an individual's decision to engage in health-promoting behaviours is influenced by four key factors: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. In addition to these four key factors, the HBM also takes into account cues to action, which are external factors that prompt individuals to take action towards health behaviour change.

Perceived susceptibility is an important factor in hypertension management. Individuals who perceive themselves as being at higher risk for hypertension-related complications during the COVID-19 pandemic are more likely to take action to manage the condition. Perceived severity is also an important factor, as individuals who believe that uncontrolled blood pressure during the pandemic has grave consequences that may even lead to mortality, are more likely to take steps to manage their condition. Perceived benefits and perceived barriers are other factors that influence hypertension management. Individuals who perceive that the benefits of hypertension management, such as reduced risk of heart disease,

controlled blood pressure, reduced risk of COVID-19 complications outweigh the barriers, such as the cost of medication or lifestyle changes, are more likely to take action to manage their blood pressure. Cues to action, such as reminders from healthcare providers or family members, can also motivate individuals to take action to manage their blood pressure. Overall, the Health Belief Model provides a useful framework for understanding the factors that influence hypertension management and control.

Rationale

Less than one in five individuals manage to maintain optimal blood pressure regulation, according to global data (WHO, 2019). Suboptimal management of hypertension is the main cause of uncontrolled blood pressure. In the year 2020, the arrival of the COVID-19 pandemic brought about a new normal, altering many facets of one's existence. The pandemic posed a new but severe challenge to hypertension patients by listing them in the vulnerable group. The hypertension patients who, because of its asymptomatic characteristics are quite complacent about their health condition, were suddenly awakened to the seriousness of their condition, finding themselves bracketed into the high-risk group for the virus that invaded the globe without a known cure or prevention. This itself is a strong reason for them to experience severe stress, and anxiety.

Added to this, the other regimentations concomitant with the lockdowns and social distancing brought a new set of behavioural demands (such as wearing a face mask, washing hands at regular intervals, social distancing, etc.) on people. Hypertensive adults were unable to go for regular health check-ups when their BP shot up and were also unable to attend to health exigencies due to restricted access to healthcare and transport. The healthcare system shifted its attention entirely to individuals who tested positive for COVID-19, which resulted in individuals with hypertension and other non-communicable diseases having no place to seek medical attention. These features of the pandemic were bound to have added to the

stress of the hypertensives which is one of the major contributing factors in triggering blood pressure levels. Thus, hypertensives, on the one hand, were labelled as a high-risk group, while a better care of their hypertension was a challenge due to lockdowns and related nationwide restrictions. Management of hypertension was affected due to a lack of adherence to diet, physical exercise, poor sleep quality, irregularity in consumption of medicines, and lesser visits to the clinics for blood pressure monitoring.

Documentation of hypertension-related data in the Indian healthcare scenario is poor. Hypertension management, is measured only in terms of pharmacotherapy in most studies. The other aspects of management (such as lifestyle modifications and self-monitoring) are not given due importance. Given the success rate of pharmacotherapy only up to a certain extent, following the prescribed lifestyle modifications goes a long way in controlling blood pressure. Therefore, it is necessary to examine hypertension management from a holistic perspective, more so during the challenging times of the COVID-19 pandemic.

India being an affiliation-oriented country, relies highly on social support. During the COVID-19 pandemic, there was a shortage of social support (a major contributor to hypertension management) due to the government-imposed lockdowns and quarantines. Though the world was connected virtually, this did not compensate for the in-person support received from one's social network. It is likely that coping with such new changes may have impaired hypertension management. The present study attempts to address all these gaps by comprehensively examining the factors that facilitated and hindered hypertension management during the COVID-19 pandemic. Thus, the study of psychosocial correlates of hypertension patients during the pandemic of COVID 19 assumes great significance.

In order to do this, the following research questions, objectives, and hypotheses were framed:

Research Questions

1. What are the various psychosocial factors that contribute to management of disease in hypertension patients during the COVID-19 pandemic?
2. Does the impact of psychosocial factors on hypertension management follow a pathway?

Objectives

1. To explore the contribution of psychosocial factors towards hypertension management in hypertensive adults during the COVID-19 pandemic
2. To track a pathway between psychosocial factors and hypertension management in hypertensive adults during the COVID-19 pandemic

Hypotheses

1. Psychosocial factors will contribute to hypertension management during the COVID-19 pandemic
2. There will be a difference in blood pressure readings of hypertensive adults based on demographic and health-related factors
3. There will be a difference in hypertension clinical symptoms of hypertensive adults based on demographic and health-related factors
4. There will be a difference in hypertension compliance of hypertensive adults based on demographic and health-related factors
5. There will be a difference in sleep quality of hypertensive adults based on demographic and health-related factors
6. The psychosocial factors that contribute to hypertension management will follow a pathway

Chapter III

METHOD

Chapter III

Method

This chapter portrays (a) the plan and design of the study, (b) Sample (c) tools and (d) the procedure

Plan and Design

The design of the study is presented in a tabular form in Table 3.1 which gives all the details at a glance.

Table 3.1

Design of the Study

Measures	Authors	Dimensions	Sample Details			
			Phase	Technique	Size	Participants
1. BP Readings	Developed for the study	-	Pilot Study	Purposive Sampling	97	Men and women within the age bracket of 30 years – 60 years diagnosed with primary hypertension from different states of India
2. Hypertension Knowledge Test	Andrew and Hariharan (2017)	4	Main Study	Snowball Sampling	406	
3. Medical Outcomes Study Social Support Instrument	Sherbourne and Stewart (1991)	4				
4. Revised Health Hardiness Inventory - 24	Gebhardt et al. (2001)	4				
5. Sleep Quality Scale	Yi et al. (2006)	6				
6. Hypertension Compliance Scale	Swain and Hariharan (2013)	4				
7. Hypertension Clinical Symptoms	Developed for the study	Unidimensional				
8. COVID-19 Pandemic Stress Scale	Developed for the Study	9				

The primary objective of this study is to study the management of hypertension among adults during the pandemic of COVID-19 in order to identify the psychosocial factors associated with hypertension management during this period. The plan and design of the study complied with this objective. In order to fulfil this, a correlational design with a cross-sectional approach was adopted within a quantitative research design (Creswell & Creswell, 2017). A thorough literature search resulted in the identification of eight variables that may contribute to hypertension management. Accordingly, the tools to be used are identified/developed for the study and the sample was chosen to suit the objective of the study. Table 3.1 presents that the study used a total of seven tools and took the self-reported blood pressure readings of the participants. The table depicts the number of dimensions each tool comprised of. The table also reveals that the study was carried out in two phases, viz- pilot study and the main study. A sample of 97 participants were taken for the pilot while the main study was conducted on a sample of 406 men and women from various parts of the country. A mixed sampling technique of purposive sampling and snowballing was used. The following pages describe the sample, tools, and the procedure in detail.

Phase I – Pilot Study

Based on Johanson and Brooks' (2010) suggestion for the need of a pilot study, Phase I of the study was conducted on a small sample ($N = 97$) with three objectives: (a) to test the efficacy of the tools, (b) to test the feasibility of the proposed research design and (c) to assess the accessibility and availability of the sample. Reliability and validity of the tools were established before proceeding with the main study.

The results of the pilot study suggested that the tools were working well with the sample. Hence, no changes were suggested in the format or items of the tools.

Phase II – Main Study

The main study consisted of a sample of 406 men and women from different Indian states.

Participants

Separate sets of samples were drawn for the pilot study and the main study.

Demographic Characteristics of the Pilot Sample:

A total of 97 men and women within the age group of 30 to 60 years were included in the sample. The mean age of the sample in the pilot study was 50.54 years (SD = 7.10). The sample consisted of 54.6% women and 45.4% men. They belonged to various levels of education (12.4% literate, 23.7% high School - intermediate, 40.2% are graduates while 23.7% are postgraduates or above). They belonged to occupations such as Freelancing/Business (24.7%), Govt employee (17.5%), Private Sector Employee (13.4%) or no occupation (44.3%). From among the sample 86.6% belonged to urban and 13.4% to rural areas. The illness duration of the sample varied from less than 1 year to 10 years and above. (0 to 4 years: 32%, 4 to 10 years: 42.3%, 10 years and above: 25.8%). The self-reported financial status of the participants was taken. According to this, 4.1% belonged to a low financial status, 85.6% belonged to a moderate financial status and 10.3% belonged to a high financial status. Of the 97 participants, 46.4% reported having a single source of income while 53.6% reported multiple sources of income.

Demographic Characteristics of the Main Sample:

The sample for the main study consisted of individuals diagnosed with hypertension. Purposive sampling technique and snowball sampling technique were used to collect data from participants. The inclusion and exclusion criteria for recruiting the sample for the main study are delineated below.

Inclusion Criteria

(a) Individuals diagnosed with essential / primary hypertension, (b) Individuals within the age range 30 – 60 years, (c) Individuals willing to participate and sign the informed consent form.

Exclusion Criteria

(a) Individuals with physical or psychological disability, (c) Individuals with secondary hypertension, or any terminal illness as a comorbid condition.

The sample size for the study was planned to be 400. However, since low response rate of web-based data collection methods was expected (Nair & Adams, 2009), data was collected from 576 hypertensive adults. Out of the 576 participants approached, 155 dropped out, resulting in a response rate of 73%. Next, Mahalanobis distance was used to check multivariate normality and this resulted in the elimination of 15 cases. The final sample consisted of 406 participants. The demographic characteristics of the participants are presented in Table 3.2.

Table 3.2*Demographic Characteristics of Participants (n = 406)*

Variables	<i>f</i>	%
Age Range: 30 – 60 years (M = 49.58, SD = 8.86)		
Gender		
Men	191	47
Women	215	53
Marital Status		
Married	376	92.6
Unmarried	30	7.4
Educational Status		
Below Graduation	109	26.8
Graduate	181	44.6
Post-Graduate and Above	116	28.6
Occupation		
Freelance / Business / Start-up Owner	76	18.7
Employee at a Government / Public Organization	85	20.9
Employee at a Private Organization	86	21.2
No Occupation	159	39.2
Work Location		
Work from Home	87	21.4
Work from Office	160	39.4
Not Employed	159	39.2

Residence

Urban	365	89.9
Rural	41	10.1

Illness Duration

4 years or less	141	34.7
4 – 10 years	172	42.4
10 years and above	93	22.9

Comorbidities

Present	174	42.9
Absent	232	57.1

Financial Status

Low	14	3.4
Middle	361	88.9
High	31	7.6

Number of Sources of Income

Single Income Source	209	51.5
Multiple Income Sources	197	48.5

Note. *f* – Frequency, % - Percentage

The age range of the participants was between 30 years to 60 years ($M = 49.58$ years, $SD = 8.86$ years). With respect to gender, 47% of the participants are men and 53% of the sample are women. Married participants comprised 92.6% of the sample whereas, 7.4% of the sample comprised of unmarried participants. The educational status of participants was divided into three categories. It was found that 26.8% of the sample have an educational level of below graduation, 44.6% were graduates and 28.6% of the sample had an educational level

of post-graduation or above. Further, among the 406 participants, 18.7% reported their occupation to be freelance work / business / start-up owner; 20.9% were employees at government organizations; 21.2% were employees at private organizations and 39.2% had no occupation. A total of 21.4% of the participants worked from home whereas 39.4% of the participants, attended office physically, and 39.2% were not employed.

With respect to residence, 89.9% of the sample resided in urban areas whereas only 10.1% were from rural areas. Duration of illness from the time of diagnosis of hypertension was calculated as classified into 3 categories. A total of 34.7% of the sample was suffering from hypertension for less than 4 years, 42.4% reported their duration of illness as ranging between 4-10 years, and 22.9% had an illness duration of 11 years and above. Several participants have also reported the presence of comorbid conditions other than psychiatric problems and terminal illness – 42.9% had comorbidities and 57.1% of the sample did not experience comorbid conditions. With respect to financial status, around 3.4% reported a low financial status, 88.9% reported a moderate financial status and 7.6% reported having a high financial status. A total of 51.5% had a single source of income and 48.5% had multiple income sources.

Measures

The following research instruments were utilized in the study: the COVID-19 Pandemic Stress Scale, the Medical Outcomes Study Social Support Instrument, the Revised Health Hardiness Inventory -24, the Sleep Quality Scale, the Hypertension Knowledge Test, the Hypertension Compliance Scale, and the Hypertension Clinical Symptoms Checklist. The self-reported BP readings of the participants were also recorded. In order to avoid repetition of collecting demographic information with every tool, a separate sheet was used to collect the demographic and basic health information about the participants. The description,

scoring, psychometric properties and development (wherever applicable) of all the tools are discussed below.

Demographic and Health Details Sheet: was developed to collect information about the demographic characteristics and few health details of the participants. It collected personal details such as name, gender, age, marital status, educational qualification, occupation, work location, residence, illness duration, comorbidities, family history of hypertension, BP readings of recent time, whether diagnosed with COVID-19, financial status, number of sources of income and employer's salary deduction (if any) during the pandemic. The tool is enclosed in Appendix A1

Blood Pressure (BP) Reading: This was a self-reported BP reading by the participants in terms of systolic and diastolic readings. This was later converted to a single value of Mean Arterial Pressure (MAP) by applying the standard formula as mentioned below -

$$\text{MAP} = \text{DBP} + 1/3 (\text{SBP} - \text{DBP})$$

DBP = Diastolic Blood Pressure

SBP = Systolic Blood Pressure

All the participants were asked to record their BP using a sphygmomanometer on the day of contact.

Hypertension Knowledge Test:

This test was developed by Andrew and Hariharan (2017) in order to measure the knowledge level of hypertension in an individual. It is an elaborate measure of 22 items with multiple choice question (MCQ) format. The test comprises of 4 dimensions: (a) General Awareness (items 1, 4, 9, 22, 18) which measures the participant's general knowledge about the disease of hypertension, (b) Lifestyle (items 2, 3, 10, 19, 20) which measures knowledge

related to the diet, exercise and lifestyle of a hypertensive individual, (c) Causes, Care and Casualty (items 6, 7, 8, 12, 16, 21) which measures the causes, treatment of and the damage that can be caused by high blood pressure, (d) Management of Medication (items 5, 11, 13, 14, 15, 17) which measures knowledge about antihypertensive medication and their usage.

Scoring. A score of 1 is given for every correct answer and a score of 0 is given for every wrong answer as well as ‘do not know’ option selected by the participant. First, scores of all the items under each dimension are added to get a total score for that dimension. Next, the total scores of all the dimensions are added to obtain an overall hypertension knowledge score. The tool gave a total of five scores that included four dimensions and the total. Scores for the overall Hypertension Knowledge Test ranged from 0 – 22. The scores for General Awareness and Lifestyle dimensions that have five items each, ranged from 0-5. The scores for the dimensions of Causes, Care and Casualty, and Management of Medication that have six items each, ranged from 0-6. A high score indicates high knowledge of hypertension and vice-versa.

Psychometric Properties. In their study, Andrew and Hariharan (2017) found that test-retest reliability coefficients for each dimension had high significant positive correlations viz. 0.91 (general awareness), 0.68 (lifestyle), 0.90 (causes, care and casualty awareness), 0.75 (management of medication) and 0.87 for the total hypertension knowledge scores. In the present sample, internal consistency coefficient (Cronbach’s α) was 0.71. In addition, hypertension knowledge showed a significant positive correlation (0.28, $p < .001$) with hypertension compliance in the present sample thus, establishing convergent validity. This tool was considered suitable for the present study as it was standardized on a large Indian sample and uses simple language to give a clear picture of an individual’s level of knowledge about hypertension. The measure is enclosed in Appendix A2.

Medical Outcomes Study (MOS) Social Support Survey:

This measure was developed by Sherbourne and Stewart (1991). It consists of 19 items measured on a 5-point Likert scale with response choices ranging from None of the Time (1) to All of the Time (5). The tool measures the perceived availability of functional support received by an individual. Examples of item statements include: “How often do you have someone you can count on to listen to you when you need to talk?”, “How often do you have someone to help with daily chores if you were sick?”, “How often do you have someone who hugs you?”, “How often do you have someone to do something enjoyable with?”. The tool has 4 subscales of support: Emotional / Informational Support (receiving positive affect; empathetic understanding; offering of advice, information, and guidance), Tangible Support (receiving behavioural support or financial assistance), Affectionate Support (receiving affection through love or touch) and Positive Social Interaction (availability of people to have fun and happy interactions with).

Scoring. Items measuring emotional / informational support are 1, 2, 3, 4, 5, 6, 7 and 8. The scores for this sub-scale ranged from 5-40. Items measuring tangible support are 9, 10, 11 and 12. The scores on this subscale ranged from 5-20. Items measuring affective support are 13, 14 and 15, where the scores ranged from 5-15. Items measuring positive social interaction are 16, 17 and 18 for which the scores ranged from 5-15. For each subscale, the mean of all the scores of the items under that subscale is obtained. Similarly, the mean of all the items in the tool is computed to obtain an overall support index. The tool has a total of five scores that included four sub-scales and a total score. Higher scores indicate higher levels of social support and vice-versa.

Psychometric Properties. Test-retest reliability (Emotional / Informational Support = 0.72, Tangible Support = 0.74, Affectionate Support = 0.76, Positive Social Interaction =

0.72, Overall Measure = 0.78) was found to be strong and Cronbach's α (Emotional / Informational Support = 0.96, Tangible Support = 0.92, Affectionate Support = 0.91, Positive Social Interaction = 0.94, Overall Measure = 0.97) showed good internal consistency coefficients. Cronbach's α of the overall scale for the present sample was found to be 0.92. High internal consistency was good in each subscale of support too (Emotional / Informational Support = 0.84, Tangible Support = 0.83, Affectionate Support = 0.78, Positive Social Interaction = 0.81). In addition, social support had a significant positive correlation (0.46, $p < .001$) with hypertension compliance thus, confirming convergent validity. The measure is enclosed in Appendix A3.

Revised Health Hardiness Inventory (RHHI-24):

This measure was developed by Gebhardt et al. (2001) and consists of 24 items measured on a 5-point Likert scale with options ranging from Strongly Disagree (1) to Strongly Agree (5). It measures the construct of hardiness (control, commitment, challenge) proposed by Kobasa in 1979, at a domain-specific level (health). The concept of health hardiness was developed to improve the predictive validity of the construct - hardiness, so that it can be applied to a specific field of research (such as health). The Revised Health Hardiness Inventory (RHHI -24) is based on the Health Hardiness Inventory (HHI) developed by Wallston and Abraham (1993). It has 4 subscales: (a) Health Value, which measures the importance given to one's health status and the efforts invested in taking care of one's health, (b) Internal Health Locus of Control, which assesses the extent to which one holds oneself responsible for their health status, (c) External Health Locus of Control, which assesses the extent to which an individual holds external factors responsible for his/her health status, and (d) Perceived Health Competence, which measures the degree to which one feels capable towards managing his/her own health.

Scoring. Items measuring health value include 6, 7, 8, 12, 16 and 21 (dimension score ranges from 6 – 30); items measuring internal health locus of control include 3, 15, 18, 23 and 24 (dimension score ranges from 5 -25); items measuring external health locus of control include 1, 4, 9, 10, 13, 14 and 22 (dimension score ranges from 7 – 35); and items measuring perceived health competence include 2, 5, 11, 17, 19 and 20 (dimension score ranges from 6 – 30). The mean of the items is the score for each dimension. A high score indicates a higher presence of the construct measured by that subscale and vice-versa. Scoring is not done for the overall scale.

Psychometric Properties. The internal consistency of all the subscales reported by Gebhardt et al. are: health value = 0.79, internal health locus of control = 0.66, external health locus of control = 0.67 and perceived health competence = 0.69. Health value, external health locus of control and perceived health competence had a significant correlation with preventive health behaviour. Internal health locus of control and perceived health competence had a significant correlation with self-reported health, thus, establishing adequate construct validity. In the present study, the Cronbach's alpha for the subscales was found to be good (health value = 0.80, internal health locus of control = 0.63, external health locus of control = 0.64 and perceived health competence = 0.65). The measure is enclosed in Appendix A4.

Sleep Quality Scale:

This measure is developed by Yi et al. (2006). It consists of 28 items measured on a 4-point Likert scale from *Rarely* (0) to *Almost Always* (3). The tool measures the self-reported quality of sleep in an individual. It has six dimensions: (1) Daytime Symptoms/Dysfunction which measures symptoms experienced during the daytime as a result of poor sleep, (2) Restoration after Sleep which measures how rested a person feels after a full night's sleep, (3) Difficulty in Initiating Sleep which measures the ease with which

an individual falls asleep, (4) Difficulty Waking which measures the ease with which an individual wakes up after a night's sleep, (5) Sleep Satisfaction which measures the gratification and sense of fulfillment experienced after waking up from sleep and (6) Difficulty in Maintaining Sleep which measures how disturbed or interrupted an individual's sleep is.

The author's permission was obtained to use the tool prior to the commencement of the study and few item statements were rephrased to suit the Indian population. This measure was considered apt for assessing sleep quality as it has strong psychometric properties and has been standardized on an Eastern population (Korean). Studies have found that high blood pressure is frequently associated with difficulty in falling asleep and staying asleep throughout the night (Forshaw et al., 2022; Jarrin et al., 2018). The Sleep Quality Scale takes these aspects of sleep into account and has subscales (Difficulty Initiating Sleep and Difficulty Maintaining Sleep) measuring them.

Scoring. The items measuring daytime symptoms / dysfunction are 10, 11, 14, 15, 17, 19, 21, 22, 23, 24, 26 and 28. The scores for this dimension ranged between 0-36. Items 8, 16, 18 and 27 measure restoration after sleep. The scores ranged from 0-12 for this dimension. Items 1, 4, 6 and 7 measure difficulty in falling asleep. The scores ranged from 0 to 12. Items 9, 12 and 25 measure difficulty waking up. The scores ranged between 0 and 9. Items 2, 13 and 20 measure sleep satisfaction giving a score range of 0 to 9. Finally, items 3 and 5 measure difficulty in maintaining sleep. The dimension score ranged from 0-6. Item scores belonging to dimensions 2 and 5 are reversed. The scores of all individual items are summed to obtain the total score. Total scores range from 0 – 84; a high score indicates poor sleep quality and the presence of acute sleep problems, and vice-versa.

Psychometric Properties. Test-retest reliability of the tool has been reported to be 0.81 (daytime dysfunction = 0.72, restoration after sleep = 0.74, difficulty in falling asleep = 0.56, difficulty in getting up = 0.62, satisfaction with sleep = 0.70, and difficulty in maintaining sleep = 0.68). Internal consistency computed by the scale developers was found to be 0.92 (daytime dysfunction = 0.90, restoration after sleep = 0.84, difficulty in falling asleep = 0.80, difficulty in getting up = 0.74, satisfaction with sleep = 0.71 and difficulty in maintaining sleep = 0.61). The Cronbach's alpha for the current sample was 0.88. Further, a significant positive correlation was found between poor sleep quality and high stress (0.41, $p < .001$) showing adequate construct validity. This measure is enclosed in Appendix A5.

Hypertension Compliance Scale (HyComps):

This measure is developed by Swain and Hariharan (2013). It consists of 15 items measured on a 5-point Likert scale ranging from *Not Applicable / Do not Know* (0) to *Not a Single Day in a Month* (4). The tool measures the frequency of compliance to antihypertensive treatment in the past one month. It has 4 subscales: Medication, Diet, Exercise and, Lifestyle and Self-Monitoring measuring the extent to which a hypertensive individual adheres to the prescribed medication, low-fat and low-salt diet, physical activity, and self-monitoring of blood pressure levels. The scale consists of both positive and negatively worded statements.

Scoring. Items 1, 2, 7, 8, 9, 10 and 11 measure compliance with medication. The score ranges from 0-28. Items 3, 4 and 5 measure compliance with diet. The score ranges from 0-12 for the dimension. Items 13, 14 and 15 measure compliance with exercise where the scores range from 0 to 12. Items 6 and 12 measure compliance with self-monitoring behaviour where the scores range from 0-8. Reverse scoring was performed for items 6, 12 and 13 and individual item scores for the items under every subscale were summed to obtain the subscale

scores. The total compliance score was obtained by summing all the subscale scores. Higher scores point towards higher compliance and vice-versa.

Psychometric Properties. The internal consistency reported for this scale on an Indian hypertensive sample was 0.67. In the present study, the internal consistency was found to be 0.77. This measure was considered suitable for the study as it was standardized on an Indian population and encompasses all aspects of compliance to hypertension treatment. The tool is enclosed in Appendix A6.

Hypertension Clinical Symptoms Checklist (HCSC):

This measure was developed for the study in order to measure the symptoms related to hypertension experienced in the past 4 weeks. It was a unidimensional scale that consisted of 16 items measured on a 5-point Likert scale ranging from *Never* (0) to *Almost Always* (4). The items comprised of the main clinical symptoms of hypertension such as headache, giddiness, nosebleed, fatigue, nausea and other common symptoms of hypertension.

Scoring: The items were scored based on the ratings given. The ratings were summed to obtain the total symptom score. The score ranged from 0-64. A high score indicated more/frequent experience of hypertension symptoms and vice-versa.

Psychometric Properties. The internal consistency (Cronbach's alpha) was found to be 0.86 in the present sample. A two-month test-retest reliability was 0.79 ($p < .001$). Further, a significant positive correlation was found between hypertension clinical symptoms and blood pressure readings (MAP) (0.13, $p < .05$), thus establishing construct validity.

Confirmatory factor analysis was performed to confirm the 16 items of the scale through AMOS v.16. The results indicated good fitness as the fitness values were above the accepted cutoffs (CMIN/DF = 1.98, GFI = .95, CFI = .96, TLI = .95, RMSEA = .04, PCLOSE = 1.00). The tool is enclosed in Appendix A7.

COVID-19 Pandemic Stress Scale (COPSS):

The measure was developed for this study in order to measure stress experienced from factors related to the COVID-19 pandemic. This is a 5-point Likert scale ranging from *Never/Not Applicable (0)* to *Always (4)*. The items cover various aspects of life affected by the COVID-19 pandemic such as the household, occupation, social life, transportation, academics, etc. Examples of item statements include, ‘Work from home is stressful for me’, ‘I experience lack of privacy with all family members at home during the lockdown’, ‘I experience anxiety with the constant flow of information related to the pandemic’, etc. The originally constructed scale consisted of 48 items. After running a Factor analysis on the scale, 19 items got dropped. The remaining 27 items were classified into nine factors, viz- COVID-19 Disease-Related Stress, COVID-19 Precautionary Guidelines-Related Stress, Home/Household Stress, Work Stress, Children-Related Stress, Uncertainty, Lack of Socialization, Travel-Related Stress, and Health of the Elderly. The detailed results of the factor analysis are presented in Appendix C.

Scoring. The scale has a total score and nine dimension wise scores. To obtain the total score the ratings of the items were summed. The total score ranges between 0 – 108. Higher scores indicate higher levels of COVID-19 pandemic related stress. Dimension scores are obtained by summing up the dimensions of the respective dimensions. Items 12, 13 and 10 belong to the dimension of COVID-19 disease related stress, where the score ranges from 0 – 12. Items 25, 26 and 24 belong to the dimension of COVID-19 precautionary guidelines related stress, where the score ranges from 0 – 12. Items 3, 4, 5 and 7 belong to the dimension of home / household stress, where the score ranges from 0 – 16. Items 1, 2, 27, 29 and 44 belong to the dimension of work stress, where the score ranges from 0 – 20. Items 38, 41 and 48 belong to the dimension of children-related stress, where the score ranges from 0 – 12. Items 28 and 33 belong to the dimension of uncertainty, where the score ranges from 0 – 8.

Items 9, 17 and 47 belong to the dimension of lack of socialization, where the score ranges from 0 – 12. Items 45 and 46 belong to the dimension of travel-related stress, where the score ranges from 0 – 8. Items 39 and 42 belong to the dimension of health of the elderly, where the score ranges from 0 – 8. The measure is enclosed in Appendix A8.

Procedure

The procedure is elaborated from the time of obtaining the mandatory approvals to the point of data collection, scoring and entering the scores into the data analysis software.

The study proposal was scrutinized by the Institutional Ethics Committee of University of Hyderabad and approved vide application number UH/IEC/2021/32. Next, an online questionnaire was prepared using all the tools, on SurveyMonkey, a web-based survey software. Participants matching the inclusion and exclusion criteria were identified across various cities of India, and rapport was built with them over a telephonic conversation or an online video call, based on their convenience. Details about the nature of the study, the instruments used and their role in the study was communicated to the participants. Participants were informed about the voluntary nature of their participation which implied that they could withdraw from the study at any point of time. They were assured about the confidentiality of their responses and the researcher clarified all the doubts and questions of the participants. Those who wished to participate in the study were provided with the informed consent form, and the demographic and health details sheet over email. After obtaining their informed consent, the tools were administered to them in a staggered manner over a period of three days. The order of administration followed a sequence. On day one, the participants were administered the following three scales:

1. COVID-19 Pandemic Stress Scale
2. Hypertension Knowledge Test

On day two, the following tools were sent:

1. The Medical Outcomes Study Social Support Instrument
2. Sleep Quality Scale
3. Hypertension Clinical Symptoms Checklist

On the last day, the participants were given:

1. Hypertension Compliance Scale
2. Revised Health Hardiness Inventory – 24

Daily reminders were mailed to them. In case the participants did not send back their response even after three reminders, they were dropped from the study. On an average, participants took two days for set one, three days for set two and two days for set three of the tools, to return. All participants were debriefed at the end of the data collection procedure.

On obtaining the response sheets, the scores were entered into SPSS v26 for the purpose of statistical treatment of the data.

Chapter IV

RESULTS

CHAPTER IV

Results

The primary objective of the study was to identify the psychosocial factors contributing towards hypertension management during the COVID-19 pandemic. Further, it was also aimed to trace a pathway in order to discover the major contributors of hypertension management during the COVID-19 pandemic. The obtained data were entered and statistical analyses were carried out using IBM SPSS V26.0 and AMOS v.22.

The primary objective of the study was to identify the psychosocial factors contributing to hypertension management during the COVID-19 pandemic. This called for a systematic inquiry into the factors that played a role in enhancing or impairing the hypertension management of adults during the COVID-19 pandemic. The results are presented in three parts. In Part 1, the sample was classified on the basis of various demographic characteristics and health-related information. The demographic characteristics included gender, level of education, occupation; and the health-related information included having a family history of hypertension, having comorbid health conditions, and duration of hypertension. It was examined if these demographic characteristics and health-related information played a role in differences in the management of hypertension. The variables that measured management of hypertension included blood pressure readings, clinical symptoms of hypertension, hypertension compliance, and sleep quality. Part 1 of the results examined the group differences based on these variables. Part 2 of the results identified the psychosocial factors significantly contributing to management of hypertension during the COVID-19 pandemic. Part 3 of the results made an attempt to trace the path between the psychosocial factors and management of hypertension during the COVID-19 pandemic.

Before going into discussing the results, it may be relevant to present the basic information of the sample on health and financial status. Table 4.1 presents this.

Table 4.1

Basic Information on Health and Financial Status of Participants (n = 406)

Variables	<i>f</i>	%
Family History of Hypertension		
Present	197	48.5
Absent	209	51.5
Knowledge of Hypertension Before Diagnosis		
Yes	220	54.2
No	186	45.8
Blood Pressure last Checked		
About a week or a fortnight back	186	45.8
Three to four weeks ago	107	26.4
More than a month back	113	27.8
COVID-19 Diagnosis		
Present	81	20
Absent	325	80
Financial Condition		
Difficult	18	4.4
Manageable	197	48.5
Comfortable	191	47.1
Salary Deduction during the COVID-19 Pandemic		
Present	108	26.6

Absent	193	47.5
Not Applicable	105	25.9

Note. *f* – Frequency, % - Percentage

From Table 4.1 it can be observed that, a family history of hypertension was present in 48.5% of the participants, whereas it was absent in 51.5% of the participants. More than half of the sample (54.2%) were observed to have knowledge of hypertension before diagnosis whereas, 45.8% reported not having hypertension knowledge before diagnosis. Further, 45.8% of the participants were found to have their blood pressure last checked about a week or a fortnight back; 26.4% had it last checked three to four weeks ago and 27.8% had it last checked more than a month back. It was observed that 20% of the sample were diagnosed with COVID-19. With respect to financial condition, 4.4% reported experiencing a difficult financial condition, 48.5% reported a manageable financial condition and 47.1% reported a comfortable financial condition. A salary deduction during the COVID-19 pandemic was reported by 26.6% of the participants.

Part 1: Role of Demographic Characteristics and Health-Related Factors in Hypertension Management

Hypertension management is measured by variables such as blood pressure readings (this is expressed as Mean Arterial Pressure - MAP values), hypertension clinical symptoms, hypertension compliance, and sleep quality. This section of the results examines if there are significant differences in these hypertension management variables based on the demographic characteristics, viz. gender, level of education, occupation; and health-related information, viz. presence of family history of hypertension, comorbid health conditions and duration of hypertension. To examine this, Student's t-tests and One-Way ANOVAs were computed. The results of these are presented in the following tables, followed by the explanations.

Blood Pressure Readings and Group Differences

Differences in blood pressure readings were examined on three demographic variables- viz. gender, education level and occupation; and three variables related to health factors, viz. presence of family history of hypertension, presence of comorbid condition and duration of hypertension in the patient. The sample was divided into two groups based on gender, presence of family history and presence of comorbid conditions. In order to find out differences between the two groups, t-tests were carried out. The sample was divided into three groups based on education level, and illness duration, and into four groups based on occupation. For these variables, separate One-Way Analysis of Variance (ANOVAs) were performed.

Results revealed that the sample did not differ in their blood pressure levels based on gender, education, occupation, duration of hypertension, and presence of comorbid conditions. However, significant differences were found among groups with and without family history of hypertension. Table 4.2 presents the results of t-test showing the differences in blood pressure levels based on family history of hypertension.

Table 4.2

Results Showing Mean (M), Standard Deviation (SD), T Values and Cohen's D for Blood Pressure Readings Among Hypertensive Adults With and Without a Family History of Hypertension (n=406)

Variable	Family History of Hypertension				95% CI for Mean		<i>t</i>	Cohen's <i>d</i>
	Presence		Absence		Difference			
	M	SD	M	SD	LL	UL		
Blood Pressure Readings	99.47	6.45	98.12	5.82	-.12	-.04	2.22*	0.21

Note. * $p < .05$

From Table 4.2, it can be inferred that hypertensive adults differed significantly on blood pressure levels based on the presence or absence of family history of hypertension $t(404) = 2.22, p < .05$, Cohen's $d = 0.21$. Participants with family history of high BP ($M = 99.47, SD = 6.45$) were found to have higher blood pressure levels in comparison with participants where family history of hypertension was not present ($M = 98.12, SD = 5.82$). In order to estimate the effect size of the differential score, Cohen's d was calculated. The values of Cohen's d for blood pressure levels suggests that there is a low effect of family history of hypertension, on blood pressure levels.

Hypertension Clinical Symptoms and Group Differences

Hypertension clinical symptoms constitutes a significant component reflecting hypertension management. It is of interest to examine the differences in clinical symptoms of hypertension based on gender, education, occupation, family history, comorbid conditions, and duration of hypertension. Results revealed that there were no differences between men and women, participants engaged in different occupations, those with or without family history of hypertension, those with or without comorbid conditions, and with variations in duration of hypertension. However, participants with different educational levels showed significant differences in the presence of clinical symptoms. Table 4.3 presents the results of One-Way ANOVA carried out to find out differences in clinical symptoms of hypertension among the three groups of participants varying in educational levels.

Table 4.3

Results of One-Way ANOVA With Means (M), Standard Deviations (SD), F Values and Effect Size (H^2) of Hypertension Clinical Symptoms Among Hypertensive Adults Across Three Levels of Education (n = 406)

Education Level →	Below Graduation		Graduation		Post-Graduation and above		F	η^2
Outcome Variable	M	SD	M	SD	M	SD	(2, 403)	
Hypertension Clinical Symptoms	22.16	9.30	19.01	9.60	15.43	9.24	14.39***	0.07

Note. *** $p < .001$

The means, standard deviations, F values and effect sizes are displayed in Table 4.3. It can be observed that hypertensive adults with different levels of education showed significant differences in hypertension clinical symptoms, $F(2, 403) = 14.39$, $p < .001$. In order to estimate the effect size of the differential scores, Eta squared (η^2) was calculated. The values of η^2 for hypertension clinical symptoms ($\eta^2 = 0.07$) shows a low effect of education level on hypertension clinical symptoms. In order to understand the differences between education levels, Tukey's HSD test was performed and its results are displayed in Table 4.4.

Table 4.4

Mean Comparisons Using Tukey's HSD Test Between the Three Groups for Hypertension Clinical Symptoms

Multiple group comparison	Hypertension Clinical Symptoms
Below Graduation ~ Graduation	3.15*
Below Graduation ~ PG and Above	6.72*
Graduation ~ PG and Above	3.57*

Note. * $p < .05$

Significant differences were observed between all the three combinations of groups. The table shows that the group with educational qualification below graduation significantly differed from the groups with educational qualification of graduation and post-graduation. Significant differences were also found between graduates and post-graduates. From Table 4.4, it can be inferred that significant differences in mean scores were observed between all three groups with respect to hypertension clinical symptoms. Participants with a lower education level i.e., below graduation ($M = 22.16$, $SD = 9.30$) were found to experience the clinical symptoms of hypertension more frequently followed by graduates ($M = 19.01$, $SD = 9.60$), and then by post-graduates ($M = 15.43$, $SD = 9.24$). This suggests that education plays a significant role in handling the clinical symptoms of hypertension effectively.

Hypertension Compliance and Group Differences

Hypertension compliance refers to clinical compliance that includes medicine management, following the prescribed diet and exercise regimens, and regular monitoring of blood pressure. This constitutes an important component of hypertension management. It is of interest to examine if there are differences between gender, education levels and occupation with regard to hypertension compliance. Also, it is of interest to scrutinise if participants with family history of hypertension differ from those without it, participants with comorbid conditions have better compliance compared to those without it, and if compliance differs with the variations in duration of illness. To examine this, three t-tests were computed in order to find out the differences between the two groups involving gender, presence or absence of family history, and presence or absence of comorbid conditions. Results revealed no differences between the groups. One-way ANOVAs were carried out separately for the overall compliance and the four dimensions of compliance to find out the differences between the three groups of participants varying in educational levels, four groups of participants varying in occupational levels and three groups of participants varying in their

duration of illness. Results revealed significant differences among the groups varying in educational levels only on the dimension of compliance with medication. There were no differences with regard to overall compliance or on any other dimension. No significant differences were found in any other groups. The results of one-way ANOVA for the groups varying in educational levels are presented in table 4.5.

Table 4.5

Results of One-Way ANOVA With Means (M), Standard Deviations (SD), F Values and Effect Size (η^2) of Hypertension Compliance Among Hypertensive Adults Across Three Levels of Education (n=406)

Education Level →	Below Graduation		Graduation		Post-Graduation (PG) and above		F	η^2
Variable	M	SD	M	SD	M	SD	(2, 403)	
Hypertension	41.25	6.81	41.12	7.60	42.84	6.81	2.26	0.01
Compliance								
Medication	22.19	4.56	22.10	5.27	23.65	5.04	3.77*	0.02
Diet	8.61	1.98	8.35	2.05	8.59	1.86	0.75	0.00
Exercise	7.03	1.89	7/02	2.10	7.35	2.08	1.08	0.01
Self-Monitoring	3.42	1.67	3.64	1.88	3.25	2.00	1.61	0.01

Note. *p < .05

The means, standard deviations, F values and effect sizes are displayed in Table 4.5. It can be observed that hypertensive adults with different levels of education showed significant differences in compliance with antihypertensive medication, $F(2, 403) = 3.77$, $p < .05$. In order to estimate the effect size of the differential scores, Eta squared (η^2) was calculated. The values of η^2 for compliance with antihypertensive medication ($\eta^2 = 0.02$) shows a low

effect of education level on compliance with medication. In order to understand the differences between education levels, Tukey's HSD test was performed and its results are displayed in Table 4.6.

Table 4.6

Mean Comparisons Using Tukey's HSD Test Between the Three Groups for Hypertension Compliance

Multiple group comparison	Compliance with Medication
Below Graduation ~ Graduation	0.09
Below Graduation ~ PG and Above	-1.45
Graduation ~ PG and Above	-1.54*

Note. * $p < .05$

Table 4.6 shows significant differences between the mean scores of graduates and post-graduates (and above) with respect to compliance with medication. From Table 4.5, it can be observed that, participants with an education level of post-graduation and above ($M = 23.65$, $SD = 5.04$) have higher compliance with medication as compared to those with an education level of graduation ($M = 22.10$, $SD = 5.27$). Table 4.5 depicts that the group with educational level that is post-graduation and above have the highest mean score ($M=23.65$) followed by those whose education level is below graduation ($M=22.92$, $Sd=4.56$), with the group having the qualification of graduation scoring the lowest ($M=22.10$). This suggests that those with higher levels of education display higher compliance with the medication while those with a low education level are found to be low in compliance.

Sleep Quality and Group Differences

Sleep quality is closely related to management of hypertension. It impacts and, also, is impacted by hypertension management. An attempt was made to find out if the sleep quality and its six dimensions differ significantly between men and women, groups with different

educational levels, occupations, with and without family history of hypertension, comorbid or no comorbid conditions, and various durations of hypertension. To find this out, separate t-tests were conducted on the two groups varying in gender, presence or absence of family history, and comorbidities. Separate one-way ANOVAs was carried out on the groups with three educational levels, four categories of occupations, and three variations on the duration of illness. Results revealed no significance differences among groups on overall sleep quality and its five dimensions. Only on the dimension of 'difficulty waking up', differences were found among the four categories of occupation $F(2, 403) = 3.39, p < .05$; and also, among the three groups varying in illness duration $F(2, 403) = 4.62, p < .01$. The results of differences among four occupational groups on sleep quality is presented in Table 4.7.

Table 4.7

Results of One-Way ANOVA With Means (M), Standard Deviations (SD), F Values and Effect Size (H^2) of Sleep Quality Among Hypertensive Adults With Respect to Occupation (N = 406)

Occupation	→	Freelance/Business		Government		Private Sector		No Occupation		F	η^2
				Employee		Employee					
Outcome Variable		M	SD	M	SD	M	SD	M	SD	(2, 403)	
Sleep Quality		32.37	12.20	30.19	13.12	33.71	11.90	33.88	12.88	1.79	0.01
Daytime Symptoms		13.30	6.53	12.18	7.63	14.35	7.05	13.14	7.15	1.33	0.01
/ Dysfunction											
Restoration after		4.62	2.96	5.00	3.11	5.20	2.53	5.43	2.83	1.49	0.01
Sleep											
Difficulty in		4.74	2.96	4.00	2.90	4.26	2.75	4.81	2.88	1.86	0.01
Initiating Sleep											
Difficulty Waking		3.21	1.44	2.99	1.74	3.80	1.73	3.19	1.96	3.39*	0.03
Sleep Satisfaction		3.72	2.19	3.92	2.50	3.57	2.26	4.49	2.36	3.67	0.03
Difficulty in		2.78	1.55	2.11	1.48	2.53	1.49	2.81	1.52	4.46	0.03
Maintaining Sleep											

Note. * $p < .05$

The means, standard deviations, F values and effect sizes are displayed in Table 4.7. It can be observed that hypertensive adults with different occupations showed significant differences in difficulty waking from sleep. In order to estimate the effect size of the differential scores, Eta squared (η^2) was calculated. The values of η^2 for difficulty waking from sleep ($\eta^2 = 0.03$) show a low effect of occupation type on difficulty waking up. In order to understand the differences between different occupation types, Tukey's HSD test was performed and its results are displayed in Table 4.8.

Table 4.8

Mean Comparisons Using Tukey's HSD Test Between the Four Groups for Difficulty Waking From Sleep

Multiple group comparison	Difficulty Waking from Sleep
Freelance/Business ~ Government Employee	0.22
Freelance/Business ~ Private Employee	-0.59
Freelance/Business ~ No Occupation	0.02
Government Employee ~ Private Employee	-0.81*
Government Employee ~ No Occupation	-0.21
Private Employee ~ No Occupation	0.61

Note. * $p < .05$

Significant differences between the mean scores of participants involved in freelance / business, government employees, private sector employees and those with no occupation can be observed with respect to difficulty waking up from sleep. From Table 4.8, it can be observed that, government employees ($M = 2.99$, $SD = 1.74$) have lower difficulty waking up as compared to private sector employees ($M = 3.80$, $SD = 1.73$). No other combination of groups showed significant differences. This could be related to the fixed and varying working hours assigned for Government and private employees, particularly during the COVID-19 pandemic when work from home was in vogue.

Duration of hypertension is expected to have an impact on sleep quality. The results of one-way ANOVA performed to examine group differences in sleep quality and its dimensions with respect to varying duration of illness are presented in Table 4.9.

Table 4.9

Results of One-Way ANOVA With Means (M), Standard Deviations (SD), F Values and Effect Size (η^2) of Sleep Quality Among Hypertensive Adults With Respect to Their Illness Duration ($n = 406$)

Illness Duration →	0 – 4 Years		4 – 10 Years		10 Years and Above		F	η^2
Outcome Variable	M	SD	M	SD	M	SD	(2, 403)	
Sleep Quality	33.25	12.82	32.98	12.23	31.73	13.18	0.44	0.00
Daytime Symptoms / Dysfunction	13.70	7.23	13.38	6.74	12.22	7.72	1.28	0.01
Restoration after Sleep	5.21	2.83	5.02	2.89	5.26	2.87	0.28	0.00
Difficulty in Initiating Sleep	4.30	2.81	4.55	2.69	4.76	3.30	0.76	0.00
Difficulty Waking	3.58	1.66	3.27	1.89	2.86	1.74	4.62**	0.02
Sleep Satisfaction	3.97	2.37	4.06	2.34	4.08	2.41	0.07	0.00
Difficulty in Maintaining Sleep	2.49	1.50	2.71	1.43	2.56	1.76	0.84	0.00

Note. ** $p < .01$

The means, standard deviations, F values and effect sizes are displayed in Table 4.9. It can be observed that hypertensive adults with different illness durations showed significant differences in difficulty waking up from sleep, $F(2, 403) = 4.62$, $p < .01$. In order to estimate the effect size of the differential scores, Eta squared (η^2) was calculated. The values of η^2 for difficulty waking up from sleep ($\eta^2 = 0.02$) shows a low effect of illness duration on difficulty waking up. In order to understand the differences between illness durations, Tukey's HSD test was performed and its results are displayed in Table 4.10.

Table 4.10

Mean Comparisons Using Tukey's HSD Test Between the Three Groups for Difficulty Waking From Sleep

Multiple group comparison	Difficulty Waking Up
0 - 4 years ~ 4 – 10 years	0.31
0 - 4 years ~ 10 years and above	0.72*
4 – 10 years ~ 10 years and above	0.41

Note. * $p < .05$

Significant differences between the mean scores of participants with an illness duration of 0 - 4 years, 4 – 10 years and 10 years and above can be observed with respect to difficulty waking up from sleep. From Table 4.10, it can be observed that participants with an illness duration of 10 years and above ($M = 2.86$, $SD = 1.74$) have lower difficulty waking up from sleep as compared to those with an illness duration of 0 – 4 years ($M = 3.58$, $SD = 1.66$). This implies that the sleep quality of participants with a lower duration of hypertension is impacted greatly as compared to those with a higher duration of hypertension.

Part 2: Identification of Psychosocial Factors Contributing to Hypertension Management During the COVID-19 Pandemic

As has already been argued earlier in the context of rationale of the study, management of hypertension during the pandemic of COVID-19 is highly challenging. It is of great significance to identify the various psychosocial factors contributing to disease management of patients diagnosed with primary hypertension. As has already been mentioned, the four variables indicating hypertension management are – blood pressure levels, hypertension clinical symptoms, compliance with treatment, and sleep quality. Since there is no single comprehensive measure of hypertension management, an attempt is made to

identify the psychosocial factors independently contributing to these four factors indicating hypertension management.

As mentioned in the Method chapter, the present study used seven tools measuring the psychosocial variables. In addition, the study also took the blood pressure readings reported by the participants. The eight psychosocial tools together measured 38 different psychosocial parameters. Out of these 14 variables referred to hypertension management. A total of 24 variables can be tested as psychosocial variables contributing to hypertension management. To test this, it is important to select the variables that correlate with the hypertension management variables, to be considered as the predictors. Pearson's correlation (r) was computed to examine the interrelationships among the 38 variables.

Table 4.11 displays the correlation matrix.

Table 4.11*Table Showing Intercorrelations Among the Variables Under Study*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1	1.00	.73**	.63**	.65**	.62**	.30**	.25**	-.05	.23**	-.28**	-.15**	-.30**	-.20**	-.18**	-.21**	-.15**	.32**	.14**	.17**	.20**	.27**	.46**	.40**	.25**	.28**	.13**	.41**	.29**	.29**	.35**	.37**	.46**	-.21**	-.06	-.31**
2		1.00	.57**	.58**	.54**	.27**	.21**	-.06	.21**	-.24**	-.13*	-.27**	-.16**	-.15**	-.18**	-.12*	.30**	.15**	.18**	.17**	.23**	.33**	.30**	.15**	.18**	.11*	.34**	.23**	.14**	.25**	.27**	.32**	-.25**	-.13*	-.15**
3			1.00	.61**	.46**	.20**	.19**	.03	.13**	-.18**	-.09	-.26**	-.09	-.13**	-.16**	-.01	.25**	.10*	.12*	.15**	.24**	.34**	.32**	.19**	.15**	.07	.26**	.17**	.04	.21**	.20**	.22**	-.08	-.14**	-.14**
4				1.00	.64**	.31**	.25**	-.02	.20**	-.20**	-.12*	-.24**	-.11*	-.11*	-.17**	-.02	.21**	.11*	.13**	.10*	.18**	.28**	.25**	.16**	.18**	.05	.28**	.14**	.12*	.19**	.30**	.27**	-.15**	-.04	-.13*
5					1.00	.24**	.22**	-.04	.19**	-.16**	-.07	-.22**	-.12*	-.11*	-.13**	-.05	.18**	.07	.11*	.13**	.13**	.27**	.23**	.19**	.18**	.03	.26**	.17**	.14**	.19**	.24**	.26**	-.17**	-.08	-.13**
6						1.00	.62**	-.02	.52**	-.32**	-.14**	-.36**	-.22**	-.19**	-.29**	-.18**	.16**	.07	.15**	.09	.09	.43**	.35**	.29**	.33**	.06	.48**	.48**	.35**	.30**	.46**	.57**	-.29**	-.13*	-.34**
7							1.00	-.06	.44**	-.26**	-.11*	-.34**	-.18**	-.13*	-.23**	-.12*	.06	.01	.01	.00	.11*	.28**	.29**	.20**	.13**	-.04	.33**	.24**	.13**	.14**	.32**	.31**	-.33**	-.13**	-.18**
8								1.00	-.31**	.26**	.24**	.07	.20**	.21**	.11*	.15**	-.04	.00	-.04	.04	-.10	-.20**	-.12*	-.13**	-.17**	-.10*	-.15**	-.14**	.00	-.01	.01	-.09	.14**	.20**	.04
9									1.00	-.38**	-.25**	-.33**	-.24**	-.26**	-.23**	-.19**	.09	-.01	.12*	-.05	.16**	.34**	.25**	.25**	.34**	-.01	.38**	.42**	.28**	.25**	.36**	.47**	-.32**	-.20**	-.26**
10										1.00	.81**	.53**	.75**	.59**	.52**	.58**	-.15**	.02	-.12*	-.04	-.21**	-.35**	-.30**	-.29**	-.26**	.04	-.26**	-.22**	-.09	-.03	-.19**	-.23**	.59**	.43**	.11*
11											1.00	.13*	.43**	.48**	.08	.31**	-.09	.04	-.04	-.05	-.16**	-.24**	-.22**	-.25**	-.14**	.10	-.14**	-.11*	.06	.05	-.08	-.07	.46**	.39**	.02
12												1.00	.28**	.10	.67**	.22**	-.14**	.00	-.11*	-.04	-.19**	-.26**	-.23**	-.14**	-.19**	-.04	-.27**	-.18**	-.19**	-.11*	-.25**	-.28**	.34**	.15**	.19**
13													1.00	.44**	.39**	.63**	-.11*	-.01	-.14**	.02	-.14**	-.25**	-.20**	-.21**	-.21**	.04	-.18**	-.19**	-.11*	-.02	-.11*	-.18**	.50**	.33**	.07
14														1.00	.10*	.32**	-.11*	-.05	-.08	-.04	-.11*	-.29**	-.24**	-.28**	-.19**	.03	-.19**	-.15**	-.04	-.01	-.16**	-.16**	.32**	.31**	.07
15															1.00	.26**	-.10	-.01	-.10*	-.01	-.11*	-.22**	-.15**	-.07	-.26**	-.10*	-.19**	-.20**	-.20**	-.11*	-.18**	-.25**	.28**	.16**	.13**
16																1.00	-.05	.02	-.07	.00	-.05	-.18**	-.13*	-.15**	-.16**	-.01	-.10	-.13**	-.10*	.00	-.06	-.12*	.38**	.23**	.08
17																	1.00	.57**	.66**	.59**	.65**	.28**	.27**	.19**	.18**	-.05	.28**	.25**	.23**	.19**	.18**	.32**	-.11*	-.03	-.16**
18																		1.00	.23**	.12*	.15**	.14**	.12*	.12*	.09	-.03	.16**	.15**	.14**	.14**	.08	.18**	.04	.09	-.07

Note. 1-Social Support, 2-Emotional Support, 3-Tangible Support, 4-Affectionate Support, 5-Positive Social Interaction, 6-Health Value, 7-Internal Health Locus of Control, 8-External Health Locus of Control, 9-Perceived Health Competence, 10-Sleep Quality, 11-Daytime Symptoms/Dysfunction, 12-Restoration after Sleep, 13-Difficulty Initiating Sleep, 14-Difficulty Waking, 15-Satisfaction with Sleep, 16-Difficulty Maintaining Sleep, 17-Hypertension Knowledge, 18-General Awareness, 19-Lifestyle, 20-Causes, Care, Casualty, 21-Medication Management, 22-Hypertension Compliance, 23-Medication, 24-Diet, 25-Exercise, 26-Self-Monitoring, 27-Hypertension Coping, 28-Medication, 29-Diet, 30-Exercise, 31-Self-Monitoring, 32-Stress Management, 33-Hypertension Clinical Symptoms, 34-COVID-19 Pandemic Stress, 35-Blood Pressure, *p<0.05, **p<0.01, ***p<0.001

Table 4.11*Table Showing Intercorrelations Among the Variables Under Study*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
19																			1.00	.18**	.26**	.18**	.13**	.16**	.16**	-.01	.20**	.25**	.22**	.13**	.16**	.28**	-.10*	-.01	-.13*
20																				1.00	.12*	.11*	.11*	.08	.08	-.02	.09	.13**	.07	.12*	.12*	.14**	-.03	-.02	-.08
21																					1.00	.26**	.29**	.13*	.12*	-.06	.25**	.11*	.14**	.09	.09	.19**	-.16**	-.11*	-.12*
22																						1.00	.86**	.63**	.60**	.20**	.47**	.40**	.29**	.28**	.35**	.49**	-.22**	-.11*	-.37**
23																							1.00	.36**	.31**	-.11*	.43**	.27**	.12*	.20**	.25**	.34**	-.20**	-.09	-.25**
24																								1.00	.34**	.02	.29**	.39**	.16**	.20**	.25**	.35**	-.15**	-.11*	-.21**
25																									1.00	.04	.28**	.31**	.42**	.22**	.30**	.44**	-.19**	-.08	-.34**
26																										1.00	.06	.07	.14**	.10*	.07	.12*	.06	.03	-.14**
27																											1.00	.41**	.34**	.37**	.40**	.70**	-.22**	-.09	-.36**
28																												1.00	.46**	.47**	.42**	.77**	-.14**	-.10	-.45**
29																													1.00	.41**	.46**	.79**	-.13*	-.10*	-.57**
30																														1.00	.40**	.63**	-.03	.06	-.42**
31																															1.00	.71**	-.19**	.00	-.43**
32																																1.00	-.21**	-.01	-.62**
33																																	1.00	.31**	.12*
34																																		1.00	-.06
35																																			1.00

Note. 1-Social Support, 2-Emotional Support, 3-Tangible Support, 4-Affectionate Support, 5-Positive Social Interaction, 6-Health Value, 7-Internal Health Locus of Control, 8-External Health Locus of Control, 9-Perceived Health Competence, 10-Sleep Quality, 11-Daytime Symptoms/Dysfunction, 12-Restoration after Sleep, 13-Difficulty Initiating Sleep, 14-Difficulty Waking, 15-Satisfaction with Sleep, 16-Difficulty Maintaining Sleep, 17-Hypertension Knowledge, 18-General Awareness, 19-Lifestyle, 20-Causes, Care, Casualty, 21-Medication Management, 22-Hypertension Compliance, 23-Medication, 24-Diet, 25-Exercise, 26-Self-Monitoring, 27-Hypertension Coping, 28-Medication, 29-Diet, 30-Exercise, 31-Self-Monitoring, 32-Stress Management, 33-Hypertension Clinical Symptoms, 34-COVID-19 Pandemic Stress, 35-Blood Pressure, *p<0.05, **p<0.01, ***p<.001

It may be taken to cognizance from Table 4.11 that there is a significant correlation between the four variables measuring hypertension management indicating a congruence among the variables. Table 4.12 presents the correlation among these variables. They can be supplementary and complementary to each other.

Table 4.12

Table Showing Intercorrelations Among the Variables Measuring Hypertension Management

	Blood Pressure Levels	Hypertension Clinical Symptoms	Hypertension Compliance	Sleep Quality
Blood Pressure Levels	1	.62**	-.37**	.26**
Hypertension Clinical Symptoms		1	-.22**	.59**
Hypertension Compliance			1	-.35**
Sleep Quality				1

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

It is observed that all the four variables measuring the hypertension management have significant interrelationships among them. Contingent on the results of Pearson's correlation (as presented in Table 4.11), four separate stepwise regression analysis models were developed and tested with criteria as –blood pressure levels, hypertension clinical symptoms, hypertension compliance and sleep quality. Those variables having a significant correlation with each of the four variables measuring hypertension management were separately identified and used as the predictors in their respective multiple regression analyses. The results are presented below.

Predictors of Blood Pressure Levels

Blood Pressure readings are the primary indicators of management of hypertension. Hence it is of significance to identify the psychosocial factors contributing to the Blood Pressure levels. Tables 4.13 presents the results of stepwise regression analyses. The assumptions of normality, linearity and homoscedasticity were checked and established for every model. Absence of multicollinearity was confirmed through tolerance values and VIF (variance inflation factor) which were found to be above .01 and below 10, respectively.

To identify the predictors of blood pressure, stepwise regression was performed using blood pressure as the criterion. The correlates of blood pressure (as seen in Table 4.11) were used as the predictors in the model. Table 4.11 shows a significant relationship between blood pressure readings and hypertension clinical symptoms and, social support and its dimensions (emotional/informational support, tangible support, affectionate support and positive social interaction), the subscales of health hardiness (health value, internal health locus of control, perceived health competence), sleep quality and its dimensions (restoration after sleep, satisfaction with sleep), hypertension knowledge along with its dimensions (lifestyle and management of medication), and, hypertension compliance and its dimensions (medication, diet, exercise, self-monitoring).

Correlation coefficients ranged between $r = .11, p < .05$ to $r = -.62, p < .01$ indicating weak to moderately strong correlations, thus, implying that the data were suitable for analysis through stepwise regression. Therefore, the abovementioned variables were entered into the stepwise regression model in order to determine the predictors of blood pressure.

Table 4.13

*Summary Table of Stepwise Regression Analysis for All Psychosocial Variables Predicting
Blood Pressure Readings*

Model and Predictor Variable	R	R²	ΔR²	B	SEB	β	t
Model 1 (C = 123.99, F = 252.32***)	.368	.136					
Hypertension Compliance				-.140	.009	-.620***	-15.885
Model 2 (C = 122.32, F = 135.57***)	.420	.177	.041***				
Hypertension Compliance				-.101	.014	-.448***	-7.108
Health Value				-.128	.037	-.218***	-3.460
Model 3 (C = 123.90, F = 93.93***)	.441	.195	.018**				
Hypertension Compliance				-.083	.016	-.365***	-5.211
Health Value				-.146	.037	-.250***	-3.917
Social Support				-.100	.038	-.116**	-2.599
Model 4 (C = 116.29, F = 63.37***)	.461	.212	.018**				
Hypertension Compliance				-1.345	.357	-.281***	-5.21
Health Value				-2.184	.433	-.253***	-5.08
Social Support				-.143	.025	-.370***	-5.12
Compliance with Exercise				-.622	.142	-.212***	-4.38
Model 5 (C = 116.43, F = 43.26***)	.478	.229	.017**				
Hypertension Compliance				-1.345	.357	-.113***	-5.21
Health Value				-2.184	.433	-.193***	-5.08
Social Support				-.143	.025	-.154***	-5.12
Compliance with Exercise				-.622	.142	-.167***	-4.38
Affectionate Support				-.041	.015	-.132**	-2.54
Model 6 (C = 115.20, F = 32.41***)	.48	.232	.008*				
Hypertension Compliance				-1.345	.357	-.248***	-5.21
Health Value				-2.184	.433	-.379***	-5.08
Social Support				-.143	.025	-.206***	-5.12
Compliance with Exercise				-.622	.142	-.158***	-4.38
Affectionate Support				-.041	.015	-.133**	-2.54
Emotional/Informational Support				-.040	.028	-.123*	-2.11
Model 7 (C = 115.05, F = 27.02***)	.490	.240	.008*				

Hypertension Compliance	-1.345	.357	-.245***	-5.21
Health Value	-2.184	.433	-.366***	-5.08
Social Support	-.143	.025	-.207***	-5.12
Compliance with Exercise	-.622	.142	-.151***	-4.38
Affectionate Support	-.041	.015	-.137**	-2.54
Emotional/Informational Support	-.040	.028	-.111*	-2.11
Compliance with Self-Monitoring	-.305	.147	-.092*	-2.09

Note. C-Constant, B-Unstandardized Beta Coefficient, SEB-Standardized Error of Beta, β -Standardized Beta

Coefficient, t-t Value of Beta, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.13 reveals the results of stepwise regression with blood pressure as the criterion ($N = 406$). At the outset, it may be pertinent to reiterate that higher Mean Arterial Pressure (MAP) readings indicate high BP. After entering the significant correlates in the stepwise regression model, the results displayed seven models. Model 1 was statistically significant [$F(1, 404) = 252.32, p < .001$] and explained 13.6% significant proportion of variance ($Adjusted R^2 = .13$) in blood pressure. Hypertension compliance ($\beta = -.62, p < .001$) emerged as a significant predictor of blood pressure in this model. In Model 2, along with hypertension compliance ($\beta = -.45, p < .001$), health value (a dimension of health hardiness) ($\beta = -.22, p < .001$) also emerged as a significant predictor of blood pressure. The model was statistically significant [$F(2, 403) = 135.57, p < .001$] and predicted an additional 4% variance amounting to a total of 17.7% significant proportion of change in the criterion ($Adjusted R^2 = .17$). In Model 3, hypertension compliance ($\beta = -.37, p < .001$), health value (a dimension of health hardiness) ($\beta = -.25, p < .001$) and social support ($\beta = -.12, p < .001$) appeared as significant predictors of blood pressure. Model 3 was statistically significant [$F(3, 402) = 93.93, p < .001$] and explained an additional 2% change in the criterion amounting to a total of 19.5% significant proportion of variance ($Adjusted R^2 = .19$). Further, in Model 4, along with hypertension compliance ($\beta = -.28, p < .001$), health value (a dimension of health hardiness) ($\beta = -.25, p < .001$) and social support ($\beta = -.37, p < .001$), compliance with

exercise (a dimension of hypertension compliance) ($\beta = -.21, p < .001$) also appeared as a significant predictor of blood pressure. Model 4 was statistically significant [$F(4, 401) = 63.37, p < .001$] and explained an additional 2% change in the criterion amounting to a total of 21.2% significant proportion of variance ($Adjusted R^2 = .20$). In Model 5, along with hypertension compliance ($\beta = -.11, p < .001$), health value (a dimension of health hardiness) ($\beta = -.19, p < .001$), social support ($\beta = -.15, p < .001$), and compliance with exercise (a dimension of hypertension compliance) ($\beta = -.17, p < .001$), affectionate support (a dimension of social support) ($\beta = -.13, p < .01$) also appeared as a significant predictor of blood pressure. Model 5 was statistically significant [$F(5, 400) = 43.26, p < .001$] and explained an additional 2% change in the criterion amounting to a total of 22.9% significant proportion of variance ($Adjusted R^2 = .22$). In Model 6, along with hypertension compliance ($\beta = -.25, p < .001$), health value (a dimension of health hardiness) ($\beta = -.38, p < .001$), social support ($\beta = -.21, p < .001$), compliance with exercise (a dimension of hypertension compliance) ($\beta = -.16, p < .001$), and affectionate support (a dimension of social support) ($\beta = -.13, p < .01$), emotional/informational support ($\beta = -.12, p < .05$) also appeared as a significant predictor of blood pressure. Model 6 was statistically significant [$F(6, 399) = 32.41, p < .001$] and explained an additional 1% change in the criterion amounting to a total of 23.2% significant proportion of variance ($Adjusted R^2 = .22$). Finally, in Model 7, along with hypertension compliance ($\beta = -.25, p < .001$), health value (a dimension of health hardiness) ($\beta = -.37, p < .001$), social support ($\beta = -.21, p < .001$), compliance with exercise (a dimension of hypertension compliance) ($\beta = -.15, p < .001$), affectionate support (a dimension of social support) ($\beta = -.14, p < .01$), and emotional/informational support ($\beta = -.11, p < .05$), compliance with self-monitoring (a dimension of hypertension compliance) ($\beta = -.09, p < .05$) also appeared as a significant predictor of blood pressure. Model 7 was statistically significant [$F(5, 398) = 27.02, p < .001$] and explained an additional 1% change

in the criterion amounting to a total of 23.2% significant proportion of variance (*Adjusted R*² = .22). To sum up, the results indicated that hypertension compliance, health value, social support, compliance with exercise, affectionate support, emotional/informational support and compliance with self-monitoring positively contributed towards lowering the blood pressure. Together as a group, the factors, viz, overall hypertension compliance, health value, social support, compliance with exercise, affectionate support, emotional/informational support and compliance with self-monitoring explained 24% of variance in blood pressure (BP) readings.

Predictors of Hypertension Clinical Symptoms

To identify the predictors of hypertension clinical symptoms, stepwise regression was performed using hypertension clinical symptoms as the criterion. The correlates of hypertension clinical symptoms (as seen in Table 4.11) were taken as the predictors in the model. Table 4.11 shows a significant relationship between hypertension clinical symptoms and, social support and its dimensions (emotional/informational support, affectionate support and positive social interaction), all the subscales of health hardiness (health value, internal health locus of control, external health locus of control and perceived health competence), sleep quality and its dimensions (daytime symptoms / dysfunction, restoration after sleep, difficulty initiating sleep, difficulty waking, satisfaction with sleep and difficulty maintaining sleep), hypertension knowledge along with its dimensions (lifestyle and management of medication), hypertension compliance and its dimensions (medication, diet, exercise), COVID-19 pandemic stress and blood pressure level.

Correlation coefficients ranged between $r = -.10, p < .05$ to $r = .59, p < .01$ indicating weak to moderately strong correlations, thus, implying that the data were suitable for analysis through stepwise regression. Therefore, the abovementioned variables except blood pressure levels were entered into the stepwise regression model in order to determine the predictors of

hypertension clinical symptoms. The variable of blood pressure level was removed because theoretically, clinical symptoms are indicators of blood pressure but not vice versa.

Table 4.14

Summary Table of Stepwise Regression Analysis for All Psychosocial Variables Predicting Hypertension Clinical Symptoms

Model and Predictor Variable	R	R ²	ΔR ²	B	SEB	β	t
Model 1 (C = 3.84, F = 220.53***)	.59	.35					
Sleep Quality				.457	.031	.594***	14.850
Model 2 (C = 15.81, F = 127.14***)	.62	.39	.03***				
Sleep Quality				.420	.031	.545***	13.517
Internal Health Locus of Control				-3.063	.650	-.190***	-4.710
Model 3 (C = 16.38, F = 87.06***)	.63	.39	.01*				
Sleep Quality				.347	.046	.451***	7.600
Internal Health Locus of Control				-3.094	.648	-.192***	-4.777
Difficulty Initiating Sleep				.424	.197	.125*	2.151
Model 4 (C = 18.72, F = 66.91***)	.63	.40	.01*				
Sleep Quality				.332	.046	.432***	7.218
Internal Health Locus of Control				-2.874	.654	-.178***	-4.397
Difficulty Initiating Sleep				.435	.196	.129*	2.217
Emotional / Informational Support				-.047	.023	-.084*	-2.073

Note. C-Constant, B-Unstandardized Beta Coefficient, SEB-Standardized Error of Beta, β-Standardized Beta

Coefficient, t-t Value of Beta, *p<0.05, **p<0.01, ***p<0.001

Table 4.14 shows the results of stepwise regression with hypertension clinical symptoms as the criterion (N = 406). After entering the significant correlates in the stepwise regression model, the results displayed four models. Model 1 was statistically significant [$F(1, 404) = 220.53, p < .001$] and explained 35% significant proportion of variance (*Adjusted* $R^2 = .35$) in hypertension clinical symptoms. In this model, sleep quality ($\beta = .59, p < .001$) emerged as a significant predictor of hypertension symptoms. In Model 2, along with sleep quality ($\beta = .55, p < .001$), internal health locus of control ($\beta = -.19, p < .001$) also emerged as

a significant predictor of hypertension clinical symptoms. The model was statistically significant [$F(2, 403) = 220.53, p < .001$] and provided an additional 3% of significant variance amounting to a total of 38% change ($Adjusted R^2 = .38$) in the criterion. The negative sign of β for internal health locus of control ($\beta = -.19$) indicates that as internal health locus of control increased, there was a decrease in hypertension clinical symptoms.

Further, Model 3 being statistically significant [$F(3, 4032) = 87.06, p < .001$] predicted an additional 1% variance totalling up to 39% significant proportion of change ($Adjusted R^2 = .39$) in hypertension clinical symptoms. Sleep quality ($\beta = .45, p < .001$), internal health locus of control ($\beta = -.19, p < .001$) and difficulty initiating sleep (a dimension of sleep quality) ($\beta = .13, p < .05$) emerged as the significant predictors in this model. In the final model (Model 4), along with sleep quality ($\beta = .43, p < .001$), internal health locus of control ($\beta = -.18, p < .001$) and difficulty initiating sleep (a dimension of sleep quality) ($\beta = .13, p < .05$), emotional / informational support (a dimension of social support) ($\beta = -.08, p < .05$) appeared as the significant predictors. Model 4 was statistically significant [$F(4, 401) = 66.91, p < .001$] and explained 1% additional change giving rise to 40% significant proportion of variance ($Adjusted R^2 = .39$) in hypertension symptoms.

The finding indicates that the accepted model (Model 4) explains 40% of variance in the clinical symptoms of hypertension. The factors that positively contribute to the clinical symptoms are poor sleep quality and difficulty in initiating sleep while the factors that negatively contribute to clinical symptoms are internal locus of control and emotional/informational support. This group of four factors explain 40% of variance in clinical symptoms among the hypertension patients.

Predictors of Hypertension Compliance

Hypertension compliance plays a significant role in managing hypertension as established by research. This phenomenon may be influenced by several factors, particularly

during COVID pandemic when compliance itself became a major challenge due to lock down and its concomitants factors. An attempt is made to identify the psychosocial factors contributing to hypertension compliance during the pandemic.

To identify the major determinants of hypertension compliance, stepwise regression was performed using hypertension compliance as the criterion. The correlates of hypertension compliance (as seen in Table 4.11) were taken as the predictors in the model. Table 4.11 shows a significant relationship between hypertension compliance and, social support and its dimensions (emotional/informational support, tangible support, affectionate support and positive social interaction), all the subscales of health hardiness (health value, internal health locus of control, external health locus of control and perceived health competence), sleep quality and its dimensions (daytime symptoms / dysfunction, restoration after sleep, difficulty initiating sleep, difficulty waking, satisfaction with sleep and difficulty maintaining sleep) and hypertension knowledge along with its dimensions (general awareness, lifestyle, causes, care and casualty, and management of medication). Though hypertension compliance correlated significantly with Blood Pressure readings and clinical symptoms they were not included in the regression model because theoretically Compliance predicted Blood Pressure Readings and Symptoms but not vice versa.

Correlation coefficients ranged between $r = -.11, p < .05$ to $r = .49, p < .01$ indicating weak to moderately strong correlations, thus, implying that the data were suitable for analysis through stepwise regression. Therefore, the variables were entered into the stepwise regression model in order to determine the predictors of hypertension compliance.

Table 4.15

Summary Table of Stepwise Regression Analysis for All Psychosocial Variables Predicting Hypertension Compliance

Model and Predictor Variable	R	R²	ΔR²	B	SEB	β	t
Model 1 (C = 18.26, F = 129.48***)	.46	.21					
Social Support				.13	.01	.46***	11.38
Model 2 (C = 15.86, F = 92.08***)	.56	.31	.10***				
Social Support				.09	.01	.36***	7.69
Health Value				.14	.02	.30***	6.45
Model 3 (C = 22.35, F = 73.04***)	.58	.34	.03***				
Social Support				.09	.01	.33***	7.29
Health Value				.12	.02	.25***	5.48
External Health Locus of Control				-.12	.02	-.21***	-4.93
Model 4 (C = 19.98, F = 58.73***)	.60	.36	.02***				
Social Support				.07	.01	.25***	4.71
Health Value				.12	.02	.25***	5.54
External Health Locus of Control				-.10	.02	-.18***	-4.12
Difficulty Waking Up				1.68	.52	-.16***	-3.25
Model 5 (C = 23.31, F = 49.78***)	.61	.37	.01**				
Social Support				.06	.01	.23***	4.47
Health Value				.12	.02	.26***	5.74
External Health Locus of Control				-.08	.03	-.14***	-3.19
Difficulty Waking Up				1.84	.52	-.18***	-3.56
Management of Medication				-1.40	.46	.12**	3.03

Note. C-Constant, B-Unstandardized Beta Coefficient, SEB-Standardized Error of Beta, β-Standardized Beta

Coefficient, t-t Value of Beta, *p<0.05, **p<0.01, ***p<0.001

Table 4.15 presents the results of stepwise regression analysis with hypertension compliance as the criterion (N = 406). Significant correlates of hypertension compliance

were entered as predictors into the stepwise regression model and the results generated five models.

In the first model, social support ($\beta = .46, p < .001$) emerged as a significant predictor of hypertension compliance. The model was statistically significant, [$F(1, 404) = 129.48, p < .001$] and explained 21% significant proportion of variance in hypertension compliance ($Adjusted R^2 = .21$). Model 2 gave rise to an additional significant predictor – health value ($\beta = .30, p < .001$). The model was significant [$F(2, 403) = 92.08, p < .001$] and predicted 10% additional significant proportion of change in hypertension compliance amounting to a total of 31% variance ($Adjusted R^2 = .31$).

In Model 3, social support ($\beta = .33, p < .001$), health value ($\beta = .25, p < .001$) and external health locus of control ($\beta = -.21, p < .001$) emerged as significant predictors of hypertension compliance. The model explained an additional 3% change amounting to 34% significant amount of variance ($Adjusted R^2 = .34$) and was statistically significant [$F(3, 402) = 73.04, p < .001$]. The negative sign of β for external health locus of control ($\beta = -.21$) indicates that as external health locus of control increased, there was a decrease in hypertension compliance. Model 4 was significant [$F(4, 401) = 58.73, p < .001$] and predicted an additional 2% change in hypertension compliance amounting to a total of 36% significant variance ($Adjusted R^2 = .36$). The model showed social support ($\beta = .25, p < .001$), health value ($\beta = .25, p < .001$), external health locus of control ($\beta = -.18, p < .001$) and difficulty waking up – a dimension of sleep quality ($\beta = -.16, p < .001$) as significant predictors of hypertension compliance.

In Model 5, along with social support ($\beta = .23, p < .001$), health value ($\beta = .26, p < .001$), external health locus of control ($\beta = -.14, p < .001$) and difficulty waking up ($\beta = -.18, p < .001$), management of medication – a dimension of hypertension knowledge ($\beta = .12, p < .01$) emerged as significant predictors of hypertension compliance. The model was significant

[$F(5, 400) = 49.78, p < .001$] and predicted an additional 1% significant proportion of change, which amounted to 37% of the total variance being explained ($Adjusted R^2 = .37$). The negative sign of β for external health locus of control ($\beta = -.14$) and difficulty waking up ($\beta = -.18$) indicates that as external health locus of control and difficulty waking up increased, there was a decrease in hypertension compliance.

Thus, the accepted model (Model 5) indicates that hypertension compliance has positive contributions from, social support, health value, and knowledge about management of medication and; has negative contributions from external health locus of control, and difficulty waking up from sleep. In other words, 37% of variance in hypertension compliance is explained by the combination of these variables where the first three facilitate and the last two hinder compliance in hypertension patients.

Predictors of Sleep Quality

Several factors determine the quality of sleep which is a significant component of hypertension management. During the pandemic sleep was identified as one major casualty among even the normal population. It is important to identify the psychosocial factors that influenced sleep quality during the pandemic.

To identify the major determinants of sleep quality, stepwise regression was performed using sleep quality as the criterion. The correlates of sleep quality (as seen in Table 4.11) were taken as the predictors in the model. Table 4.11 shows a significant relationship between sleep quality and, social support and its dimensions (emotional/informational support, tangible support, affectionate support and positive social interaction), all the subscales of health hardiness (health value, internal health locus of control, external health locus of control and perceived health competence), and hypertension knowledge along with its two dimensions (lifestyle, and management of medication),

hypertension compliance and its three dimensions (medication, diet and exercise), hypertension clinical symptoms, COVID-19 pandemic stress and blood pressure levels.

Correlation coefficients ranged between $r = -.12, p < .05$ to $r = .59, p < .01$ indicating weak to moderately strong correlations, thus, implying that the data were suitable for analysis through stepwise regression. Therefore, the variables were entered into the stepwise regression model in order to determine the predictors of sleep quality.

Table 4.16

Summary Table of Stepwise Regression Analysis for All Psychosocial Variables Predicting Sleep Quality

Model and Predictor Variable	R	R ²	ΔR ²	B	SEB	β	t
Model 1 (C = 35.44, F = 220.53***)	.594	.353					
Hypertension Clinical Symptoms				.13	.01	.59***	11.38
Model 2 (C = 51.86, F = 148.81***)	.652	.425	.072***				
Hypertension Clinical Symptoms				.09	.01	.51***	7.69
COVID-19 Pandemic Stress				.14	.02	.28***	6.45
Model 3 (C = 47.29, F = 120.04***)	.687	.473	.048***				
Hypertension Clinical Symptoms				.09	.01	.47***	7.29
COVID-19 Pandemic Stress				.12	.02	.27***	5.48
Hypertension Compliance				-.12	.02	-.22***	4.93
Model 4 (C = 50.57, F = 93.83***)	.695	.483	.011**				
Hypertension Clinical Symptoms				.07	.01	.44***	4.71
COVID-19 Pandemic Stress				.12	.02	.26***	5.54
Hypertension Compliance				-.10	.02	-.19***	4.12
Perceived Health Competence				1.68	.52	-.12**	3.25
Model 5 (C = 50.57, F = 76.84***)	.700	.490	.006*				
Hypertension Clinical Symptoms				.07	.01	.44***	4.71
COVID-19 Pandemic Stress				.12	.02	.24***	5.54

Coefficient, t-t Value of Beta, *p<0.05, **p<0.01, ***p<0.001

In the first model, hypertension clinical symptoms ($\beta = .59, p < .001$) emerged as a significant predictor of sleep quality. The model was statistically significant, [$F(1, 404) = 220.53, p < .001$] and explained 35% significant proportion of variance in sleep quality (*Adjusted $R^2 = .35$*). Model 2 gave rise to an additional significant predictor – COVID-19 pandemic stress ($\beta = .28, p < .001$). The model was significant [$F(2, 403) = 148.81, p < .001$]

and predicted 7.2% additional significant proportion of change in sleep quality amounting to a total of 42.5% variance (*Adjusted R*² = .42).

In Model 3, hypertension clinical symptoms ($\beta = .47, p < .001$), COVID-19 pandemic stress ($\beta = .27, p < .001$) and hypertension compliance ($\beta = -.22, p < .001$) emerged as significant predictors of sleep quality. The model explained an additional 4.8% change amounting to 47.3% significant amount of variance (*Adjusted R*² = .47) and was statistically significant [$F(3, 402) = 120.04, p < .001$]. The negative sign of β for hypertension compliance ($\beta = -.22$) indicates that as compliance with antihypertensive treatment increased, there was a decrease in poor sleep quality. Model 4 was significant [$F(4, 401) = 93.83, p < .001$] and predicted an additional 1.1% change in hypertension compliance amounting to a total of 48.3% significant variance (*Adjusted R*² = .48). The model showed hypertension clinical symptoms ($\beta = .44, p < .01$), COVID-19 pandemic stress ($\beta = .26, p < .001$), hypertension compliance ($\beta = -.19, p < .01$) and perceived health competence ($\beta = -.12, p < .01$) as significant predictors of sleep quality. The negative sign of β for perceived health competence ($\beta = -.13$) indicates that as perceived health competence increased, there was an improvement in sleep quality.

In Model 5, hypertension clinical symptoms ($\beta = .44, p < .001$), COVID-19 pandemic stress ($\beta = .24, p < .001$), hypertension compliance ($\beta = -.18, p < .001$), perceived health competence ($\beta = -.09, p < .001$), and external health locus of control ($\beta = .09, p < .001$) emerged as significant predictors of sleep quality. The model explained an additional 0.6% change amounting to 49% significant amount of variance (*Adjusted R*² = .49) and was statistically significant [$F(5, 400) = 76.84, p < .001$]. Model 6 was significant [$F(6, 399) = 65.38, p < .001$] and predicted an additional 0.6% change in hypertension compliance amounting to a total of 49.6% significant variance (*Adjusted R*² = .48). The model showed hypertension clinical symptoms ($\beta = .43, p < .01$), COVID-19 pandemic stress ($\beta = .25, p <$

.001), hypertension compliance ($\beta = -.15, p < .01$), perceived health competence ($\beta = -.09, p < .01$), external health locus of control ($\beta = .09, p < .001$) and social support ($\beta = -.09, p < .01$) as significant predictors of sleep quality. The negative sign of β for social support ($\beta = -.09$) indicates that as social support increased, there was an improvement in sleep quality.

Finally, Model 7 was significant [$F(7, 398) = 57.05, p < .001$] and predicted an additional 0.5% change in hypertension compliance amounting to a total of 50% significant variance ($Adjusted R^2 = .49$). The model showed hypertension clinical symptoms ($\beta = .43, p < .01$), COVID-19 pandemic stress ($\beta = .24, p < .001$), hypertension compliance ($\beta = -.09, p < .01$), perceived health competence ($\beta = -.08, p < .01$), external health locus of control ($\beta = .09, p < .001$), social support ($\beta = -.09, p < .01$) and compliance with antihypertensive diet ($\beta = -.09, p < .01$) as significant predictors of sleep quality. The negative sign of β for compliance with diet ($\beta = -.09$) indicates that as compliance with diet increased, there was an improvement in sleep quality.

It may be reiterated here that the scores of sleep quality are negative, where higher scores indicate lower sleep quality. Hence the predictions must be carefully interpreted. Thus, the accepted model (Model 7) indicates that sleep quality is negatively contributed by hypertension clinical symptoms, COVID-19 pandemic stress and external health locus of control. It has positive contributions from hypertension compliance, perceived health competence, social support, and compliance with diet. In all, 50% of variance in sleep quality is explained by the combination of these variables where the first three hinder and the last four facilitate sleep quality in hypertension patients.

Part 3: Tracking a Pathway between Psychosocial factors and Hypertension

Management During COVID 19 Pandemic:

Part 2 of the results identified the psychosocial variables contributing to the four components measuring hypertension management. Logically, these psychosocial factors

should be so organized to identify the pathway from them to the factors measuring hypertension management with the major factors being Clinical Symptoms and Blood Pressure reading as the destination or the final indicators of the effective management or otherwise

The final objective of the study was to examine the pathway in the relationships between psychosocial factors and hypertension management. In order to address this objective, structural equation modelling (SEM) was utilized. IBM SPSS AMOS v. 22 was used to perform SEM on the obtained data.

Structural equation modelling is carried out in two steps: 1.) the measurement model is developed and confirmatory factor analysis is performed to test the relationships between latent variables and their indicators and, 2.) the hypothetical structural model is developed to examine the relationships among the latent variables. Three types of relationships exist between variables in a structural equation model. A nondirectional relationship between two latent variables or error terms is known as an association. A directional relationship between an independent variable and a dependent variable is known as a direct effect. An indirect effect refers to the relationship between an independent variable and a dependent variable mediated through a third variable. The indirect effect may treat the same variable as both a dependent as well as an independent variable (Hoyle, 1995). SEM provides the estimates of strengths of all the hypothesized relationships between variables in a theoretical model and also represents the underlying causal processes (Maruyama, 1997).

The usual steps of model confirmation, model discrimination, parameter estimation, testing for model fit, and model reconfirmation were followed in this study. The measurement model along with the structural model are required to have adequate levels of fitness in order to understand the degree of similarity between the hypothesized theoretical model and the observed data (Maruyama, 1997). Several researchers have proposed

acceptable values of model fitness for structural equation models. The values of overall fitness indices such as comparative fit index (CFI), incremental fit index (IFI), normed fit index (NFI), Tucker Lewis index (TLI) and relative fit index (RFI) vary from 0 to 1. Values above .90 are considered to be acceptable for the above-mentioned fitness indices (Bentler & Bonett, 1980; Collier, 2020). With respect to root mean square error of approximation (RMSEA) MacCallum et al. (1996) suggest a value below .05 denotes a good model fit, a value between .05 - .08 indicates adequate model fit and values above .10 indicate poor fit.

Adequate values for indicators such as goodness-of-fit (GFI) and adjusted goodness of fit (AGFI) are above .90 (Hu & Bentler, 1999). However, while this index was well-accepted in its early years, it was found to be sensitive to sample size (Sharma et al. 2005). Prior research has also suggested values above .80 as acceptable (Baumgartner & Homburg, 1996; Doll *et al.*, 1994) when the sample size is high (Hair et al., 2010). With respect to GFI, CFI, TLI, IFI and RFI, values closer to 1 indicate a good fit whereas, values inclined towards 0 show poor model fit.

The steps followed to develop an acceptable structural model in this study are presented below:

Measurement Model

The measurement model is developed in order to examine the associations between observed measures and their latent structures, through Confirmatory Factor Analysis (CFA). This statistical technique aids in confirming the underlying factor structure of latent variables and examines the extent to which the factor structure is consistent with the observed data (Lattin et al., 2003).

In order to test the measurement model, a confirmatory factor analysis was run with seven latent factors (COVID-19 pandemic stress, hypertension knowledge, health hardiness, social support, sleep quality, hypertension compliance and hypertension clinical symptoms)

identified through correlation analysis, and their item statements as indicators on AMOS v.

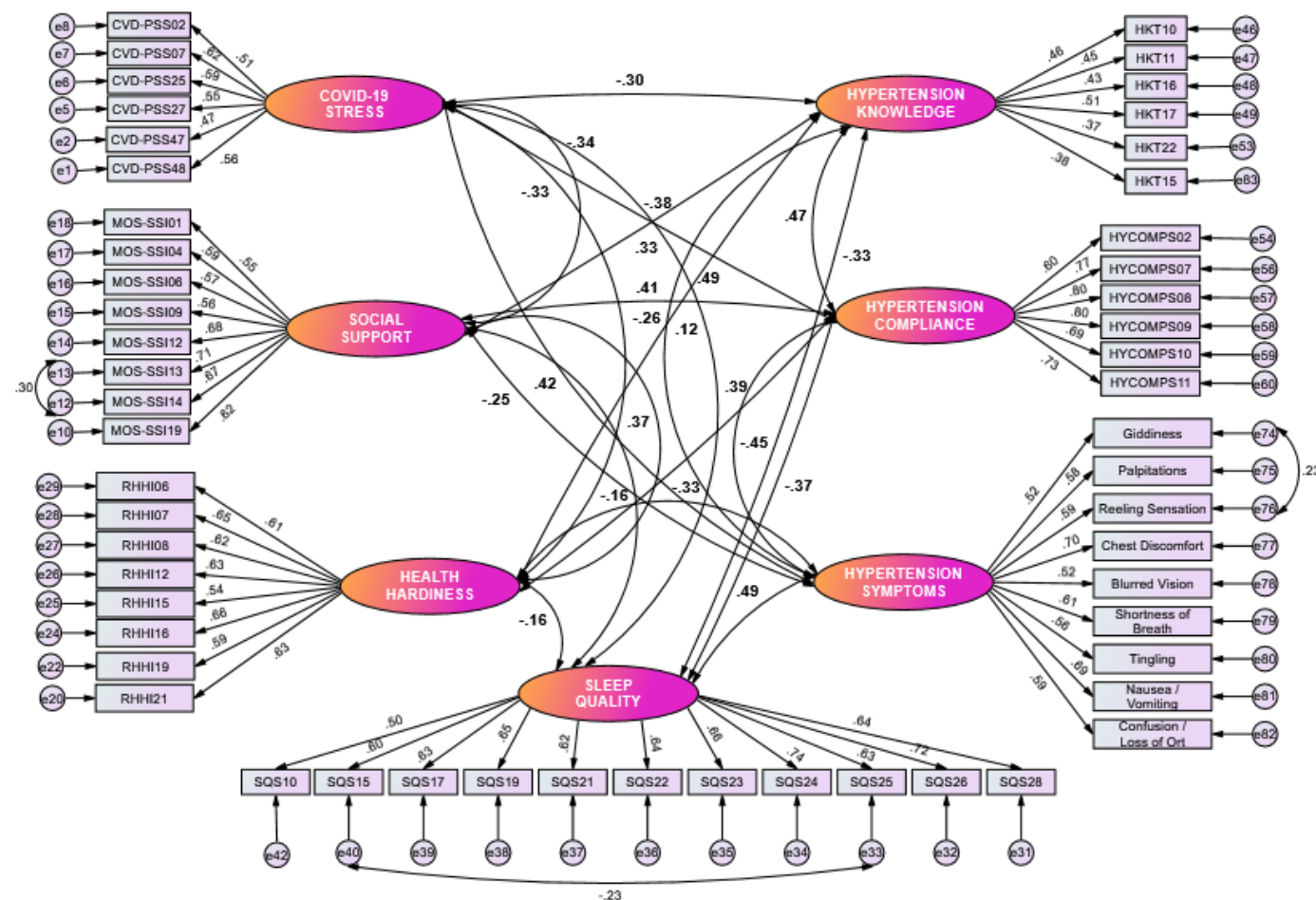
22. The model fit indices were found to be lesser than the acceptable cut-off, therefore, modifications were made to improve the model fit. Improvement in model fit, at every stage, was brought about in three steps:

1. Indicators with the lowest factor loadings (below 0.5) were deleted one by one and model fitness was checked at every step
2. Next, the standardized residual covariances were examined and significant residual covariances that were above 2.5 were used to eliminate constructs/indicators of the latent variables
3. Finally, the modification indices were used to identify and draw covariances between error terms of the same latent construct

All the above steps were performed in iteration. Model fitness was checked at each step and further modifications were made. Finally, six indicators of COVID-19 pandemic stress, six indicators of hypertension knowledge, eight indicators of social support, eight indicators of health hardiness, and six indicators of hypertension compliance, nine indicators of hypertension clinical symptoms and 11 indicators of sleep quality were retained in the measurement model to get an acceptable model fit. Following were the model fit indices after modifications: the value of *chi square / df* was reported as 1.44, *GFI* = .85, *AGFI* = .84, *CFI* = .91, *TLI* = .91, *RMSEA* = .03, *PCLOSE* = 1.00. The confirmatory factor analysis with seven latent constructs ((COVID-19 pandemic stress, hypertension knowledge, health hardiness, social support, sleep quality, hypertension compliance and hypertension clinical symptoms) and their indicators is represented in Figure 4.1.

Figure 4.1

Confirmatory Factor Analysis Depicting Measurement Model Among All Psychosocial Factors



Structural Model

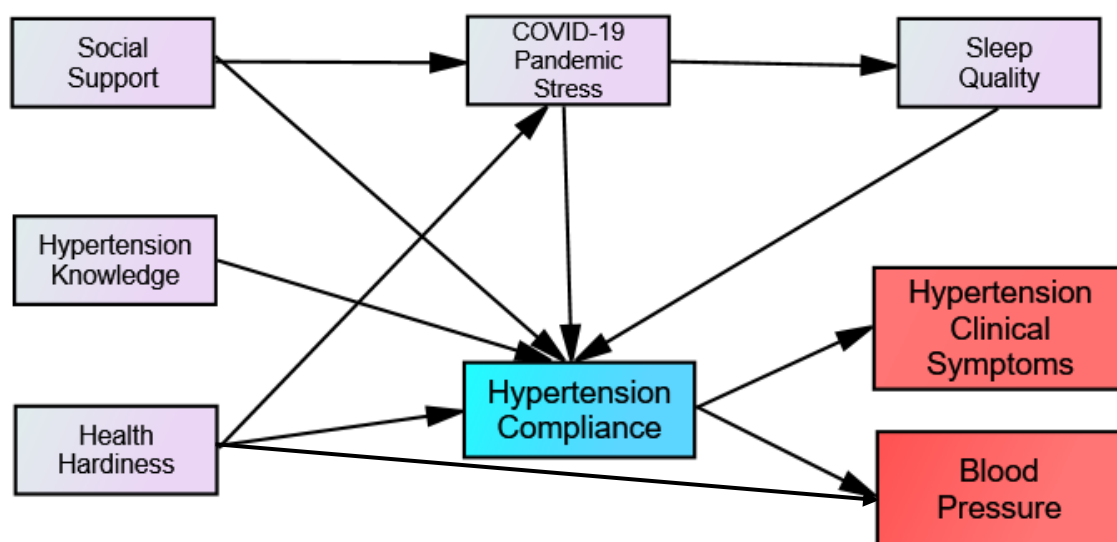
After establishing the measurement model, the structural model is developed and tested by conceptualising causal relationships between the latent variables while conserving the factor structures of the CFA in the measurement model.

Hypothetical Model. To identify the pathway leading to hypertension management, a hypothetical model was conceptualised. This figure is illustrated in Figure 2 below which was utilized in testing pathways in structural equation modelling. The model shows pathways drawn between the independent and dependent variables to specify the relationships between

them. A single-headed arrow depicts a path from the exogenous construct (independent variable) to the endogenous construct (dependent variable). A double-headed arrow denotes covariance between two variables without specifying any direction. An endogenous construct can also act as a mediating variable between two latent constructs. After testing the hypothetical model with the observed data, the fitness of the model was examined.

Figure 4.2

Hypothetical Model Depicting the Pathway Leading to Hypertension Management

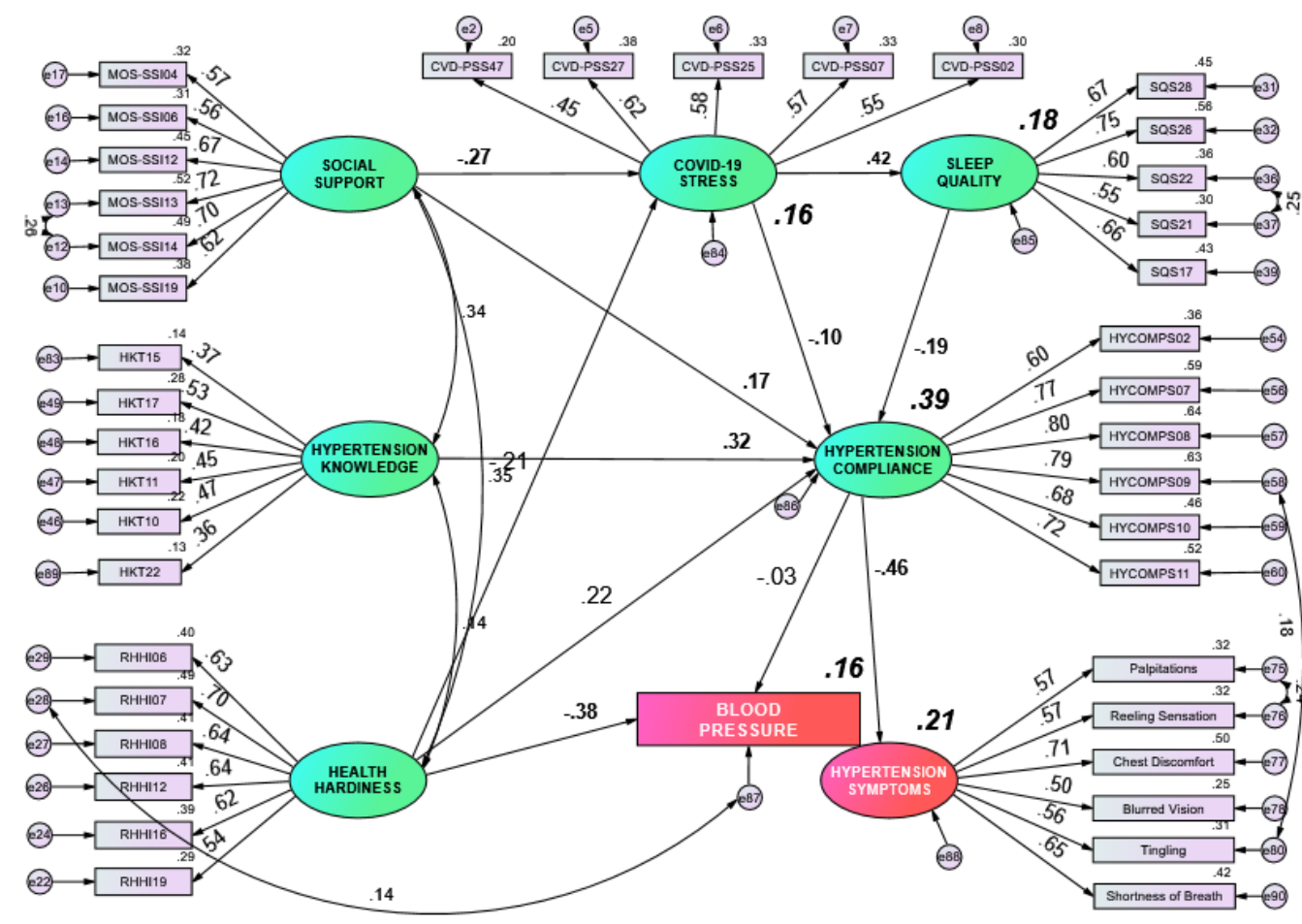


Model Confirmation. The fit indices and path estimates for the first model created by SEM were evaluated. Two indices—the standardised residual covariances and modification indices—were utilised for the deletion of constructs / indicators or modification of the model. Standardised residuals are the differences between the observed and the estimated covariance matrix (Collier, 2020). Ideally, the values of residuals should be low and inclined towards zero (Tabachnick et al., 2007). Theoretically sound covariances among residual errors were drawn after examining the modification indices.

Hypothesized paths among COVID-19 pandemic stress, hypertension knowledge, social support, health hardiness, hypertension compliance, sleep quality, hypertension symptoms and blood pressure were drawn. The final model is illustrated in Figure 4.3. The parameters of the modified model were estimated and the fit indices showed good model fitness. Following were the values of the indices: CMIN/DF= 1.30, GFI=.90, AGFI=.88, CFI=.95, TLI=.94, IFI=.95 and RMSEA=.03, PCLOSE=1.00. As the fitness values met the acceptable cut-offs stated in literature, this model was accepted. After analysing the standard path coefficients for all the pathways, it was found that nine out of the 10 hypothesized paths were statistically significant whereas, one path was statistically insignificant. The direction of their relationships was also found to be as proposed in the hypothetical model.

Figure 4.3

Structural Equation Model Depicting the Causal Pathway Between Psychosocial Factors and Hypertension Management in Indian Hypertensive Adults



The interrelationship between the independent variables of Health Hardiness, Hypertension Knowledge and Social support is indicated by the positive association between them. Health hardiness (-0.23, $p < .001$) and social support (-0.25, $p < .001$) contribute negatively to COVID-19 pandemic stress. The negative estimates indicate that an increase in social support and health hardiness predict a decrease in COVID-19 pandemic stress.

COVID-19 pandemic stress while seen to have a positive contributing effect of 0.42 ($p < .001$) on poor Sleep Quality, is also found to have a negative contributing effect of -0.17 ($p < .05$) on Hypertension Compliance. Sleep quality has a negative contribution of -0.18 ($p < .05$) on Hypertension Compliance. Hypertension Compliance has a positive contributing effect of 0.21 ($p < .05$) on Blood Pressure and 0.46 ($p < .001$) on Hypertension Symptoms. Health Hardiness has a negative contributing effect of -0.38 ($p < .001$) on Blood Pressure and 0.14 ($p < .05$) on Hypertension Symptoms. Social Support has a positive contributing effect of 0.32 ($p < .001$) on Hypertension Compliance and 0.17 ($p < .05$) on Hypertension Symptoms.

.01) on Hypertension Compliance. This means that greater problems in sleep quality predicted lower rates of compliance. A positive contribution of hypertension knowledge of 0.32 ($p < .01$) was found on hypertension compliance. Similarly, the contribution of social support on hypertension compliance was found to be 0.24 ($p < .001$). Together, all the four factors (hypertension knowledge, social support, COVID-19 pandemic stress, sleep quality) predicted 36% change in hypertension compliance.

Further, the contribution of hypertension compliance towards hypertension symptoms was found to be -0.45 ($p < .001$), indicating that high compliance negatively impacted symptoms of hypertension, thereby, reducing them. Blood pressure reading was also found to receive a direct negative contribution of -0.37 ($p < .001$) from health hardiness signifying that an increase in health hardiness predicted lower blood pressure levels. It was observed that with the introduction of a direct path from health hardiness to blood pressure, the impact of hypertension compliance on blood pressure becomes insignificant, indicating that health hardiness has a direct significant impact on blood pressure ($\beta = -0.37$, $p < .001$). In terms of regression estimates, there is a 20% difference in hypertension symptoms and 15% difference in blood pressure reading due to health hardiness and hypertension compliance. This is because of contributions from Hypertension Knowledge, Social Support, good Sleep Quality and lower COVID-19 Pandemic Stress. Thus, enhanced Compliance on the one hand helps in reducing the Hypertension Symptoms and Blood Pressure and, on the other hand improved health hardiness directly lowers Blood Pressure.

To sum up, this chapter presented the results of interrelationships between the various psychosocial variables and hypertension management, presented the outcome of statistical applications that identified the predictors of hypertension management and traced the path between the psychosocial factors and hypertension management.

Chapter V

DISCUSSION

Chapter V

Discussion

The study was carried out to examine hypertension management in adults during the COVID-19 pandemic. This chapter systematically discusses the hypotheses laid down for the study while recapping the key findings in view of relevant research conducted in the past. The limitations of the study are discussed further, which is followed by a deliberation upon the implications of the study.

This study is fitted into the theoretical framework of the Health Belief Model. During the pandemic the perception of severity and susceptibility were high because hypertension was one of the non-communicable diseases identified as a high-risk factor for contracting COVID-19. With the novelty of the virus and lockdown(s) in place, the perceived control was low while perceived barriers in managing hypertension were high. However, the perceived benefits of managing the disease during the COVID-19 pandemic were expected to be high. Given these circumstances, the psychosocial variables that aided in the effective management of hypertension were examined in this study.

It was hypothesised that given the high severity, susceptibility, perceived barriers in combination with high perceived benefits under the condition of low control, a number of psychosocial variables play a role in enhancing the effective management of hypertension during the pandemic. Four different parameters were identified as components of hypertension management, viz.: BP readings, hypertension clinical symptoms, hypertension compliance and sleep quality. The study examined the psychosocial contributors for each of these disease management variables.

The results revealed that three major factors contributed to BP readings - compliance with hypertension treatment, health hardiness and social support. According to the results, three

components of compliance, i.e., overall compliance, compliance with exercise and self-monitoring were the significant contributors to BP readings. During the COVID-19 pandemic, the nationwide lockdown(s) confined everyone to their respective residences, thus curtailing the scope for physical exercise through regular walks or workouts at fitness centres, and even short-distance walks to the workplaces or to run errands. Those who complied with the guidelines could manage their BP levels better than those who could not. Similarly, self-monitoring of BP assumed new significance because hospitals and health care centres were inaccessible for routine health checkups due to concerted efforts to accommodate treatment for COVID-19 patients. Furthermore, there was an inhibition in visiting any hospital for fear of contracting the virus. Given such constraints, those who monitored their BP at home using an electronic BP apparatus could reap the benefit of managing their BP levels better. This result has been corroborated by studies during the COVID-19 pandemic (Attahiru et al., 2023; Trimarco et al., 2023) as well as before the pandemic (Yue et al., 2015). It is evident that compliance with the prescribed hypertensive treatment regimen will have a direct impact on reducing blood pressure levels. Following medical advice, adhering to the specified medication, diet, exercise have beneficial effects on uncontrolled blood pressure. Compliance with exercise and self-monitoring during the COVID-19 pandemic is challenging and hence, is a significant aspect to be noted.

Health hardiness was the second factor that contributed to BP levels during the COVID-19 pandemic. The subscale of health value of the scale measuring health hardiness, reflecting the component of commitment, was found to be a significant contributor. Health hardiness, though a less-examined construct, has shown to improve health status and the mechanisms behind this are unclear as of now. The commitment one has towards one's health and well-being will determine the amount of effort invested, particularly so, during the challenging time of the COVID-19 pandemic. An individual who values his/her health condition, will find a way

to take action for managing the hypertension to bring it within the normal range, when the avenues for attending any emergencies are almost nil, which happened during the pandemic. Thus, hypertensives who were high on their scores on health value were the ones who could maintain their BP levels within the normal range despite all the constraints that came with the pandemic and the lockdown(s). Though studies directly supporting the contributions of health value to maintaining the BP levels were not found, there are studies that indicated the relationship between health hardiness and health promoting behaviour as well as healthy lifestyle (Carlucci et al., 2022; Klag & Bradley, 2004; Smith et al., 2004;).

Social support and its two specific components, viz. - affectionate support and emotional/informational support constituted the third factor that contributed to maintaining BP levels during the pandemic. Social support acts as a push towards compliance through family support in the form of encouragement and daily reminders; and physician's support in the form of health information imparted about the disease, its risk factors, and the treatment regimen. Social support may also act as a buffer against stressors in stressful situations. It is well known that stress is a major cause of increased blood pressure. By functioning as a cushion, social support lowers the negative impact of stress on blood pressure.

The COVID-19 pandemic brought along with it a very strange social phenomenon called social distancing, which was experienced as a severe deprivation, particularly in an affiliation- oriented country like India. This itself was a source of stress. In such circumstances, finding a succour in receiving affectionate support from someone, proved to be a great stress-absorbent during the period. Further, receiving relevant and correct information on health-related aspects during such a period (pandemic) where rumours and misinformation were abundant (Hariharan, 2020), proved to be a great source of relief from stress which helped in maintaining the BP levels. During the pandemic though the physical presence of family, extended family and friends was prohibited, those who could optimise on social media to gather

emotional and informational support were the ones who could maintain better BP levels better than those who failed to do this. The contribution of social support in maintaining BP levels has been suggested by prior studies (Shahin et al., 2021; Taher et al., 2014; Turan et al., 2019) and the significance of social support in controlling BP levels during the COVID-19 pandemic has also been suggested by one study by Fentaw et al., (2022).

The Health Belief Model does not take into account the significance of social support. While the other theories (Theory of Planned Behaviour, Theory of Reasoned Action) have included social support as a component in their model, they do not refer to perception of severity and susceptibility which are important in the context of the COVID-19 pandemic. Hence, one may postulate the expansion of the Health Belief Model based on the new findings of health behaviour during the COVID-19 pandemic.

The second major component measuring hypertension management is hypertension clinical symptoms. Results revealed that the clinical symptoms are predicted by components of sleep quality, health hardiness and social support. Overall sleep quality and difficulty initiating sleep were the contributing factors to clinical symptoms of hypertension. Studies in the past have demonstrated a relationship between insomnia / poor sleep quality and symptoms of primary hypertension (Budhiraja et al., 2011; Rod et al., 2011; Thomas & Calhoun, 2017). Poor sleep quality has also been associated with elevated nocturnal blood pressure and a nondipping BP pattern (Lo et al., 2018).

Sleep was a major casualty among the general public during the pandemic (Hariharan, 2020). High levels of anxiety about the unknown (COVID-19) and the unusual physical and family environment in which everyone worked from home following different time zones adversely affected sleep quality. One of the reasons for the adverse impact on sleep quality was increased screen time, which in turn affected the secretion of melatonin, delaying the initiation of sleep. One of the requirements for managing hypertension is adequate sleep, both in terms

of quality and quantity. When sleep is affected, it impacts the maintenance of healthy BP levels as well as manifests in the form of various symptoms such as headaches, exhaustion, palpitations, and the like. Those who were able to maintain a good quality of sleep despite all the challenges of the pandemic were those who did not show many or strong symptoms of hypertension. Sleep quality was found to be significant in predicting blood pressure and its symptoms in hypertensive patients during the COVID-19 pandemic in a few studies (Kreutz et al., 2021; Fernandex et al., 2022). Prior to the pandemic also, studies have demonstrated the impact of sleep quality on hypertension management (Lo et al., 2018; Palagini et al., 2013).

The second factor that contributed to the clinical symptoms of hypertension was health hardiness, and specifically internal health locus of control. A stronger internal health locus of control indicated lower manifestation of symptoms related to hypertension. While there is no physiological mechanism that explains the connection between health locus of control and somatic experience, an internal health locus of control may drive an individual towards positive health behaviours. Individuals with an internal health locus of control take ownership and responsibility of their health. They believe that health outcomes are under their control and the actions taken by them directly impact their health status. Those with high internal locus of control have a greater sense of personal control including behavioural control, cognitive control, decisional control and informational control (Hariharan, 2020). Therefore, they are highly motivated to engage in health promoting behaviours. An internal health locus of control in hypertensives results in higher compliance with the antihypertensive treatment regimen thus, reducing the symptoms of hypertension.

An internal health locus of control during the pandemic of COVID-19 indicates the tenacity of the individual. This is likely to be present along with a high health value. Those with an internal health locus of control are the persons who are likely to be active in health seeking behaviour even during the difficult situation of the COVID-19 pandemic. These are

the people, who, despite the pandemic situation are likely to show high compliance and hence, maintain a relatively symptom-free life during the COVID-19 pandemic where there were several limitations such as, reduced access to health care systems, low stock of medication, inability to follow the diet and exercise regimen, and others. The persons with internal locus of control are likely to go the extra mile to make things available to them, so as to facilitate the prescribed treatment regimen. Studies conducted on hypertension patients in hospital settings in African countries of Ghana and Nigeria have reported the positive influence of internal health locus of control on clinical symptoms of hypertension (Afsahi & Kachooei, 2020; Omeje & Nebo, 2011; Taher et al., 2015).

The third component that predicted clinical symptoms is social support, where the emotional/informational support is found to be a significant contributor. Numerous studies have been conducted to examine the connection between social networks and physical health, and it has often been found that those who are connected to others socially have a longer life expectancy, experience reduced somatic symptoms, and have lower blood pressure. The stress-buffering hypothesis postulates that the perceived availability of social support will reduce or even reverse the detrimental effects of perceived stress caused by a chronic condition on one's health and quality of life (Cohen & McKay, 2020).

According to a study by Bowen et al. (2014), in predicting ambulatory blood pressure, momentary stress was reduced by overall social support, emotional support, tangible support, and informational support. The most significant stress-relieving predictor of ambulatory blood pressure was informational support, which predicted both ambulatory systolic and diastolic blood pressure. Emotional support, signifying care and compassion, serves as a source of wellbeing-enhancer and is an effective coping mechanism during times of distress. Informational support on the other hand, refers to the knowledge, advice and psychoeducation provided to patients by healthcare providers, peers, and family members. This type of support

equips the patient with facts about his/her health condition which helps them cope better with and develop new strategies to manage their chronic condition, in turn implying improved compliance behaviour which has a direct impact on hypertension and its symptoms.

The third factor that measures hypertension management is compliance. This is a major component measuring hypertension management in terms of behaviour. The four factors that predicted this component are social support, health hardiness, sleep quality and hypertension knowledge. Social support constitutes a good reinforcement for any health behaviour. During the pandemic while hypertension compliance became a challenge, a strong social support component is likely to have functioned as a good reinforcer to strengthen the compliance behaviour. Those who had strong social support were the ones who showed greater compliance. Studies have proved that compliance directly predicts the prognosis of hypertension (Hariharan & Thomas, 2020; Swain, 2015; Thomas, 2016).

The other two components of health hardiness predicting hypertension compliance are external health locus of control (negatively predicting compliance) and health value. Those with external health locus of control are unlikely to show high compliance behaviour. They are more likely to cite the COVID-19 pandemic-related factors such as inaccessibility of the health care system, running out of stock of medication, difficulty in following the exercise regimen due to restrictions in movements and problems in following diet regimen due to multiple changes in the home environment and so on as barriers to compliance. In contrast, those with high scores on health value would pursue compliance at all costs. Thus, the challenges of the COVID-19 pandemic are differentially encountered by people with high and low levels of health hardiness in their personality traits.

Sleep quality, particularly difficulty waking up also emerged as a significant predictor of hypertension compliance. Difficulty waking up is an indicator of inadequate sleep. The COVID-19 pandemic imposed a long period of stress on people worldwide and has been shown

to significantly affect sleep duration and quality across different populations. The new normal brought about changes in family organization and working routines, social isolation and confinement at home which may have induced feelings of helplessness, loneliness, anger, and fear. Stress and the experience of negative emotions are likely to have a negative impact on sleep quality. The increase in rotational shifts at the workplace during the pandemic, is likely to cause disturbances in the sleep schedule of employees resulting in difficulty in waking up on time due to inadequate sleep. It is known that a sufficient amount of sleep each night (7 to 8 hours) improves concentration, memory, judgement, vigilance and decision-making. These cognitive factors play a role in compliance by helping hypertensives remember to take medications on time, leave adequate time to plan, prepare and follow the prescribed diet and monitor themselves for physiological symptoms. Inadequate sleep results in feelings of tiredness and exhaustion which hinder compliance with exercise. Good sleep quality increases positive emotions and general well-being, which are associated with higher rates of compliance (Bassett et al., 2019; Harvey et al., 2016). Therefore, those hypertensive adults who were able to maintain a good sleep quality despite the challenges posed by the COVID-19 pandemic, were also able to comply better with the prescribed treatment regimen.

The fourth factor contributing to compliance is hypertension knowledge, specifically knowledge of medication management. Knowledge contributes positively to cognition. Those with the knowledge about the significance of being regular with medication and the repercussions of missing the medication were the ones who complied not only with the timings and dosage of medication but also with diet, exercise and monitoring reflected in overall compliance. The Health Belief Model advocates that those with the cognition of severity and susceptibility are the ones who are motivated to comply with health behaviour. Cognition contributes positively to motivation and motivation in turn to health behaviour. The Information Motivation Behavioural Skills model by Fisher and Fisher (1992) advocates the

role of information in triggering or enhancing the motivation to initiate a behaviour. Those hypertensives with prior knowledge about the various aspects of hypertension and the significance of compliance are the ones who conformed to compliance behaviour. This, in fact points to health literacy and its significance in compliance behaviour. There is a possibility that due to the high prevalence rates of hypertension and its typical asymptomatic characteristics, people during the pandemic are likely to have assumed a complacency resulting in missing their medication and becoming lenient with their diet and exercise regimen. The policy level learning point from this, particularly in terms of public health measures is to gear up to create strong health awareness programmes for non-communicable diseases among the public.

Numerous evidence-based studies have shown that interventions aimed at improving patients' knowledge of medications are of potential clinical value in improving adherence with antihypertensive therapy. The results of these studies support the notion that improving the knowledge base and gaining an understanding of the long-term risk of hypertension are valid approaches to improving compliance (Gwadry-Sridhar, 2013). A study by Andrew et al. (2022) showed the efficacy of a hypertension knowledge enhancing intervention which imparted knowledge about the aetiology, risk factors, treatment and lifestyle modifications required to manage hypertension. This intervention was delivered in various forms and frequencies, and carried out on Indian hypertensive adults. The results indicated that the hypertension management in terms of compliance was higher in the group that received a double exposure through direct interaction with healthcare professionals.

The fourth factor measuring hypertension management is Sleep quality. Sleep quality has a significant contribution to maintaining blood pressure levels. Results revealed that sleep quality is predicted by five factors, viz- hypertension clinical symptoms, COVID-19 pandemic stress, hypertension compliance, health hardiness, and social support. The COVID-19 pandemic itself was a stressor for the vulnerable group of hypertensives. This may have given

rise to somatic symptoms (such as palpitations, headaches, difficulty breathing, nausea, and others) which are part of clinical symptoms of hypertension. Somatic symptoms of hypertension such as headaches, palpitations, chest pain, difficulty breathing, and the like, may keep an individual awake at night, and even give rise to anxiety leading to sleep disturbances. Further, novel research shows that antihypertension medications such as beta-blockers may disrupt sleep and lead to insomnia as they interact with the body's natural sleep-inducing hormones, making it difficult to initiate and maintain sleep (Chang et al., 2013). Impaired sleep is one of the factors that disturbs the equilibrium of BP levels. A connection between impaired sleep and elevated blood pressure levels with hypertension symptoms has been established in past research (Knutson et al., 2009).

The second factor contributing to sleep quality was found to be COVID-19 pandemic stress. The stress emerging from the COVID-19 pandemic was something that prolonged across its two waves, running into several months, thus taking the turn of a chronic characteristic. Reports of reduced sleep quality during the COVID-19 pandemic are widely cited in different populations (Barros et al., 2020; Huang & Zhao, 2020) possibly due to fear and uncertainty concerning the disease (COVID-19), changes in living conditions and health behaviours, and the various consequences of the social distancing and sanitary measures. These feelings and aggravations are added to the concerns of chronic patients, mainly the fear of contracting the disease and insecurity regarding medical routines along with the continuity of treatment. Those who experienced higher levels of stress due to pandemic-related factors, had lower sleep quality. Numerous studies have reported the adverse impact of the COVID-19 pandemic on sleep quality (Gupta et al., 2020; Lima et al., 2022; Pinto et al., 2020; Targa et al., 2021; Xia et al., 2021; Xiao et al., 2021). Previous studies have established that stress interferes with sleep quality and duration in several ways. As a result of adrenaline and cortisol secretion during

stress, chronic stress causes the body to stay in a heightened state of arousal for long durations. This leads to sleep deprivation stemming from an absence of relaxation.

Hypertension compliance in general and, dietary compliance in particular, are identified as factors contributing to sleep quality during the COVID-19 pandemic. The pandemic brought with itself, several challenges for patients with hypertension with respect to compliance. In addition to the stress of being classified as vulnerable to the COVID-19 infection, they also had to experience specific management-related obstacles such as inaccessibility to healthcare, shortage of medical supplies, closure of fitness centres, insufficient attention from healthcare professionals, and lack of confidence in telemedicine/remote management of illness. Researchers have documented a decrease in compliance levels in patients with chronic illnesses during the COVID-19 pandemic (Gul & Atakli, 2021; Salvio et al., 2022; Zakaria et al., 2020). Higher compliance rates would imply lower blood pressure readings, which would, in turn, enhance sleep quality.

Health hardiness emerged as another significant predictor of sleep quality. Specifically, perceived health competence and external health locus of control were found to contribute to sleep quality. Individuals with a high level of perceived health competence viewed health conditions as a challenge rather than a stressor, indicating their willingness to effectively manage a chronic condition as a learning experience that will help personal growth. Such individuals were likely to have appraised the stressors created by the pandemic as a challenge and found novel strategies to overcome the health-related hurdles posed by the pandemic and the ensuing lockdown. This would have a positive influence on hypertension compliance, further lowering blood pressure levels and raising sleep quality.

Yet another predictor of sleep quality was the external health locus of control dimension of health hardiness, which negatively predicted sleep quality. External health locus of control denotes the control component of health hardiness. This negative contribution to sleep quality,

indicates that external health locus of control is associated with poor sleep quality. A person with a high LoC (external) attributes his/her health condition and the ability to follow treatment to external sources such as healthcare professionals, chance, fate, and supernatural powers. Without taking up responsibility and ownership of one's health condition, optimal compliance is impossible. This leads to uncontrolled BP, which may affect one's sleep quality.

The final significant contributor of sleep quality was social support indicating that high social support is related to better sleep quality. Social support became particularly important during the COVID-19 pandemic, as many people experienced increased stress and anxiety due to the uncertainties and disruptions caused by the coronavirus. The COVID-19 pandemic was a stressor for hypertensives, classifying them as a vulnerable group and at the same time, the nation was required to cut down on social support, which is a cornerstone for the collectivistic culture in India. This, in fact adversely affects the security needs of the individual. Deprivation of security needs, worries about the wellbeing of their loved ones may have negatively impacted their sleep quality. As mentioned earlier, social support has numerous effects on physical health. It helps minimising psychological stress, improves compliance in hypertensive adults and even helps bring blood pressure under control. Adequate social support has previously been reported to have a positive effect on psychological health and sleep function (Kent de Grey et al., 2018; Prati & Pietrantonio, 2010).

To summarise, the four measurement variables of hypertension management were predicted by a number of psychosocial factors. The identified psychosocial factors are - compliance with hypertension (overall compliance, diet, exercise and self-monitoring), health hardiness (health value, internal health locus of control, external health locus of control and perceived health competence), social support (overall support, affectionate support and emotional/instrumental support), sleep quality (overall sleep quality, difficulty initiating sleep and difficulty waking up), hypertension knowledge (management of medication), hypertension

clinical symptoms and COVID-19 pandemic stress. A total of 17 variables factored under compliance behaviour, the personality variable of health hardiness, social support, the biological need factor called sleep quality, clinical symptoms of hypertension, the cognitive variable called hypertension knowledge, and the affective factor called COVID-19 pandemic stress were identified as psychosocial factors contributing to hypertension management. Thus, the study was able to identify psychological, social and biological factors contributing to hypertension management during the COVID-19 pandemic. Hence the hypothesis – *psychosocial factors contribute towards hypertension management during the COVID-19 pandemic* is accepted.

While psychosocial factors contributing to hypertension management were identified, the results also tested the hypothesis that there were significant group differences in the management of hypertension with respect to factors other than those found to have contributed to it. In order to examine this, four hypotheses were formulated to investigate the differences in hypertension management-related variables (blood pressure levels, hypertension clinical symptoms, hypertension compliance, and sleep quality) on health-related factors and demographic variables.

The first hypothesis tested for differences in blood pressure levels based on demographic factors such as gender, education levels, and occupation as well as health-related factors such as presence of a family history of hypertension, presence of comorbid conditions and illness duration. This hypothesis was explored via six sub-hypotheses.

The first three sub-hypotheses postulated that there will be differences in blood pressure readings based on gender, education level and occupation. No significant differences were found based on these demographic factors. Therefore, these hypotheses are rejected.

The fourth sub-hypothesis stated that *there will be a difference in blood pressure readings based on family history of hypertension*. It was observed that participants with a family history of hypertension have higher blood pressure readings compared to those who do not have a family history of hypertension. Though such individuals show high compliance with treatment, they have a low control on their blood pressure as hypertension has a strong biological basis. Muralikrishnan et al. (2011) found early markers of cardiovascular autonomic impairment in Indian young adults with a parental history of hypertension. Hypertension is a genetic health condition which is passed on to the upcoming generations via heredity and therefore, those with the presence of hypertension in the family, tend to manifest higher BP levels than those who do not have hypertension running in the family. Based on the findings the hypothesis that there will be differences among those with and without family history of hypertension in their BP levels is accepted.

The fifth and sixth sub-hypotheses explored differences in blood pressure readings based on the presence of comorbid conditions and duration of hypertension. No significant differences were found based on these health-related factors. Therefore, these hypotheses are rejected.

The next component measuring hypertension management in the present study is hypertension clinical symptoms. It was hypothesised that there will be a difference in hypertension clinical symptoms based on demographic factors such as gender, education level and occupation and based on health-related factors such as presence or absence of family history of hypertension, comorbid conditions, and varying periods of illness duration. This hypothesis was tested via six sub-hypotheses as described below.

The first sub-hypothesis stated that *there will be a difference in hypertension clinical symptoms based on education level*. Results revealed that the lowest symptoms were

experienced by participants who had the highest educational qualifications (post-graduation and above). This indicates that those who are more educated, experience lower clinical symptoms of hypertension. This could be because the educated groups also had adequate health literacy regarding hypertension which is supported by earlier studies. Several studies have shown that those who are highly educated, have higher knowledge of hypertension (Sanne et al., 2008; Pandit et al., 2009). Hence, they seem to be more sensitive to the manifestation of clinical symptoms and attend to it appropriately before the symptoms pose a serious problem. Samal et al. (2007) have reported similar results in their study. It is possible that knowledge creates a cognitive base for hypertensive adults and provides them with the awareness of the consequences of uncontrolled blood pressure and the conviction for effective management of hypertension. Saounatsu et al. (2001) have reported that the number of years of schooling is significantly positively associated with hypertension compliance. This may be another reason behind low clinical symptoms being experienced by highly educated participants. Based on this the hypothesis that there will be a difference in hypertension clinical symptoms based on education level is accepted.

According to the remaining five sub-hypotheses, it was hypothesized that there will be differences in the clinical symptoms of hypertension based on gender, occupation, family history of hypertension, presence of comorbid conditions and illness duration. No differences were found based on these demographic and health-related variables. Therefore, these five hypotheses are rejected.

It was hypothesised that hypertension compliance behaviour will differ based on demographic characteristics such as gender, education and occupation; and health related factors such as presence of family history of hypertension, comorbid conditions and illness duration. Six separate hypotheses were formulated and tested. This hypothesis was tested via six separate sub-hypotheses as described below.

The first sub-hypothesis stated that *there will be a difference in hypertension compliance based on education level*. Results indicate that those with higher education levels (post-graduation and above) have higher compliance with antihypertension medication. A higher level of education may indicate greater understanding and comprehension of knowledge about hypertension through healthcare awareness programmes. Such individuals understand the risk factors, treatment regimen, and repercussions of not taking the prescribed medication and also how medication affects the physiology of the body. Therefore, they are more likely to have higher compliance with medication. Those with a higher education level are also likely to have higher health literacy which shows their ability to understand health related information in a better manner and also use health services more frequently. Earlier studies support the inference that higher levels of education are associated with higher health literacy (Janesen et al., 2018) and compliance (Mahmoud, 2012; Roca et al., 2003). Therefore, this hypothesis was accepted.

According to the remaining five sub-hypotheses, it was hypothesized that there will be differences in hypertension compliance based on gender, occupation, family history of hypertension, presence of comorbid conditions and illness duration. No differences were found based on these demographic and health-related variables. Therefore, these five hypotheses are rejected.

Sleep quality is the fourth component measuring hypertension management. In order to examine group differences in sleep quality, it was hypothesized that there will be differences in sleep quality based on demographic and health-related factors such as gender, education and occupation, family history, comorbid conditions and varying illness durations respectively.

This hypothesis was tested by formulating six separate sub-hypotheses. The first and second sub-hypotheses stated that there will be differences in sleep quality based on gender

and education. These two sub-hypotheses were rejected as no differences were found in sleep quality with respect to these two demographic variables.

The third sub-hypothesis stated that *there will be a difference in sleep quality based on occupation*. In the present study, it was found that employees working in the private sector had higher difficulty waking up as compared to other occupations. Though sleep disturbances were commonly reported in healthcare professionals in India and abroad (Gupta et al., 2020; Zarzour, 2022), it has not been investigated in depth with respect to other types of occupations. During the COVID-19 pandemic, almost all offices shifted their work base from the office to the home. An examination of sleep quality in individuals working from home has shown that the support derived from informal interactions while working from home predicted sleep quality (Russo et al., 2021). This means that greater informal social support while working was associated with better sleep quality, when working from home. However, the lack of social support available during the pandemic could be a factor contributing to difficulty waking up (which is an aspect of sleep quality). Further, private employees experienced rotating shift work during the pandemic which may have impacted the circadian rhythm of the body leading to inadequate sleep and difficulty in waking up (San Martin et al., 2020; Zare, 2022). Based on the findings of the present study and the supporting evidence from other studies, the hypothesis that there will be a difference in sleep quality based on occupation is accepted.

In order to explore differences in sleep quality based on health-related factors, the fourth and fifth sub-hypotheses were formulated to test differences in sleep quality based on the presence of a family history of hypertension and the presence of comorbid conditions. No significant differences were found in these health-related factors. Therefore, these hypotheses are also rejected.

The sixth sub-hypothesis with respect to sleep quality stated that *there will be a difference in sleep quality based on illness duration*. The results clearly indicated that participants with an illness duration of less than four years had greater difficulty waking up as compared to those with an illness duration of 10 years and above. This may occur due to the poor hypertension management ability of those newly diagnosed with the condition. With a longer illness duration, over time, individuals learn to manage their chronic condition better and develop improved coping skills (Padhy et al., 2021). This may have a positive impact on sleep quality.

After identifying the psychosocial factors contributing to hypertension management during the COVID-19 pandemic, discovering the demographic variables that play a role in hypertension management, and examining the effect of health-related factors resulting in differences in hypertension management, it was deemed important to bring all these factors together and examine the relative positions of various psychosocial factors in relation to the variables measuring hypertension management. This helped the investigator track the pathway between the psychosocial factors and parameters measuring hypertension management.

It was hypothesised that *the relationship between psychosocial factors and hypertension management during the COVID-19 pandemic will follow a pathway*.

In order to test this hypothesis, a theoretical model was first developed and tested through structural equation modelling. The results clearly show the pathways through which cognitive, affective, personality and behavioural factors have contributed towards lowering blood pressure and the clinical symptoms of hypertension to the desired levels. The several different pathways involved are underlined below for a better understanding.

The main pathway was tracked from the psychosocial factors towards blood pressure and hypertension clinical symptoms routing via hypertension compliance. The structural model showed social support directly impacting COVID-19 pandemic stress and hypertension

compliance. The cognitive factor of hypertension knowledge can be seen contributing to hypertension compliance. COVID-19 pandemic stress directly influences sleep quality and the two have an impact on hypertension compliance. Hypertension compliance predicted the outcome variables— blood pressure and hypertension clinical symptoms. A significant role was played by health hardiness, a personality trait which contributed directly to hypertension compliance, blood pressure as well as to COVID-19 pandemic stress. It is of the essence to mention here that the addition of a path leading from health hardiness to hypertension compliance weakened the relationship between hypertension compliance and blood pressure. In other words, the strong relationship between compliance and BP levels, that has been established and confirmed by various past studies was found to fade away in the presence of health hardiness, a significant personality factor. It may be relevant to mention here about the earlier theories that advocated the relationship between type A personality and hypertension, suggesting a major role of personality in determining hypertension. In this study, the role of health hardiness has emerged as a strong determining factor that even camouflaged the well-established path between compliance and BP readings. This means that health hardiness was found to have a relatively high contributing effect towards blood pressure compared to the contribution of compliance in maintaining normal BP levels. This novel finding suggests a strong role of personality reflected by health hardiness, in blood pressure control. This finding calls for further elaboration and discussion, which is taken up in the following paragraphs.

Past studies have generally shown an overarching association of negative personality traits with hypertension. Type A personality, anger, aggression, neuroticism, state and trait anxiety, trait depression have been commonly linked with the presence as well as increase of blood pressure (García-Vera, et al., 2010; Irvine et al., 1989; Terracciano et al., 2014) however, a deficiency can be seen in the examination of positive personality traits and their impact on

blood pressure levels and its control. The present study attempted to explore the relationship between one such positive personality trait – health hardiness – and hypertension.

The statistically proven pathways clearly foreground the role of several psychosocial factors affecting hypertension management interposed by hypertension compliance. The psychosocial factors influencing hypertension compliance were – social support, COVID-19 pandemic stress, sleep quality, hypertension knowledge and health hardiness. Past research has also demonstrated the contribution of various psychosocial factors to compliance and adherence behaviour (Kyngäs & Lahdenperä, 1999; Osamor & Owumi, 2011; Ross et al., 2004). From the structural model, it is apparent that hypertension knowledge ($\beta = .32$) was the highest contributor to compliance. It is established that knowledge serves as the cognitive foundation for action. Interventional and correlational studies in the past have shown that awareness about the disease and disease-related knowledge increases compliance behaviour. Equipping hypertensive patients with knowledge about their disease state will help them make informed decisions regarding their health behaviour. This kind of information will empower them with reason and logic when received from the appropriate sources. Adequate knowledge about hypertension will result in a shift towards a positive attitude concerning the management of the illness reflected in health-promoting behavioural practices such as improved compliance.

The second-highest contributor to hypertension compliance was found to be social support ($\beta = .24$). The tested pathway also demonstrated social support negatively contributing to COVID-19 pandemic stress ($\beta = -.25$). Social support has been found to be significantly associated with compliance behaviour and COVID-19-related stress as indicated by earlier findings (Shahin et al., 2021; Szkody et al., 2021). Social support acts as a shockproof, and cushions against the harmful effects of stress. It has been found that in addition to receiving social support, providing social support also offers unique effects to health and lowers stress levels. It also predicts lower symptoms of illness as observed in a study conducted by Piferi

and Lawler (2006). Receipt of social support is closely connected to cardiovascular health. Support in the form of information, affection, tangible assistance, and positive interactions increase the self-esteem and self-efficacy of an individual. Social integration i.e., being a part of a social network such as family, friends, religious communities, and the like, help in promoting healthy behavioural practices exerting a positive influence on health behaviours.

The value of social support has been greatly recognized during the COVID-19 pandemic which brought the nationwide lockdowns and imposition of social distancing. While populations in Western countries experienced a dampening effect of social support during the pandemic, eastern countries such as India experienced this at a much lower level despite restrictions in social mobility. This could be because people in India are not bound by formalities and restrictions in calling and speaking to others on the telephone/phone. They need no specific reason or prior appointments to execute a phone call and engage in conversation. This typical phenomenon was a great respite to optimise on virtual social support during the pandemic. During such casual telephonic conversations, enquiry about regular medications and compliance to diet, and cautioning about taking care of hypertension compliance go a long way in enhancing the compliance behaviour in the patients. The sensitivity of being accountable to another person about one's own health care, the conviction of the impact on one's health on the loved ones staying away, may be adequate motivators to inculcate good adherence behaviour during the COVID-19 pandemic.

Other than health hardiness, hypertension knowledge and social support, COVID-19 pandemic stress and sleep quality, both were found to influence hypertension compliance. A direct path was also established from COVID-19 pandemic stress towards sleep quality. Stress impairs sleep by activating the sympathetic nervous system and releasing the stress hormone (cortisol). This reduces the quality of sleep by shifting the body to a fight-or-flight mode and either causing sleep deprivation or oversleeping. Reports of compromised sleep quality were

prevalent during the COVID-19 pandemic in different populations across the world (Dobler et al., 2020; Pinto et al., 2020; Rawat et al., 2021; Xia et al., 2021). Apart from the occurrence of declining sleep quality as a barrier in achieving optimal compliance behaviour during the COVID-19 pandemic, public restrictive measures such as the lockdowns, quarantining, shortage of medical supplies, closure of fitness centres, lack of access to healthcare facilities and auxiliary testing also created challenges in adherence to hypertension treatment goals. The pandemic, moreover, generated alterations in personal life such as working remotely, dealing with the virtual schooling systems of children, social isolation, fear of travel, and others. Such stressors had an unbidden impact on treatment compliance in those suffering from chronic illnesses, especially hypertension (Kendzierska et al., 2021; Nadar et al., 2020; Serlachius et al., 2020). Not complying with the prescribed treatment further, has an adverse impact on the cardiovascular system by increasing blood pressure and somatic symptoms of hypertension. Two pathways from hypertension compliance towards blood pressure and hypertension clinical symptoms were established to demonstrate this.

The tracked pathway is summarised in the following way. Social support, hypertension knowledge and health hardiness constituted major factors contributing to hypertension compliance. Compliance also received a negative contribution from COVID-19 pandemic stress and a positive contribution from good sleep quality. In turn, hypertension compliance contributed to the management outcome variables such as BP levels and clinical symptoms. However, when health hardiness was directly connected to the management component of BP levels that indicated the outcome measurement, the role of compliance was proved to be weak and insignificant. This suggests the powerful role played by the personality factor of health hardiness which while contributing to the compliance behaviour, that measured hypertension management, also significantly contributed to a more important outcome measure of hypertension management, that is, the BP levels. This needs to be discussed with reference to

the theoretical framework of the Health Belief Model. The Health Belief Model makes a mention of the significant role played by self-efficacy and perception of control. These two are closely related to the *control* component of a hardy personality. In light of the present finding, one may attempt to remodel the Health Belief model or postulate a new theoretical model by integrating health hardiness and re-examining the relative role of self-efficacy, perceived control and perceived barriers with respect to health hardiness as well as health behaviour. A more robust model of health behaviour may evolve out of it.

The proposed hypothetical model and the tested structural equation model evidently tracked the pathway of psychosocial factors contributing to hypertensive adults' compliance behaviour which leads to improved blood pressure control and reduced hypertension symptom experience. Thus, the hypothesis that the relationship between psychosocial factors and hypertension management during the COVID-19 pandemic will follow a pathway is accepted.

Limitations

One shortcoming of the study is the absence of a qualitative inquiry that would have corroborated the statistical findings. This could give an insight into the unique lived experiences of hypertensive adults during the COVID-19 pandemic and the pandemic-induced challenges that hinder optimal compliance. While the study recruited a pan-Indian sample, equal representation from each state of India could not be maintained due to the feasibility aspect of the study.

Implications

In order to reduce non-communicable disease-related mortality, it is important to focus on magnifying disease management. A holistic care approach is required to manage hypertension, which is the leading cause of cardiovascular mortality. The transition from the biomedical model of health to the biopsychosocial model of health has changed the way we look at illness management. However, this still remains in theory and is not practically adopted

in the Indian healthcare system. Treatment outcomes of hypertension are focused on the elimination of symptoms medically through pharmacotherapy, neglecting the psychosocial factors impacting its management. The present study was designed with the objective of exploring how cognitive, affective, personality, behavioural and social factors play a role in the management of hypertension and the manifestation of its symptoms, during the challenging phase of the COVID-19 pandemic.

The COVID-19 pandemic, which affected several nations between 2019 and 2022, put a significant pressure on the world's healthcare systems. In circumstances like this, it can be difficult for patients with chronic illnesses to access medical facilities for routine care. Due to underlying immunodeficiency, people with comorbidities, particularly non-communicable diseases like diabetes and hypertension, were more likely to acquire a severe form of COVID-19 infection. This demonstrates how crucial it is to manage one's chronic illness effectively in pandemonium-like situations such as during the spread of COVID-19. The findings of the present study clearly indicated that given certain psychosocial factors, the management of hypertension proved effective even during the trying period of the coronavirus pandemic. If this was possible during the pandemic with all its unique challenges and constraints, it should be possible during any challenging time, faced by the individual or the nation. This gives rise to a question on the *modus operandi* of successfully managing hypertension in the face of any challenges. Further, it should also be contemplated to evolve measures to optimise hypertension management as a public health programme.

Knowledge of hypertension is a useful tool to bridge the gap between awareness of the prescribed hypertension treatment and actually adhering to it. Efforts to furnish hypertensives with accurate information about their disease condition provided by credible sources (healthcare professionals and health psychologists) in the form of psychoeducation will create

a strong cognitive base about their illness and serve as a motivating factor to engage in compliance behaviour.

The results of this study help discern the undermined value of social support, especially during a global epidemic which necessitated measures of social distancing. The nexus of Indian culture lies in harmony and unity with others. In such a family-oriented, collectivistic culture, utilizing the asset of social support to formulate interventions will not only be a cost-effective driver of compliance, but also benefit during pandemic/epidemic-like situations when healthcare systems are already overburdened.

A salient outcome of this study was an insight into the untapped potential of a scarcely explored personality factor - health hardiness. Functioning as a shield against stress, inculcating health hardiness through interventions will help enhance the hardy disposition in hypertension patients which will directly bring down blood pressure levels. The health hardiness factor that emerged in this study can be further explored in postulating a new robust theory of health behaviour.

REFERENCES

References

- Abdisa, L., Alemu, A., Heluf, H., Sertsu, A., Dessie, Y., Negash, B., ... & Letta, S. (2022). Factors associated with poor medication adherence during COVID-19 pandemic among hypertensive patients visiting public hospitals in Eastern Ethiopia: a cross-sectional study. *BMJ open*, 12(10), e064284.
- Abegaz, T. M., Shehab, A., Gebreyohannes, E. A., Bhagavathula, A. S., & Elnour, A. A. (2017). Nonadherence to antihypertensive drugs: a systematic review and meta-analysis. *Medicine*, 96(4).
- Abougambou, S. S. I., & Abougambou, A. S. (2013). A study evaluating prevalence of hypertension and risk factors affecting on blood pressure control among type 2 diabetes patients attending teaching hospital in Malaysia. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 7(2), 83-86.
- Abu, H., Aboumatar, H., Carson, K. A., Goldberg, R., & Cooper, L. A. (2018). Hypertension knowledge, heart healthy lifestyle practices and medication adherence among adults with hypertension. *European journal for person centered healthcare*, 6(1), 108.
- ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Journal of the American College of Cardiology*, 71(19), e127-e248.
- Add Swain & Hariharan (2013) reference for HyComps
- Adisa, R., Olajide, O. O., & Fakeye, T. O. (2017). Social support, treatment adherence and outcome among hypertensive and type 2 diabetes patients in ambulatory care settings in Southwestern Nigeria. *Ghana medical journal*, 51(2), 64-77.

- Agondi, R. D. F., Gallani, M. C. B. J., Cornélio, M. E., & Rodrigues, R. C. M. (2012). Analysis of action plans and coping plans for reducing salt consumption among women with hypertension. *Revista Latino-Americana de Enfermagem*, 20, 486-494.
- Akoko, B. M., Fon, P. N., Ngu, R. C., & Ngu, K. B. (2017). Knowledge of hypertension and compliance with therapy among hypertensive patients in the Bamenda Health District of Cameroon: a cross-sectional study. *Cardiology and therapy*, 6(1), 53-67.
- Akpek, M. (2022). Does COVID-19 cause hypertension?. *Angiology*, 73(7), 682-687.
- Alefan, Q., Huwari, D., Alshogran, O. Y., & Jarrah, M. I. (2019). Factors affecting hypertensive patients' compliance with healthy lifestyle. *Patient preference and adherence*, 13, 577.
- Almojali, A. I., Almalki, S. A., Alothman, A. S., Masuadi, E. M., & Alaqeel, M. K. (2017). The prevalence and association of stress with sleep quality among medical students. *Journal of epidemiology and global health*, 7(3), 169-174.
- Amicucci, G., Salfi, F., D'Atri, A., Viselli, L., & Ferrara, M. (2021). The differential impact of COVID-19 lockdown on sleep quality, insomnia, depression, stress, and anxiety among late adolescents and elderly in Italy. *Brain Sciences*, 11(10), 1336.
- Andjelkovic, M., Mitrovic, M., Nikolic, I., Jovanovic, D. B., Zelen, I., Zaric, M., ... & Jankovic, S. (2017). Older hypertensive patients' adherence to healthy lifestyle behaviors. *Serbian Journal of Experimental and Clinical Research*, 19(1), 51-56.
- Andrew, A., & Hariharan, M. (2017). Hypertension knowledge test: Development and validation. *International Journal of Indian Psychology*, 5(1), 44-55.
- Andrew, A., Hariharan, M., Monteiro, S. R., Padhy, M., & Chivukula, U. (2022). Enhancing adherence and management in patients with hypertension: Impact of form and frequency of knowledge intervention. *Indian Heart Journal*, 74(4), 302-306.

- Andrew, A., & Hariharan, M. (2017). Hypertension knowledge test: Development and validation. *International Journal of Indian Psychology*, 5(1), 44-55.
- Andrew, A., Kallavarapu, V., Thomas, M., & Swain, S. (2014). Doctor-patient communication in health care: issues and challenges. *Journal of Indian Health Psychology*, 9(1), 21-36.
- Asilar, R. H., Yildirim, A., Saglam, R., Selcuk, E. D., Erduran, Y., & Sarihan, O. (2020). The effect of loneliness and perceived social support on medication adherence self-efficacy in hypertensive patients: An example of Turkey. *Journal of Vascular Nursing*, 38(4), 183-190.
- Asnani, M. R., Knight Madden, J., Reid, M., Greene, L. G., & Lyew-Ayee, P. (2017). Socio-environmental exposures and health outcomes among persons with sickle cell disease. *PLoS One*, 12(4), e0175260.
- Attahiru, M., Simon, P. L., Mutalub, Y. B., Akangoziri, M. D., & Grema, B. A. (2023). Predictors of blood pressure control amongst primary care patients of a teaching hospital in Bauchi, North-Eastern Nigeria. *Nigerian Postgraduate Medical Journal*, 30(1), 46.
- Audulv, Å., Packer, T., Hutchinson, S., Roger, K. S., & Kephart, G. (2016). Coping, adapting or self-managing—what is the difference? A concept review based on the neurological literature. *Journal of advanced nursing*, 72(11), 2629-2643.
- awareness and control of hypertension in Chennai-the Chennai urban rural
- Bacha, D., & Abera, H. (2019). Knowledge, attitude and self-care practice towards control of hypertension among hypertensive patients on follow-up at St. Paul's hospital, Addis Ababa. *Ethiopian journal of health sciences*, 29(4).
- Bahamin, G., Taheri, F., Moghaddas, A., Sohrabi, F., & Dortaj, F. (2012). The effects of hardiness training on suicide ideation, quality of life and plasma levels of lipoprotein (a) in patients with depressive disorder. *Procedia-Social and Behavioral Sciences*, 46, 4236-4243.

- Bajkó, Z., Szekeres, C. C., Kovács, K. R., Csapó, K., Molnár, S., Soltész, P., ... & Csiba, L. (2012). Anxiety, depression and autonomic nervous system dysfunction in hypertension. *Journal of the neurological sciences*, 317(1-2), 112-116.
- Baldasseroni, A., Abrami, V., Arcangeli, G., Cupelli, V., Fioriti, M., Guarducci, L., ... & Tartaglia, R. (2005). Longitudinal study for assessing the efficacy of preventive measures in a population of health workers exposed to the risk of patient lifting. *Giornale Italiano di Medicina del Lavoro ed Ergonomia*, 27(1), 101-105.
- Baral-Grant, S., Haque, M. S., Nouwen, A., Greenfield, S. M., & McManus, R. J. (2012). Self-monitoring of blood pressure in hypertension: a UK primary care survey. *International Journal of Hypertension*, 2012.
- Barros, M. B. D. A., Lima, M. G., Malta, D. C., Szwarcwald, C. L., Azevedo, R. C. S. D., Romero, D., ... & Gracie, R. (2020). Report on sadness/depression, nervousness/anxiety and sleep problems in the Brazilian adult population during the COVID-19 pandemic. *Epidemiologia e Serviços de Saúde*, 29, e2020427.
- Bathgate, C. J., & Fernandez-Mendoza, J. (2018). Insomnia, short sleep duration, and high blood pressure: recent evidence and future directions for the prevention and management of hypertension. *Current hypertension reports*, 20, 1-10.
- Baumgartner, H., & Homburg, C. (1996). Applications of structural equation modeling in marketing and consumer research: A review. *International journal of Research in Marketing*, 13(2), 139-161.
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological bulletin*, 88(3), 588.
- Black, P. H., & Garbutt, L. D. (2002). Stress, inflammation and cardiovascular disease. *Journal of psychosomatic research*, 52(1), 1-23.

- Bowen, K. S., Uchino, B. N., Birmingham, W., Carlisle, M., Smith, T. W., & Light, K. C. (2014). The stress-buffering effects of functional social support on ambulatory blood pressure. *Health Psychology, 33*(11), 1440.
- Brooks, M. V. (2003, July). Health-related hardiness and chronic illness: A synthesis of current research. In *Nursing forum* (Vol. 38, No. 3, pp. 11-20). Oxford, UK: Blackwell Publishing Ltd.
- Brooks, M. V. (2008). Health-related hardiness in individuals with chronic illnesses. *Clinical nursing research, 17*(2), 98-117.
- Bruno, R. M., Palagini, L., Gemignani, A., Viridis, A., Di Giulio, A., Ghiadoni, L., ... & Taddei, S. (2013). Poor sleep quality and resistant hypertension. *Sleep Medicine, 14*(11), 1157-1163.
- Bruno, S., Bazzani, A., Marantonio, S., Cruz-Sanabria, F., Benedetti, D., Frumento, P., ... & Faraguna, U. (2022). Poor sleep quality and unhealthy lifestyle during the lockdown: an Italian study. *Sleep medicine, 90*, 53-64.
- Burnier, M. (2017). Drug adherence in hypertension. *Pharmacological research, 125*, 142-149.
- Bush, D. (2022, August 12). Covid fades as major issue ahead of midterm elections. *Newsweek*.
<https://www.newsweek.com/covid-fades-major-issue-ahead-midterm-elections-1733057>
- Busingye, D., Arabshahi, S., Evans, R. G., Riddell, M. A., Srikanth, V. K., Kartik, K., ... & Thrift, A. G. (2019). Knowledge of risk factors for hypertension in a rural Indian population. *Heart Asia, 11*(1).
- Cappuccio, F. P., Cooper, D., D'Elia, L., Strazzullo, P., & Miller, M. A. (2011). Sleep duration predicts cardiovascular outcomes: a systematic review and meta-analysis of prospective studies. *European heart journal, 32*(12), 1484-1492.

- Carlucci, S., & McCuaig Edge, H. (2022). An exploratory analysis of hardiness and health behaviours in Canadian Armed Forces recruits. *Journal of Military, Veteran and Family Health*, 8(2), 94-103.
- Carvalho, M. V. D., Siqueira, L. B., Sousa, A. L. L., & Jardim, P. C. B. V. (2013). The influence of hypertension on quality of life. *Arquivos brasileiros de cardiologia*, 100, 164-174.
- Charles, L., Triscott, J., & Dobbs, B. (2017). Secondary hypertension: discovering the underlying cause. *American family physician*, 96(7), 453-461.
- Chia, Y. C., Buranakitjaroen, P., Chen, C. H., Divinagracia, R., Hoshide, S., Park, S., ... & HOPE Asia Network. (2017). Current status of home blood pressure monitoring in Asia: statement from the HOPE Asia Network. *The Journal of Clinical Hypertension*, 19(11), 1192-1201.
- Chockalingam, A. (2008). World Hypertension Day and global awareness. *Canadian Journal of Cardiology*, 24(6), 441-444.
- Cohen, S. (2004). Social relationships and health. *American psychologist*, 59(8), 676.
- Cohen, S. P., Baber, Z. B., Buvanendran, A., McLean, B. C., Chen, Y., Hooten, W. M., ... & Phillips, C. R. (2020). Pain management best practices from multispecialty organizations during the COVID-19 pandemic and public health crises. *Pain Medicine*, 21(7), 1331-1346.
- Colbay, G., Cetin, M., Colbay, M., Berker, D., & Guler, S. (2015). Type 2 diabetes affects sleep quality by disrupting the respiratory function: 2 型糖尿病通过损害呼吸功能影响睡眠质量. *Journal of Diabetes*, 7(5), 664-671.
- Collier, J. E. (2020). *Applied structural equation modeling using AMOS: Basic to advanced techniques*. Routledge.
- Conroy, D. A., & Arnedt, J. T. (2014). Sleep and substance use disorders: an update. *Current psychiatry reports*, 16(10), 1-9.

- Coolican, H. (2017). *Research methods and statistics in psychology*. Psychology press.
- Craig, R., & Mindell, J. (2008). Health survey for England 2006. cardiovascular disease and risk factors in adults.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- Cuffee, Y., Ogedegbe, C., Williams, N. J., Ogedegbe, G., & Schoenthaler, A. (2014). Psychosocial risk factors for hypertension: an update of the literature. *Current hypertension reports*, 16(10), 1-11.
- D'Addario, M., Adorni, R., Steca, P., Capelli, R., Zanatta, F., Fattirolli, F., ... & Greco, A. (2022). Associations between Lifestyle Changes and Adherence to COVID-19 Restrictions in Older Adults with Hypertension. *International Journal of Environmental Research and Public Health*, 19(13), 7853.
- da Luz Pádua Guimarães, M. C., Coelho, J. C., Dos Santos, J., de Oliveira Higa, C. B., Flório, C. F., Lee, R. J. W., ... & Pierin, A. M. G. (2022). Adherence to antihypertensive treatment during the COVID-19 pandemic: findings from a cross-sectional study. *Clinical Hypertension*, 28(1), 1-10.
- Deer, T., Sayed, D., Pope, J., Chakravarthy, K., Petersen, E., Moeschler, S. M., ... & Mekhail, N. (2020). Emergence from the coronavirus disease 2019 pandemic and the care of chronic pain: guidance for the interventionalist. *Anesthesia and analgesia*.
- DeJean, D., Giacomini, M., Vanstone, M., & Brundisini, F. (2013). Patient experiences of depression and anxiety with chronic disease: a systematic review and qualitative meta-synthesis. *Ontario health technology assessment series*, 13(16), 1.

- Dey, S., Mukherjee, A., Pati, M. K., Kar, A., Ramanaik, S., Pujar, A., ... & Swaroop, N. (2022). Socio-demographic, Behavioural and Clinical determinants influencing Control of Diabetes and Hypertension in Urban Mysore, South India: A Mixed-Method Study.
- Doll, W. J., Xia, W., & Torkzadeh, G. (1994). A confirmatory factor analysis of the end-user computing satisfaction instrument. *MIS quarterly*, 453-461.
- Duclos, M., Dejager, S., Postel-Vinay, N., di Nicola, S., Quéré, S., & Fiquet, B. (2015). Physical activity in patients with type 2 diabetes and hypertension—insights into motivations and barriers from the MOBILE study. *Vascular health and risk management*, 11, 361.
- Duran, S., & Erkin, Ö. (2021). Psychologic distress and sleep quality among adults in Turkey during the COVID-19 pandemic. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 107, 110254.
- Duvdevany, I., Cohen, M., Minsker-Valtzer, A., & Lorber, M. (2011). Psychological correlates of adherence to self-care, disease activity and functioning in persons with systemic lupus erythematosus. *Lupus*, 20(1), 14-22.
- Eccleston, C., Blyth, F. M., Dear, B. F., Fisher, E. A., Keefe, F. J., Lynch, M. E., ... & de C Williams, A. C. (2020). Managing patients with chronic pain during the COVID-19 outbreak: considerations for the rapid introduction of remotely supported (eHealth) pain management services. *Pain*, 161(5), 889.
- Engel, G. L. (1977). The need for a new medical model: a challenge for biomedicine. *Science*, 196(4286), 129-136.
- epidemiology study (CURES–52). *Journal of Association of Physicians of*
- Erden, I., Erden, E. C., Özhan, H., Basar, C., Aydin, M., Dumlu, T., & Alemdar, R. (2010). Poor-quality sleep score is an independent predictor of nondipping hypertension. *Blood pressure monitoring*, 15(4), 184-187.

- Everson, S. A., Lynch, J. W., Kaplan, G. A., Lakka, T. A., Sivenius, J., & Salonen, J. T. (2001). Stress-induced blood pressure reactivity and incident stroke in middle-aged men. *Stroke*, 32(6), 1263-1270.
- Express Web Desk (2023, April 12). *Mask mandate back in these states as covid cases rise*. TheIndianEXPRESS. <https://indianexpress.com/article/india/state-wise-covid-guidelines-masks-8549886/>
- Fahey, T., Schroeder, K., & Ebrahim, S. (2005). Educational and organisational interventions used to improve the management of hypertension in primary care: a systematic review. *British Journal of General Practice*, 55(520), 875-882.
- Faraco, G., & Iadecola, C. (2013). Hypertension: a harbinger of stroke and dementia. *Hypertension*, 62(5), 810-817.
- Farber, E. W., Schwartz, J. A., Schaper, P. E., Moonen, D. J., & McDaniel, J. S. (2000). Resilience factors associated with adaptation to HIV disease. *Psychosomatics*, 41(2), 140-146.
- Fekadu, G., Bekele, F., Tolossa, T., Fetensa, G., Turi, E., Getachew, M., ... & Labata, B. G. (2021). Impact of COVID-19 pandemic on chronic diseases care follow-up and current perspectives in low resource settings: a narrative review. *International Journal of Physiology, Pathophysiology and Pharmacology*, 13(3), 86.
- Fentaw, Z., Adamu, K., & Wedajo, S. (2022). Blood pressure control status of patients with hypertension on treatment in Dessie City Northeast Ethiopia. *BMC Public Health*, 22(1), 917.
- Fikriana, R., Devy, N. N. S. R., Ahsan, A., & Afik, A. (2020). The Effect of Coping Strategies on the Dietary Regulation of Patients with Hypertension. *International Journal of Psychosocial Rehabilitation*, 24(7).

- Fisher, W. A., & Fisher, J. D. (1992). Understanding and promoting AIDS preventive behaviour: a conceptual model and educational tools. *Canadian Journal of Human Sexuality*.
- Ford, M. E., Tilley, B. C., & McDonald, P. E. (1998). Social support among African-American adults with diabetes, Part 2: A review. *Journal of the National Medical Association*, 90(7), 425.
- Ford, M. T. (2014). Perceived unfairness at work, social and personal resources, and resting blood pressure. *Stress and Health*, 30(1), 12-22.
- Forshaw, P. E., Correia, A. T. L., Roden, L. C., Lambert, E. V., & Rae, D. E. (2022). Sleep characteristics associated with nocturnal blood pressure nondipping in healthy individuals: a systematic review. *Blood Pressure Monitoring*, 10-1097.
- Gallant, M. P. (2003). The influence of social support on chronic illness self-management: a review and directions for research. *Health education & behavior*, 30(2), 170-195.
- Garcia, S., Albaghdadi, M. S., Meraj, P. M., Schmidt, C., Garberich, R., Jaffer, F. A., ... & Henry, T. D. (2020). Reduction in ST-segment elevation cardiac catheterization laboratory activations in the United States during COVID-19 pandemic. *Journal of the American College of Cardiology*, 75(22), 2871-2872.
- Garg, S., Kim, L., Whitaker, M., O'Halloran, A., Cummings, C., Holstein, R., ... & Fry, A. (2020). Hospitalization rates and characteristics of patients hospitalized with laboratory-confirmed coronavirus disease 2019—COVID-NET, 14 States, March 1–30, 2020. *Morbidity and mortality weekly report*, 69(15), 458.
- Gasperin, D., Netuveli, G., Dias-da-Costa, J. S., & Pattussi, M. P. (2009). Effect of psychological stress on blood pressure increase: a meta-analysis of cohort studies. *Cadernos de saude publica*, 25(4), 715-726.

Gautam, A. (2023, April 10). *Covid curbs back in 3 states amid rapid increase in daily cases*. NDTV.

<https://www.ndtv.com/india-news/amid-covid-spike-masks-mandate-back-in-haryana-kerala-and-puducherry-3932411>

GBD 2016 Risk Factors Collaborators. (2017). Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet (London, England)*, 390(10100), 1345.

Gebhardt, W. A., Van der Doef, M. P., & Paul, L. B. (2001). The Revised Health Hardiness Inventory (RHHI-24): psychometric properties and relationship with self-reported health and health behavior in two Dutch samples. *Health education research*, 16(5), 579-592.

Geldsetzer, P., Manne-Goehler, J., Theilmann, M., Davies, J. I., Awasthi, A., Vollmer, S., ... & Atun, R. (2018). Diabetes and hypertension in India: a nationally representative study of 1.3 million adults. *JAMA Internal Medicine*, 178(3), 363-372.

Geronimus, A. T., Andersen, H. F., & Bound, J. (1991). Differences in hypertension prevalence among US black and white women of childbearing age. *Public Health Reports*, 106(4), 393.

Global Burden of Disease Study 2015. *Health data*. <http://ghdx.healthdata.org/gbd-data-tool>. Accessed 2017.

Gordon, R. (2023). *Hypertension and comorbidities – A common and dangerous combination*. <https://casanacare.com/blog-and-news/hypertension-and-comorbidities-a-dangerous-combination/>

Gotanda, H., Liyanage-Don, N., Moran, A. E., Krousel-Wood, M., Green, J. B., Zhang, Y., & Nuckols, T. K. (2022). Changes in Blood Pressure Outcomes Among Hypertensive

- Individuals During the COVID-19 Pandemic: A Time Series Analysis in Three US Healthcare Organizations. *Hypertension*, 79(12), 2733-2742.
- Greer, D. B., & Abel, W. M. (2017). Religious/spiritual coping in older African American women. *The Qualitative Report*, 22(1), 237.
- Grey, M. (2000). Coping and diabetes. *Diabetes Spectrum*, 13(3), 167.
- Gu, S., Hu, H., & Dong, H. (2016). Systematic review of health-related quality of life in patients with pulmonary arterial hypertension. *Pharmacoeconomics*, 34(8), 751-770.
- Guerrero-García, C., & Rubio-Guerra, A. F. (2018). Combination therapy in the treatment of hypertension. *Drugs in context*, 7.
- Guo, G., Ye, L., Pan, K., Chen, Y., Xing, D., Yan, K., ... & Xue, X. (2020). New insights of emerging SARS-CoV-2: epidemiology, etiology, clinical features, clinical treatment, and prevention. *Frontiers in Cell and Developmental Biology*, 8, 410.
- Gupta, B., Sharma, V., Kumar, N., & Mahajan, A. (2020). Anxiety and sleep disturbances among health care workers during the COVID-19 pandemic in India: cross-sectional online survey. *JMIR public health and surveillance*, 6(4), e24206.
- Gupta, R. (2016). Convergence in urban–rural prevalence of hypertension in India. *Journal of human hypertension*, 30(2), 79-82.
- Gupta, R., Gupta, V. P., Prakash, H., Agrawal, A., Sharma, K. K., & Deedwania, P. C. (2018). 25-Year trends in hypertension prevalence, awareness, treatment, and control in an Indian urban population: Jaipur Heart Watch. *Indian heart journal*, 70(6), 802-807.
- Gupta, R., Kaur, M., Islam, S., Mohan, V., Mony, P., Kumar, R., ... & Yusuf, S. (2017). Association of household wealth index, educational status, and social capital with hypertension

awareness, treatment, and control in South Asia. *American journal of hypertension*, 30(4), 373-381.

Gupta, R., Gaur, K., & S. Ram, C. V. (2019). Emerging trends in hypertension epidemiology in India. *Journal of human hypertension*, 33(8), 575-587.

Gwadry-Sridhar, F. H., Manias, E., Lal, L., Salas, M., Hughes, D. A., Ratzki-Leewing, A., & Grubisic, M. (2013). Impact of interventions on medication adherence and blood pressure control in patients with essential hypertension: a systematic review by the ISPOR medication adherence and persistence special interest group. *Value in health*, 16(5), 863-871.

Hacker, K. A., Briss, P. A., Richardson, L., Wright, J., & Petersen, R. (2021). Peer reviewed: COVID-19 and chronic disease: the impact now and in the future. *Preventing Chronic Disease*, 18.

Hair, J. F. (2011). Multivariate data analysis: An overview. *International encyclopedia of statistical science*, 904-907.

Hajat, C., & Stein, E. (2018). The global burden of multiple chronic conditions: a narrative review. *Preventive medicine reports*, 12, 284-293.

Hale, E. D., Treharne, G. J., & Kitas, G. D. (2007). The common-sense model of self-regulation of health and illness: how can we use it to understand and respond to our patients' needs?. *Rheumatology*, 46(6), 904-906.

Hall, G., Laddu, D. R., Phillips, S. A., Lavie, C. J., & Arena, R. (2021). A tale of two pandemics: How will COVID-19 and global trends in physical inactivity and sedentary behavior affect one another?. *Progress in cardiovascular diseases*, 64, 108.

Hariharan, M. (2020). *Health psychology: Theory, Practice and Research*. Sage publications.

Haughton McNeill, L., Wyrwich, K. W., Brownson, R. C., Clark, E. M., & Kreuter, M. W. (2006). Individual, social environmental, and physical environmental influences on physical activity

among black and white adults: a structural equation analysis. *Annals of Behavioral Medicine*, 31(1), 36-44.

Heijmans, M. (1999). The role of patients' illness representations in coping and functioning with Addison's disease. *British Journal of Health Psychology*, 4(2), 137-149.

Henderson, B. N., & Baum, A. (2004). Biological mechanisms of health and disease. *The Sage handbook of health psychology*, 69-93.

Hennein, R., Hwang, S. J., Au, R., Levy, D., Muntner, P., Fox, C. S., & Ma, J. (2018). Barriers to medication adherence and links to cardiovascular disease risk factor control: the Framingham Heart Study. *Internal medicine journal*, 48(4), 414-421.

Hirokawa, K., Ohira, T., Nagayoshi, M., Kajiura, M., Imano, H., Kitamura, A., ... & Iso, H. (2016). Occupational status and job stress in relation to cardiovascular stress reactivity in Japanese workers. *Preventive medicine reports*, 4, 61-67.

Hocking Schuler, J. L., & O'Brien, W. H. (1997). Cardiovascular recovery from stress and hypertension risk factors: A meta-analytic review. *Psychophysiology*, 34(6), 649-659.

Hoyle, R. H. (1995). *Structural equation modeling: Concepts, issues, and applications*. Sage.

Hu, H. H., Li, G., & Arao, T. (2015). The association of family social support, depression, anxiety and self-efficacy with specific hypertension self-care behaviours in Chinese local community. *Journal of human hypertension*, 29(3), 198-203.

Huang, Y., & Zhao, N. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry research*, 288, 112954.

Hull, J. G., Van Treuren, R. R., & Virnelli, S. (1987). Hardiness and health: A critique and alternative approach. *Journal of personality and social psychology*, 53(3), 518.

- Idowu, O. A., Adeniyi, A. F., Atijosan, O. J., & Ogwumike, O. O. (2013). Physical inactivity is associated with low self-efficacy and social support among patients with hypertension in Nigeria. *Chronic illness*, 9(2), 156-164.
- India TV. (2022, December 29). India to witness 4th COVID wave in Jan 2023? Expert says number of cases will jump in next 40 days. <https://www.indiatvnews.com/health/india-to-witness-4th-covid-wave-in-jan-2023-expert-says-number-of-cases-will-jump-in-next-40-days-2022-12-29-834993>
- India*, 55, 326-32.
- Jacob, L., Tully, M. A., Barnett, Y., Lopez-Sanchez, G. F., Butler, L., Schuch, F., ... & Smith, L. (2020). The relationship between physical activity and mental health in a sample of the UK public: A cross-sectional study during the implementation of COVID-19 social distancing measures. *Mental health and physical activity*, 19, 100345.
- Jahrami, H., BaHammam, A. S., Bragazzi, N. L., Saif, Z., Faris, M., & Vitiello, M. V. (2021). Sleep problems during the COVID-19 pandemic by population: a systematic review and meta-analysis. *Journal of Clinical Sleep Medicine*, 17(2), 299-313.
- Jankowska-Polańska, B., Uchmanowicz, I., Dudek, K., & Mazur, G. (2016). Relationship between patients' knowledge and medication adherence among patients with hypertension. *Patient preference and adherence*, 2437-2447.
- Jansen, T., Rademakers, J., Waverijn, G., Verheij, R., Osborne, R., & Heijmans, M. (2018). The role of health literacy in explaining the association between educational attainment and the use of out-of-hours primary care services in chronically ill people: a survey study. *BMC health services research*, 18(1), 1-13.
- Jansen, T., Rademakers, J., Waverijn, G., Verheij, R., Osborne, R., & Heijmans, M. (2018). The role of health literacy in explaining the association between educational attainment and

the use of out-of-hours primary care services in chronically ill people: a survey study. *BMC health services research*, 18(1), 1-13.

Jarrin, D. C., Alvaro, P. K., Bouchard, M. A., Jarrin, S. D., Drake, C. L., & Morin, C. M.

(2018). Insomnia and hypertension: a systematic review. *Sleep medicine reviews*, 41, 3-38.

Joeckes, K. & Boersma, S. (2007). Hypertension. In S. Ayers, A. Baum, C. McManus, S. Newman, K.

Wallston, J. Weinman & R. West (Eds.), *Cambridge handbook of psychology, health and medicine* (pp 742 – 744). Cambridge University Press.

Johansson, G., Evans, G. W., Cederström, C., Rydstedt, L. W., Fuller-Rowell, T., & Ong, A. D.

(2012). The effects of urban bus driving on blood pressure and musculoskeletal problems: a quasi-experimental study. *Psychosomatic Medicine*, 74(1), 89-92.

Jönsson, P., Österberg, K., Wallergård, M., Hansen, Å. M., Garde, A. H., Johansson, G., & Karlson,

B. (2015). Exhaustion-related changes in cardiovascular and cortisol reactivity to acute psychosocial stress. *Physiology & behavior*, 151, 327-337.

Kamran, A., Ahari, S. S., Biria, M., Malpour, A., & Heydari, H. (2014). Determinants of patient's adherence to hypertension medications: application of health belief model among rural patients. *Annals of medical and health sciences research*, 4(6), 922-927.

Kang, A. W., Dulin, A., Nadimpalli, S., & Risica, P. M. (2018). Stress, adherence, and blood pressure control: A baseline examination of Black women with hypertension participating in the SisterTalk II intervention. *Preventive medicine reports*, 12, 25-32.

Kapoor, M., Dhar, M., Mirza, A., Saxena, V., & Pathania, M. (2021). Factors responsible for Uncontrolled Hypertension in the Adults over 50 years of age: A pilot study from Northern India. *Indian Heart Journal*, 73(5), 644-646.

- Karakurt, P., & Kaşıkçı, M. (2012). Factors affecting medication adherence in patients with hypertension. *Journal of Vascular Nursing*, 30(4), 118-126.
- Kaur, P., Kunwar, A., Sharma, M., Mitra, J., Das, C., Swasticharan, L., ... & Bhargava, B. (2021). India hypertension control initiative—hypertension treatment and blood pressure control in a cohort in 24 sentinel site clinics. *The Journal of Clinical Hypertension*, 23(4), 720-729.
- Kendzerska, T., Zhu, D. T., Gershon, A. S., Edwards, J. D., Peixoto, C., Robillard, R., & Kendall, C. E. (2021). The effects of the health system response to the COVID-19 pandemic on chronic disease management: a narrative review. *Risk management and healthcare policy*, 14, 575.
- Kent de Grey, R. G., Uchino, B. N., Trettevik, R., Cronan, S., & Hogan, J. N. (2018). Social support and sleep: A meta-analysis. *Health Psychology*, 37(8), 787.
- Khadoura, K., Shakibazadeh, E., Mansournia, M. A., Aljeesh, Y., & Fotouhi, A. (2021). Determining the prevalence of and the factors associated with antihypertensive medication non-adherence in the Gaza Strip. *Korean Journal of Family Medicine*, 42(2), 150.
- Kharibam, P., Pathania, M., Naithani, M., Singh, Y., Bahurupi, Y., Dhar, M., ... & Singh, N. (2022). A comparative study of baseline heart rate variability, sleep quality, and oxidative stress levels in hypertensive versus normotensive subjects: a cross-sectional study. *Cureus*, 14(6).
- Kilander, L., Nyman, H., Boberg, M., Hansson, L., & Lithell, H. (1998). Hypertension is related to cognitive impairment: a 20-year follow-up of 999 men. *Hypertension*, 31(3), 780-786.
- Kim, H., & Andrade, F. C. (2016). Diagnostic status of hypertension on the adherence to the Dietary Approaches to Stop Hypertension (DASH) diet. *Preventive Medicine Reports*, 4, 525-531.
- Kim, S. Y. (1998). The Relationship between Hardiness, Self-Efficacy and Compliance in Coronary Artery Disease Patients. *Journal of East-West Nursing Research*, 3(1), 83-95.

- King, A. C., Taylor, C. B., Albright, C. A., & Haskell, W. L. (1990). The relationship between repressive and defensive coping styles and blood pressure responses in healthy, middle-aged men and women. *Journal of Psychosomatic Research*, 34(4), 461-471.
- Kobasa, S. C., Maddi, S. R., & Kahn, S. (1982). Hardiness and health: a prospective study. *Journal of Personality and Social Psychology*, 42, 168-177.
- Kobayashi, K., Chin, K., Umezawa, S., Ito, S., Yamamoto, H., Nakano, S., ... & Tamura, K. (2022). Influence of stress induced by the first announced state of emergency due to coronavirus disease 2019 on outpatient blood pressure management in Japan. *Hypertension Research*, 45(4), 675-685.
- Kontis, V., Cobb, L. K., Mathers, C. D., Frieden, T. R., Ezzati, M., & Danaei, G. (2019). Three public health interventions could save 94 million lives in 25 years: global impact assessment analysis. *Circulation*, 140(9), 715-725.
- Kouri, A., Gupta, S., Yadollahi, A., Ryan, C. M., Gershon, A. S., To, T., ... & Chow, C. W. (2020). Addressing reduced laboratory-based pulmonary function testing during a pandemic. *Chest*, 158(6), 2502-2510.
- Kretchy, I. A., Owusu-Daaku, F. T., & Danquah, S. A. (2014). Mental health in hypertension: assessing symptoms of anxiety, depression and stress on anti-hypertensive medication adherence. *International journal of mental health systems*, 8(1), 1-6.
- Kretchy, I. A., Owusu-Daaku, F. T., Danquah, S. A., & Asampong, E. (2015). A psychosocial perspective of medication side effects, experiences, coping approaches and implications for adherence in hypertension management. *Clinical Hypertension*, 21(1), 1-8.
- Krishnamoorthy, Y., Giriappa, D. K., Eliyas, S. K., Priyan, S., Saya, G. K., & Lakshminarayanan, S. (2019). Patient and Provider's experience and perspective in addressing barriers to

medication adherence among noncommunicable disease patients in rural Puducherry, South India—a qualitative study. *Journal of Patient Experience*, 6(3), 216-223.

Krystal, A. D., & Edinger, J. D. (2008). Measuring sleep quality. *Sleep medicine*, 9, S10-S17.

Kulkarni, S. & Graggaber, J. (2022, March 23). *How to improve compliance to hypertension treatment*. European Society of Cardiology. <https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-22/how-to-improve-compliance-to-hypertension-treatment>

Kulkarni, S., O'Farrell, I., Erasi, M., & Kochar, M. S. (1998). Stress and hypertension. *WMJ: official publication of the State Medical Society of Wisconsin*, 97(11), 34-38.

Kumbla, D., Dharmalingam, M., Dalvi, K., Ray, S., Shah, M. K., Gupta, S., ... & Fegade, T. (2016).

A Study of salt and fat consumption pattern in regional Indian diet among hypertensive and dyslipidemic patients-SCRIPT study. *J Assoc Physicians India*, 64(12), 47-54.

Kurniawati, N. D., Wahyuni, E. D., & Toulasik, Y. A. (2019). Family Support Improves Hypertensive Patient Drug Compliance. *Indian Journal of Public Health Research & Development*, 10(8).

Laffin, L. J., Kaufman, H. W., Chen, Z., Niles, J. K., Arellano, A. R., Bare, L. A., & Hazen, S. L.

(2022). Rise in blood pressure observed among US adults during the COVID-19 pandemic. *Circulation*, 145(3), 235-237.

Lattin, J. M., Carroll, J. D., & Green, P. E. (2003). *Analyzing multivariate data* (Vol. 1).

Pacific Grove, CA: Thomson Brooks/Cole.

Laupacis, A. (2020). Working together to contain and manage COVID-19. *CMAJ*, 192(13), E340-E341.

Leigh, J. P., & Du, J. (2012). Are low wages risk factors for hypertension?. *The European Journal of Public Health*, 22(6), 854-859.

- Leserman, J. (2008). Role of depression, stress, and trauma in HIV disease progression. *Psychosomatic medicine*, 70(5), 539-545.
- Lewis, L. M., & Ogedegbe, G. (2008). Understanding the nature and role of spirituality in relation to medication adherence: A proposed conceptual model. *Holistic nursing practice*, 22(5), 261.
- Li, X., Xu, S., Yu, M., Wang, K., Tao, Y., Zhou, Y., ... & Zhao, J. (2020). Risk factors for severity and mortality in adult COVID-19 inpatients in Wuhan. *Journal of Allergy and Clinical Immunology*, 146(1), 110-118.
- Lima, M. G., Malta, D. C., de Oliveira Werneck, A., Szwarcwald, C. L., de Oliveira Souza, D. B., Gomes, C. S., ... & de Azevedo Barros, M. B. (2022). Effect of chronic non-communicable diseases (CNCDs) on the sleep of Brazilians during the COVID-19 pandemic. *Sleep Medicine*, 91, 205-210.
- Lippi, G., Wong, J., & Henry, B. M. (2020). Hypertension and its severity or mortality in Coronavirus Disease 2019 (COVID-19): a pooled analysis. *Pol Arch Intern Med*, 130(4), 304-309.
- Liu, R. Q., Qian, Z., Trevathan, E., Chang, J. J., Zelicoff, A., Hao, Y. T., ... & Dong, G. H. (2016). Poor sleep quality associated with high risk of hypertension and elevated blood pressure in China: results from a large population-based study. *Hypertension Research*, 39(1), 54-59.
- Lo, K., Woo, B., Wong, M., & Tam, W. (2018). Subjective sleep quality, blood pressure, and hypertension: a meta-analysis. *The Journal of Clinical Hypertension*, 20(3), 592-605.
- Lo, K., Woo, B., Wong, M., & Tam, W. (2018). Subjective sleep quality, blood pressure, and hypertension: a meta-analysis. *The Journal of Clinical Hypertension*, 20(3), 592-605.

- Lopes, S., Félix, G., Mesquita-Bastos, J., Figueiredo, D., Oliveira, J., & Ribeiro, F. (2021). Determinants of exercise adherence and maintenance among patients with hypertension: a narrative review. *Reviews in Cardiovascular Medicine*, 22(4), 1271-1278.
- Louvardi, M., Pelekasis, P., Chrousos, G. P., & Darviri, C. (2020). Mental health in chronic disease patients during the COVID-19 quarantine in Greece. *Palliative & Supportive Care*, 18(4), 394-399.
- Lovallo, W. R., & Gerin, W. (2003). Psychophysiological reactivity: mechanisms and pathways to cardiovascular disease. *Psychosomatic medicine*, 65(1), 36-45.
- Lu, K., Ding, R., Tang, Q., Chen, J., Wang, L., Wang, C., ... & Hu, D. (2015). Association between self-reported global sleep status and prevalence of hypertension in Chinese adults: data from the Kailuan community. *International journal of environmental research and public health*, 12(1), 488-503.
- Lu, S., Wu, Y., Mao, Z., & Liang, X. (2020). Association of formal and informal social support with health-related quality of life among Chinese rural elders. *International journal of environmental research and public health*, 17(4), 1351.
- Ma, C. (2018). An investigation of factors influencing self-care behaviors in young and middle-aged adults with hypertension based on a health belief model. *Heart & Lung*, 47(2), 136-141.
- MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological methods*, 1(2), 130.
- Maddi, S. R. (1999). Comments on trends in hardiness research and theorizing. *Consulting Psychology Journal: Practice and Research*, 51, 67-71.
- Maddi, S. R. (1999). The personality construct of hardiness: I. Effects on experiencing, coping, and strain. *Consulting psychology journal: practice and research*, 51(2), 83.

- Mahmoud, M. I. H. (2012). Compliance with treatment of patients with hypertension in Almadinah Almunawwarah: A community-based study. *Journal of Taibah University Medical Sciences*, 7(2), 92-98.
- Malik, A., Yoshida, Y., Erkin, T., Salim, D., & Hamajima, N. (2014). Hypertension-related knowledge, practice and drug adherence among inpatients of a hospital in Samarkand, Uzbekistan. *Nagoya journal of medical science*, 76(3-4), 255.
- Malta, D. C., Gomes, C. S., Silva, A. G. D., Cardoso, L. S. D. M., Barros, M. B. D. A., Lima, M. G., ... & Szwarcwald, C. L. (2021). Use of health services and adherence to social distancing by adults with Noncommunicable Diseases during the COVID-19 pandemic, Brazil, 2020. *Ciência & Saúde Coletiva*, 26, 2833-2842.
- Mandelkorn, U., Genzer, S., Choshen-Hillel, S., Reiter, J., Meira e Cruz, M., Hochner, H., ... & Gileles-Hillel, A. (2021). Escalation of sleep disturbances amid the COVID-19 pandemic: a cross-sectional international study. *Journal of Clinical Sleep Medicine*, 17(1), 45-53.
- Manuck, S. B. (1994). Cardiovascular reactivity in cardiovascular disease: "Once more unto the breach". *International Journal of Behavioral Medicine*, 1(1), 4-31.
- Marazziti, D., Falcone, M. F., Rosa, C., & Ghione, S. (1990). Changes in serotonergic mechanisms in essential hypertension. *Annali Italiani di Medicina Interna: Organo Ufficiale Della Societa Italiana di Medicina Interna*, 5(4 Pt 2), 459-463.
- Marseille, B. R., Commodore-Mensah, Y., Davidson, P. M., Baker, D., D'Aoust, R., & Baptiste, D. L. (2021). Improving hypertension knowledge, medication adherence, and blood pressure control: a feasibility study. *Journal of clinical nursing*, 30(19-20), 2960-2967.
- Marshall, I. J., Wolfe, C. D., & McKevitt, C. (2012). Lay perspectives on hypertension and drug adherence: systematic review of qualitative research. *Bmj*, 345.

- Martin, M. Y., Person, S. D., Kratt, P., Prayor-Patterson, H., Kim, Y., Salas, M., & Pisu, M. (2008). Relationship of health behavior theories with self-efficacy among insufficiently active hypertensive African–American women. *Patient education and counseling*, 72(1), 137-145.
- Maruyama, G. (1997). *Basics of structural equation modeling*. Sage.
- McEwen, B. S. (1998). Stress, adaptation, and disease: Allostasis and allostatic load. *Annals of the New York academy of sciences*, 840(1), 33-44.
- McKie, R. (2023, May 7). Is Covid really over? WHO’s announcement sounds more like surrender than victory. *The Guardian*. <https://www.theguardian.com/world/2023/may/07/is-covid-really-over-whos-announcement-sounds-more-like-surrender-than-victory>
- Mellen, P. B., Gao, S. K., Vitolins, M. Z., & Goff, D. C. (2008). Deteriorating dietary habits among adults with hypertension: DASH dietary concordance, NHANES 1988-1994 and 1999-2004. *Archives of internal medicine*, 168(3), 308-314.
- Mills, K. T., Stefanescu, A., & He, J. (2020). The global epidemiology of hypertension. *Nature Reviews Nephrology*, 16(4), 223-237.
- Modrek, S., & Cullen, M. R. (2013). Health consequences of the ‘Great Recession’ on the employed: evidence from an industrial cohort in aluminum manufacturing. *Social Science & Medicine*, 92, 105-113.
- Mohan, V., Deepa, M., Farooq, S., Datta, M., & Deepa, R. (2007). Prevalence, awareness and control of hypertension in Chennai-the Chennai Urban Rural Epidemiology Study (CURES-52). *Journal of the Association of Physicians of India*, 55, 326-332.
- Mohan. M, V, Deepa. M., Farooq. S., Datta. M., & Deepa, R. (2007). Prevalence,
- Moises Jr, C. (2020). Online data collection as adaptation in conducting quantitative and qualitative research during the COVID-19 pandemic. *European Journal of Education Studies*, 7(11).

- Molloy, G. J., Perkins-Porras, L., Strike, P. C., & Steptoe, A. (2008). Social networks and partner stress as predictors of adherence to medication, rehabilitation attendance, and quality of life following acute coronary syndrome. *Health Psychology, 27*(1), 52.
- Monteiro, S. R., & Hariharan, M. (2019). Family support in effective management of hypertension: role of children as passive change agents. *Int J Health Sci Res, 9*(06), 363-377.
- Moore, S. M., Charvat, J. M., Gordon, N. H., Roberts, B. L., Pashkow, F., Ribisl, P., & Rocco, M. (2006). Effects of a CHANGE intervention to increase exercise maintenance following cardiac events. *Annals of Behavioral Medicine, 31*(1), 53-62.
- Moos, R. H., & Holahan, C. J. (2007). Adaptive tasks and methods of coping with illness and disability. In *Coping with chronic illness and disability* (pp. 107-126). Springer, Boston, MA.
- Morelli, N., Rota, E., Terracciano, C., Immovilli, P., Spallazzi, M., Colombi, D., ... & Guidetti, D. (2020). The baffling case of ischemic stroke disappearance from the casualty department in the COVID-19 era. *European neurology, 1*.
- Moser, M., Miller, N. H., Jaffe, M., & Gifford Jr, R. (2001). Roundtable discussion: hypertension and comorbidities. *The Journal of Clinical Hypertension, 3*(5), 302-312.
- Moss-Morris, R., Petrie, K. J., & Weinman, J. (1996). Functioning in chronic fatigue syndrome: do illness perceptions play a regulatory role?. *British Journal of Health Psychology, 1*(1), 15-25.
- Muralikrishnan, K., Balasubramanian, K., & Rao, B. V. (2011). Heart rate variability in normotensive subjects with family history of hypertension. *Indian J Physiol Pharmacol, 55*(3), 253-61.
- Nadar, S. K., Tayebjee, M. H., Stowasser, M., & Byrd, J. B. (2020). Managing hypertension during the COVID-19 pandemic. *Journal of Human Hypertension, 34*(6), 415-417.
- Nair, C. S., & Adams, P. (2009). Survey platform: A factor influencing online survey delivery and response rate. *Quality in Higher Education, 15*(3), 291-296.

National Heart, Lung and Blood Institute. (2021). *DASH eating plan*.

<https://www.nhlbi.nih.gov/education/dash-eating-plan>

Navuluri, R. B. (2001). Do hardiness and attitude promote self-care adherence to physical activity among adults with diabetes. *The Internet Journal of Internal Medicine*, 3(1), 23-37.

Neighbors, M., & Tannehill-Jones, R. (2022). *Human diseases*. Cengage Learning.

Nicholas, P. K., & Leuner, J. D. M. (1999). Hardiness, social support, and health status: are there differences in older African-American and Anglo-American adults?. *Holistic Nursing Practice*, 13(3), 53-61.

Nguyen, Q., Dominguez, J., Nguyen, L., & Gullapalli, N. (2010). Hypertension management: an update. *American health & drug benefits*, 3(1), 47.

Nyaaba, G. N., Agyemang, C., Masana, L., Aikins, A. D. G., Beune, E., Larrea-Killinger, C., & Stronks, K. (2019). Illness representations and coping practices for self-managing hypertension among sub-Saharan Africans: a comparative study among Ghanaian migrants and non-migrant Ghanaians. *Patient education and counseling*, 102(9), 1711-1721.

Ogedegbe, G., & Schoenthaler, A. (2006). A systematic review of the effects of home blood pressure monitoring on medication adherence. *The Journal of Clinical Hypertension*, 8(3), 174-180.

Osonoi, Y., Mita, T., Osonoi, T., Saito, M., Tamasawa, A., Nakayama, S., ... & Watada, H. (2015). Poor sleep quality is associated with increased arterial stiffness in Japanese patients with type 2 diabetes mellitus. *BMC endocrine disorders*, 15(1), 1-7.

Paczkowska, A., Hoffmann, K., Kus, K., Kopciuch, D., Zaprutko, T., Ratajczak, P., ... & Bryl, W. (2021). Impact of patient knowledge on hypertension treatment adherence and efficacy: A single-centre study in Poland. *International journal of medical sciences*, 18(3), 852.

- Padhy, M., Hariharan, M., Mukherjee, O., Mutnury, S. L., & Anand, V. (2021). Effect of Illness Duration and Gender on Coping Skills Deficiency among Chronic Illness Patients. *Int. Journal of Advanced Multidisciplinary Research*, 8(9), 13-25.
- Padhy, M., Lalnuntluangi, R., Chelli, K., & Padiri, R. A. (2016). Social Support and Adherence among hypertensive patients. *AJHM*, 1(1), 33-40.
- Padhy, M., Lalnuntluangi, R., Chelli, K., & Padiri, R. A. (2016). Social Support and Adherence among hypertensive patients. *AJHM*, 1(1), 33-40.
- Padilla, J., Wallace, J. P., & Park, S. (2005). Accumulation of physical activity reduces blood pressure in pre-and hypertension. *Medicine and Science in Sports and Exercise*, 37(8), 1264.
- Pal, R., & Bhadada, S. K. (2020). COVID-19 and non-communicable diseases. *Postgraduate Medical Journal*, 96(1137), 429-430.
- Pan American Health Organization (2020). *World hypertension day 2020*.
- Pandit, A. U., Tang, J. W., Bailey, S. C., Davis, T. C., Bocchini, M. V., Persell, S. D., ... & Wolf, M. S. (2009). Education, literacy, and health: Mediating effects on hypertension knowledge and control. *Patient education and counseling*, 75(3), 381-385.
- Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V. G., Papoutsis, E., & Katsaounou, P. (2020). Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, behavior, and immunity*, 88, 901-907.
- Pednekar, M. S., Gupta, R., & Gupta, P. C. (2009). Association of blood pressure and cardiovascular mortality in India: Mumbai cohort study. *American journal of hypertension*, 22(10), 1076-1084.
- Petrie, K., & Weinman, J. (2006). Why illness perceptions matter. *Clinical medicine*, 6(6), 536.

- Petzold, M. B., Bendau, A., Plag, J., Pyrkosch, L., Mascarell Maricic, L., Betzler, F., ... & Ströhle, A. (2020). Risk, resilience, psychological distress, and anxiety at the beginning of the COVID-19 pandemic in Germany. *Brain and behavior*, 10(9), e01745.
- Pfeifer, L. S., Heyers, K., Ocklenburg, S., & Wolf, O. T. (2021). Stress research during the COVID-19 pandemic and beyond. *Neuroscience & Biobehavioral Reviews*, 131, 581-596.
- Pierin, A. M. G., Silva, S. S. B. E. D., Colósimo, F. C., Toma, G. D. A., Serafim, T. D. S., & Meneghin, P. (2016). Chronic and asymptomatic diseases influence the control of hypertension treatment in primary care. *Revista da Escola de Enfermagem da USP*, 50, 763-770.
- Piferi, R. L., & Lawler, K. A. (2006). Social support and ambulatory blood pressure: An examination of both receiving and giving. *International Journal of Psychophysiology*, 62(2), 328-336.
- Pollock, S. E., Christian, B. J., & Sands, D. (1990). Responses to chronic illness: analysis of psychological and physiological adaptation. *Nursing research*, 39(5), 300-304.
- Pollock, S. E., Verran, J. A., Hoare, K., & Solomons, H. C. (1989). Adaptive responses to diabetes mellitus. *Western Journal of nursing research*, 11(3), 265-280.
- Poulter, N. R., Borghi, C., Parati, G., Pathak, A., Toli, D., Williams, B., & Schmieder, R. E. (2020). Medication adherence in hypertension. *Journal of hypertension*, 38(4), 579-587.
- Prati, G., & Pietrantoni, L. (2010). The relation of perceived and received social support to mental health among first responders: a meta-analytic review. *Journal of Community Psychology*, 38(3), 403-417.
- Prenissl, J., Manne-Goechler, J., Jaacks, L. M., Prabhakaran, D., Awasthi, A., Bishops, A. C., ... & Geldsetzer, P. (2019). Hypertension screening, awareness, treatment, and control in India: a nationally representative cross-sectional study among individuals aged 15 to 49 years. *PLoS medicine*, 16(5), e1002801.

- Puspita, R. C., Tamtomo, D., & Indarto, D. (2017). Health belief model for the analysis of factors affecting hypertension preventive behavior among adolescents in Surakarta. *Journal of Health Promotion and Behavior*, 2(2), 183-196.
- Putri, N. R. I. A. T., Wati, D. N. K., & Rekawati, E. (2018). The correlation of family support and social support with the adherence to physical exercise among the older persons with hypertension. *International Journal of Indonesian National Nurses Association (IJINNA)*, 55-63.
- Queiroz, M. G., Prado, A. G. K., Alves-Santos, É. T., Araújo, J. A., Damazo, A. S., & Cambri, L. T. (2022). Influence of family history of hypertension on blood pressure and heart rate variability in young adults: a meta-analysis. *Blood Pressure Monitoring*, 27(4), 259-271.
- Ragavan, R. S., Joshi, R., Evans, R. G., Riddell, M. A., Thankappan, K. R., Chow, C. K., ... & Thrift, A. G. (2021). Additive association of knowledge and awareness on control of hypertension: a cross-sectional survey in rural India. *Journal of Hypertension*, 39(1), 107-116.
- Rahmawati, R., & Bajorek, B. (2018). Factors affecting self-reported medication adherence and hypertension knowledge: A cross-sectional study in rural villages, Yogyakarta Province, Indonesia. *Chronic illness*, 14(3), 212-227.
- Rau, R. (2006). The association between blood pressure and work stress: The importance of measuring isolated systolic hypertension. *Work & Stress*, 20(1), 84-97.
- Rauniyar, S. K., Rahman, M., Abe, S. K., Nomura, S., & Shibuya, K. (2020). Inequalities and risk factors analysis in prevalence and management of hypertension in India and Nepal: a national and subnational study. *BMC public health*, 20(1), 1-11.

- Reddy, B. M., Ganguly, E., & Sharma, P. K. (2018). Hypertension and its correlates in the oldest old population aged 80 years and above in urban South India. *Journal of gerontology & geriatric research*, 7(3).
- Resurreccion, D. M., Motrico, E., Rigabert, A., Rubio-Valera, M., Conejo-Ceron, S., Pastor, L., & Moreno-Peral, P. (2017). Barriers for nonparticipation and dropout of women in cardiac rehabilitation programs: a systematic review. *Journal of women's health*, 26(8), 849-859.
- Rhodes, S. D., Bowie, D. A., & Hergenrather, K. C. (2003). Collecting behavioural data using the world wide web: considerations for researchers. *Journal of Epidemiology & Community Health*, 57(1), 68-73.
- Richardson, S., Hirsch, J. S., Narasimhan, M., Crawford, J. M., McGinn, T., Davidson, K. W., ... & Northwell COVID-19 Research Consortium. (2020). Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. *Jama*, 323(20), 2052-2059.
- Roberts, K. C., Rao, D. P., Bennett, T. L., Loukine, L., & Jayaraman, G. C. (2015). Prevalence and patterns of chronic disease multimorbidity and associated determinants in Canada. *Health promotion and chronic disease prevention in Canada: research, policy and practice*, 35(6), 87.
- Roca, B., Nadal, E., Rovira, R. E., Valls, S., Lapuebla, C., & Lloria, N. (2003). Usefulness of a hypertension education program. *Southern medical journal*, 96(11), 1133-1138.
- Rodriguez-Morales, A. J., Cardona-Ospina, J. A., Gutiérrez-Ocampo, E., Villamizar-Peña, R., Holguin-Rivera, Y., Escalera-Antezana, J. P., ... & Sah, R. (2020). Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis. *Travel medicine and infectious disease*, 34, 101623.

- Rodríguez-Rey, R., Garrido-Hernansaiz, H., & Collado, S. (2020). Psychological impact and associated factors during the initial stage of the coronavirus (COVID-19) pandemic among the general population in Spain. *Frontiers in psychology, 11*, 1540.
- Rosengren, A., Hawken, S., Ôunpuu, S., Sliwa, K., Zubaid, M., Almahmeed, W. A., ... & INTERHEART investigators. (2004). Association of psychosocial risk factors with risk of acute myocardial infarction in 11 119 cases and 13 648 controls from 52 countries (the INTERHEART study): case-control study. *The Lancet, 364*(9438), 953-962.
- Rosland, A. M., Kieffer, E., Israel, B., Cofield, M., Palmisano, G., Sinco, B., ... & Heisler, M. (2008). When is social support important? The association of family support and professional support with specific diabetes self-management behaviors. *Journal of general internal medicine, 23*(12), 1992-1999.
- Russell, K. L., & Bray, S. R. (2010). Promoting self-determined motivation for exercise in cardiac rehabilitation: the role of autonomy support. *Rehabilitation Psychology, 55*(1), 74.
- Russo, D., Hanel, P. H., Altnickel, S., & van Berkel, N. (2021). Predictors of well-being and productivity among software professionals during the COVID-19 pandemic—a longitudinal study. *Empirical Software Engineering, 26*(4), 62.
- Saida, T. G. R. H., Sørensen, T. J., & Langberg, H. (2017). Long-term exercise adherence after public health training in at-risk adults. *Annals of Physical and Rehabilitation Medicine, 60*(4), 237-243.
- Samal, D., Greisenegger, S., Auff, E., Lang, W., & Lalouschek, W. (2007). The relation between knowledge about hypertension and education in hospitalized patients with stroke in Vienna. *Stroke, 38*(4), 1304-1308.

- Samal, D., Greisenegger, S., Auff, E., Lang, W., & Lalouschek, W. (2007). The relation between knowledge about hypertension and education in hospitalized patients with stroke in Vienna. *Stroke*, 38(4), 1304-1308.
- San Martin, A. H., Serrano, J. P., Cambriles, T. D., Arias, E. M. A., Méndez, J. M., del Yerro Álvarez, M. J., & Sánchez, M. G. (2020). Sleep characteristics in health workers exposed to the COVID-19 pandemic. *Sleep medicine*, 75, 388-394.
- Sanne, S., Muntner, P., Kawasaki, L., Hyre, A., & DeSalvo, K. B. (2008). Hypertension knowledge among patients from an urban clinic. *Ethnicity & disease*, 18(1), 42-47.
- Saounatsou, M., Patsi, O., Fasoi, G., Stylianou, M., Kavga, A., Economou, O., ... & Nicolaou, M. (2001). The influence of the hypertensive patient's education in compliance with their medication. *Public Health Nursing*, 18(6), 436-442.
- Satoh, M., Murakami, T., Obara, T., & Metoki, H. (2022). Time-series analysis of blood pressure changes after the guideline update in 2019 and the coronavirus disease pandemic in 2020 using Japanese longitudinal data. *Hypertension Research*, 45(9), 1408-1417.
- Sayeed, A., Kundu, S., Al Banna, M., Christopher, E., Hasan, M. T., Rasheda Begum, M., ... & Islam Khan, M. S. (2020). Mental health outcomes of adults with comorbidity and chronic diseases during the COVID-19 pandemic: a matched case-control study. *Psychiatria Danubina*, 32(3-4), 491-498.
- Schulman-Green, D., Jaser, S., Martin, F., Alonzo, A., Grey, M., McCorkle, R., ... & Whittemore, R. (2012). Processes of self-management in chronic illness. *Journal of Nursing Scholarship*, 44(2), 136-144.
- Sensoy, B., Gunes, A., & Ari, S. (2021). Anxiety and depression levels in Covid-19 disease and their relation to hypertension. *Clinical and Experimental Hypertension*, 43(3), 237-241.

- Shah, S. N., Munjal, Y. P., Kamath, S. A., Wander, G. S., Mehta, N., Mukherjee, S., ... & Jha, V. (2020). Indian guidelines on hypertension-IV (2019). *Journal of Human Hypertension*, 34(11), 745-758.
- Shahin, W., Kennedy, G. A., & Stupans, I. (2021). The association between social support and medication adherence in patients with hypertension: a systematic review. *Pharmacy Practice (Granada)*, 19(2).
- Shamsi, A., Nayeri, N. D., & Esmaeili, M. (2017). Living with hypertension: A qualitative research. *International journal of community based nursing and midwifery*, 5(3), 219.
- Shanthanna, H., Strand, N. H., Provenzano, D. A., Lobo, C. A., Eldabe, S., Bhatia, A., ... & Narouze, S. (2020). Caring for patients with pain during the COVID-19 pandemic: consensus recommendations from an international expert panel. *Anaesthesia*, 75(7), 935-944.
- Sharma, S., Mukherjee, S., Kumar, A., & Dillon, W. R. (2005). A simulation study to investigate the use of cutoff values for assessing model fit in covariance structure models. *Journal of Business Research*, 58(7), 935-943.
- Sheard, M., & Golby, J. (2007). Hardiness and undergraduate academic study: The moderating role of commitment. *Personality and in*
- Sherbourne, C. D., & Stewart, A. L. (1991). The MOS social support survey. *Social science & medicine*, 32(6), 705-714.
- Shimels, T., Asrat Kassu, R., Bogale, G., Bekele, M., Getnet, M., Getachew, A., ... & Abraha, M. (2021). Magnitude and associated factors of poor medication adherence among diabetic and hypertensive patients visiting public health facilities in Ethiopia during the COVID-19 pandemic. *PloS one*, 16(4), e0249222.

- Silveira, L. C. J., Aliti, G. B., Da Silva, E. M., Pimentel, R. P., Gus, M., & Rabelo-Silva, E. R. (2019). Effect of motivational interviewing in hypertensive patients (MIIdNIgHT): study protocol for a randomized controlled trial. *Trials*, 20(1), 1-8.
- Singh, K., Kondal, D., Mohan, S., Jaganathan, S., Deepa, M., Venkateshmurthy, N. S., ... & Eggleston, K. (2021). Health, psychosocial, and economic impacts of the COVID-19 pandemic on people with chronic conditions in India: a mixed methods study. *BMC public health*, 21(1), 1-15.
- Smith, P. M., Mustard, C. A., Lu, H., & Glazier, R. H. (2013). Comparing the risk associated with psychosocial work conditions and health behaviours on incident hypertension over a nine-year period in Ontario, Canada. *Canadian Journal of Public Health*, 104(1), e82-e86.
- Stein, S. J., & Bartone, P. T. (2020). *Hardiness: Making stress work for you to achieve your life goals*. John Wiley & Sons.
- Step toe, A., & Kivimäki, M. (2012). Stress and cardiovascular disease. *Nature Reviews Cardiology*, 9(6), 360-370.
- Step toe, A., Brydon, L., & Kunz-Ebrecht, S. (2005). Changes in financial strain over three years, ambulatory blood pressure, and cortisol responses to awakening. *Psychosomatic medicine*, 67(2), 281-287.
- Suls, J., & Fletcher, B. (1985). The relative efficacy of avoidant and nonavoidant coping strategies: a meta-analysis. *Health psychology*, 4(3), 249.
- Sweet, S. N., Fortier, M. S., Strachan, S. M., & Blanchard, C. M. (2012). Testing and integrating self-determination theory and self-efficacy theory in a physical activity context. *Canadian Psychology/Psychologie Canadienne*, 53(4), 319.

- Świątoniowska-Lonc, N., Polański, J., Tański, W., & Jankowska-Polańska, B. (2020). Impact of satisfaction with physician–patient communication on self-care and adherence in patients with hypertension: cross-sectional study. *BMC health services research*, 20(1), 1-9.
- Szkody, E., Stearns, M., Stanhope, L., & McKinney, C. (2021). Stress-buffering role of social support during COVID-19. *Family process*, 60(3), 1002-1015.
- Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (Vol. 5, pp. 481-498). Boston, MA: pearson.
- Tam, C. C. F., Cheung, K. S., Lam, S., Wong, A., Yung, A., Sze, M., ... & Siu, C. W. (2020). Impact of coronavirus disease 2019 (COVID-19) outbreak on ST-segment–elevation myocardial infarction care in Hong Kong, China. *Circulation: Cardiovascular Quality and Outcomes*, 13(4), e006631.
- The Lancet Respiratory Medicine. (2020). COVID-19 heralds a new era for chronic diseases in primary care. *The Lancet. Respiratory Medicine*, 8(7), 647.
- Thomas, S. J., & Calhoun, D. (2017). Sleep, insomnia, and hypertension: current findings and future directions. *Journal of the American Society of Hypertension*, 11(2), 122-129.
- Thomas, P. A., Liu, H., & Umberson, D. (2017). Family relationships and well-being. *Innovation in aging*, 1(3), igx025.
- Tozo, T. A., Pereira, B. O., Menezes Junior, F. J. D., Montenegro, C. M., Moreira, C. M. M., & Leite, N. (2022). Family history of hypertension: impact on blood pressure, anthropometric measurements and physical activity level in schoolchildren. *International Journal of Cardiovascular Sciences*, 35, 382-390.
- Trail Ross, M. E. (1991). Hardiness and compliance in elderly patients with diabetes. *The Diabetes Educator*, 17(5), 372-375.

- Trakada, A., Nikolaidis, P. T., Andrade, M. D. S., Puccinelli, P. J., Economou, N. T., Steiropoulos, P., ... & Trakada, G. (2020). Sleep during “lockdown” in the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 17(23), 9094.
- Trevisol, D. J., Moreira, L. B., Kerkhoff, A., Fuchs, S. C., & Fuchs, F. D. (2011). Health-related quality of life and hypertension: a systematic review and meta-analysis of observational studies. *Journal of hypertension*, 29(2), 179-188.
- Trimarco, V., Izzo, R., Mone, P., Lembo, M., Manzi, M. V., Pacella, D., ... & Trimarco, B. (2023). Therapeutic concordance improves blood pressure control in patients with resistant hypertension. *Pharmacological Research*, 187, 106557.
- Turan, G. B., Aksoy, M., & Çiftçi, B. (2019). Effect of social support on the treatment adherence of hypertension patients. *Journal of Vascular Nursing*, 37(1), 46-51.
- Umucu, E., & Lee, B. (2020). Examining the impact of COVID-19 on stress and coping strategies in individuals with disabilities and chronic conditions. *Rehabilitation psychology*, 65(3), 193.
- Van den Hoogen, P. C., Feskens, E. J., Nagelkerke, N. J., Menotti, A., Nissinen, A., & Kromhout, D. (2000). The relation between blood pressure and mortality due to coronary heart disease among men in different parts of the world. *New England Journal of Medicine*, 342(1), 1-8.
- Vaughan, R., Morrison, L., & Miller, E. (2003). The illness representations of multiple sclerosis and their relations to outcome. *British journal of health psychology*, 8(3), 287-301.
- Vindegaard, N., & Benros, M. E. (2020). COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain, behavior, and immunity*, 89, 531-542.
- Voitsidis, P., Gliatas, I., Bairachtari, V., Papadopoulou, K., Papageorgiou, G., Parlapani, E., ... & Diakogiannis, I. (2020). Insomnia during the COVID-19 pandemic in a Greek population. *Psychiatry research*, 289, 113076.

- Vrijens, B., Antoniou, S., Burnier, M., De la Sierra, A., & Volpe, M. (2017). Current situation of medication adherence in hypertension. *Frontiers in pharmacology*, 100.
- Wallston, K. A., & Abraham, D. (1993). The Health Hardiness Inventory. *Unpublished instrument, available from author at Vanderbilt University School of Nursing, Nashville Tennessee.*
- Wang, R., Zhao, Y., He, X., Ma, X., Yan, X., Sun, Y., ... & He, J. (2009). Impact of hypertension on health-related quality of life in a population-based study in Shanghai, China. *Public health*, 123(8), 534-539.
- Warren-Findlow, J. (2006). Weathering: Stress and heart disease in African American women living in Chicago. *Qualitative Health Research*, 16(2), 221-237.
- Wearick-Silva, L. E., Richter, S. A., Viola, T. W., & Nunes, M. L. (2022). Sleep quality among parents and their children during COVID-19 pandemic. *Jornal de Pediatria*, 98, 248-255.
- Weinstein, E., Ragazzoni, L., Burkle, F., Allen, M., Hogan, D., & Della Corte, F. (2020). Delayed primary and specialty care: the coronavirus disease–2019 pandemic second wave. *Disaster medicine and public health preparedness*, 14(3), e19-e21.
- Whelton, P. K., Carey, R. M., Aronow, W. S., Casey, D. E., Collins, K. J., Dennison Himmelfarb, C., ... & Wright, J. T. (2018). 2017
- Williams, B., Mancia, G., Spiering, W., Agabiti Rosei, E., Azizi, M., Burnier, M., ... & Desormais, I. E. S. C. (2018). ESC Scientific Document Group. 2018 ESC/ESH Guidelines for the management of arterial hypertension. *European Heart Journal*, 39(33), 3021-3104.
- Williams, S., & Tsiligianni, I. (2020). COVID-19 poses novel challenges for global primary care. *NPJ Primary Care Respiratory Medicine*, 30(1), 1-3.

- Wilson, D. K., & Ampey-Thornhill, G. (2001). The role of gender and family support on dietary compliance in an African American adolescent hypertension prevention study. *Annals of Behavioral Medicine*, 23(1), 59-67.
- Witten, J., Jansen van Vuuren, A., & Learmonth, D. (2013). Psychological intervention to address hypertension in South Africa's peri-urban settlements. *Online Readings in Psychology and Culture*, 10(1), 3.
- Wolde, M., Azale, T., Debalkie Demissie, G., & Addis, B. (2022). Knowledge about hypertension and associated factors among patients with hypertension in public health facilities of Gondar city, Northwest Ethiopia: Ordinal logistic regression analysis. *Plos one*, 17(6), e0270030.
- Wolff, H. P. (1996). *Speaking of High Blood Pressure*. Delair Publishing, New York.
- World Health Organization (2022, June 2). *India Hypertension Control Initiative, a high impact and low-cost solution*. <https://www.who.int/india/news/detail/02-06-2022-india-hypertension-control-initiative--a-high-impact-and-low-cost-solution>
- World Health Organization (2023). *Coronavirus disease (COVID-19) pandemic*. <https://www.who.int/europe/emergencies/situations/covid-19>
- World Health Organization (2023). WHO coronavirus (COVID-19) dashboard. [Data set]. <https://covid19.who.int/>
- World Health Organization (2023, March 16). *Hypertension*. <https://www.who.int/news-room/fact-sheets/detail/hypertension>
- World Health Organization. (2021). *Hypertension* [Factsheet]. <https://www.who.int/news-room/fact-sheets/detail/hypertension>
- World Health Organization. Hypertension. 2019. Available online: <https://www.who.int/news-room/fact-sheets/detail/hypertension> (accessed on 12 January 2021).

- Wright, B. R., Barbosa-Leiker, C., & Hoekstra, T. (2011). Law enforcement officer versus non-law enforcement officer status as a longitudinal predictor of traditional and emerging cardiovascular risk factors. *Journal of Occupational and Environmental Medicine*, 730-734.
- Wright, T. A., & Sweeney, D. (1989). Coping strategies and diastolic blood pressure. *Psychological Reports*, 65(2), 443-449.
- Yang, J., Zheng, Y. A., Gou, X., Pu, K., Chen, Z., Guo, Q., ... & Zhou, Y. (2020). Prevalence of comorbidities and its effects in patients infected with SARS-CoV-2: a systematic review and meta-analysis. *International journal of infectious diseases*, 94, 91-95.
- Yao, Q., Wang, P., Wang, X., Qie, G., Meng, M., Tong, X., ... & Chu, Y. (2020). Retrospective study of risk factors for severe SARS-Cov-2 infections in hospitalized adult patients. *Pol Arch Intern Med*, 130(5), 390-399.
- Yi, H., Shin, K., & Shin, C. (2006). Development of the sleep quality scale. *Journal of sleep research*, 15(3), 309-316.
- Yu, V. (2022, December 21). China changes definition of Covid deaths as cases surge. *The Guardian*.
- Yue, Z., Bin, W., Weilin, Q., & Aifang, Y. (2015). Effect of medication adherence on blood pressure control and risk factors for antihypertensive medication adherence. *Journal of evaluation in clinical practice*, 21(1), 166-172.
- Zakin, G. Solomon, Z., Neriya, Y. (2003). Hardiness, attachment style, and long term psychological distress among Israeli POWs and combat veterans. *Journal of Personality and Individual Differences*, 34, 819–829.
- Zare, F., Sadeghian, F., Alatab, S., Chaman, R., & Mirrezaie, S. M. (2022). COVID-19 epidemic effects on sleep quality among health sector workers: A follow up study. *Chronobiology International*, 39(7), 1015-1026.

- Zarzour, M., Hachem, C., Kerbage, H., Richa, S., El Choueifaty, D., Saliba, G., ... & Choucair, J. (2022). Anxiety and sleep quality in a sample of Lebanese healthcare workers during the COVID-19 outbreak. *L'encephale*, 48(5), 496-503.
- Zhang, Y., Zhang, H., Ma, X., & Di, Q. (2020). Mental health problems during the COVID-19 pandemics and the mitigation effects of exercise: a longitudinal study of college students in China. *International journal of environmental research and public health*, 17(10), 3722.
- Zheng, Z., Peng, F., Xu, B., Zhao, J., Liu, H., Peng, J., ... & Tang, W. (2020). Risk factors of critical & mortal COVID-19 cases: A systematic literature review and meta-analysis. *Journal of infection*, 81(2), e16-e25.
- Zhou, B., Bentham, J., Di Cesare, M., Bixby, H., Danaei, G., Cowan, M. J., ... & Cho, B. (2017). Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19· 1 million participants. *The Lancet*, 389(10064), 37-55.
- Zhou, B., Carrillo-Larco, R. M., Danaei, G., Riley, L. M., Paciorek, C. J., Stevens, G. A., ... & Breckenkamp, J. (2021). Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *The Lancet*, 398(10304), 957-980.
- Zinat Motlagh, S. F., Chaman, R., Ghafari, S. R., Parisay, Z., Golabi, M. R., Eslami, A. A., & Babouei, A. (2015). Knowledge, treatment, control, and risk factors for hypertension among adults in Southern Iran. *International journal of hypertension*, 2015.

APPENDICES

DEMOGRAPHIC AND HEALTH DETAILS SHEET

APPENDIX A1

1. Name:
2. Age:
3. Gender:
 - a. Man
 - b. Woman
 - c. Other
4. Marital Status:
 - a. Single
 - b. Married
5. Education:
 - a. Literate
 - b. High School
 - c. Intermediate
 - d. Graduate
 - e. Post-Graduate and above
6. Employment Status: Employed / Unemployed
7. Occupation:
 - a. Freelance / Business / Start-up Owner
 - b. Employee at a Government / Public Organization
 - c. Employee at a Private Organization
 - d. Not Applicable
 - e. Others (please specify):
8. Work Experience:
9. Location of Work: Work from Home / Work from Office

10. Residence:

- a. Urban
- b. Rural

11. For how long have you been diagnosed with High Blood Pressure?

- a. 0 – 4 years
- b. 5 – 7 years
- c. 8 – 10 years
- d. 11 years and above

12. Presence of any Other Health Issues apart from High Blood Pressure:

- a. Diabetes
- b. Arthritis
- c. Asthma
- d. None of the above
- e. Other (Please Specify):

13. Presence of any Mental Health Issues: Yes / No

- a. If yes, please specify:

14. Presence of Hypertension in other family members (family history): Yes / No

If yes, please mention the number of members and your relationship with them:

15. Did you have knowledge of hypertension prior to your diagnosis? Yes / No

16. When was your Blood Pressure checked last?

- a. About a week or a fortnight back
- b. Three to four weeks ago
- c. More than a month back

17. Blood Pressure reading: Systolic/Diastolic (mmHg)

18. Were you diagnosed with COVID-19? Yes / No

19. Financial Condition: _____ Difficult / Manageable / Comfortable

19. Financial Condition: _____ Difficult / Manageable / Comfortable

20. Number of sources of income in the family:

- Single Income
- Double Income
- More than 2 sources of Income

21. Number of Dependents:

22. Was there a salary deduction during the COVID-19 pandemic? Yes / No

23. Contact details:

- a. Email:
- b. Ph No.:

HYPERTENSION KNOWLEDGE TEST

APPENDIX A2

Please read the following questions regarding high blood pressure carefully and select the correct answer and assess how much you know about your disease.

1. If someone's blood pressure is 120/80, it is
 - a. High
 - b. Low
 - c. Normal
 - d. Pre-Hypertension
 - e. Do not know

2. Dietary Changes that are useful to control hypertension include:
 - a. Consuming more fruits and whole grains
 - b. Red meat, egg, milk, cheese
 - c. Go on Fasting
 - d. Intermittently
 - e. Do not Know

3. For patients with high B.P reducing salt intake
 - a. Helps in bringing down the B.P
 - b. Increases the B.P
 - c. Does not have any impact
 - d. Is dangerous
 - e. Do not know

4. Once someone has high blood pressure, it usually lasts for
 - a. Two Years
 - b. 5-10 years
 - c. 10-15 years
 - d. Rest of their life
 - e. Do not know

5. People with high blood pressure should take their medicine
 - a. Every day and lifelong without break
 - b. A course for one week
 - c. Only when the B.P is high
 - d. Until the B.P gives normal reading
 - e. Do not know

6. What happens when B.P shoots very high, crossing its limits?
 - a. Leads to paralysis
 - b. Leads to holes in the heart

- c. Damages the bones
 - d. Both a& b
 - e. Do not Know
7. Doctor needs to be informed about the medicines that a B.P patient is using
- a. When undergoing surgical procedures
 - b. When going for X Ray
 - c. When consulting doctor for uncontrolled fever
 - d. When one has severe throat infection
 - e. Do not know
8. Which of the following is not a cause of high B.P.?
- a. Obesity
 - b. Excessive anger
 - c. Smoking
 - d. Hereditary
 - e. Do not Know
9. The fact about high blood pressure is that
- a. It is normal phenomenon, problems if left untreated
 - b. It causes serious health problems if left untreated
 - c. It is seen only in old people
 - d. It is seen in people who are short tempered
 - e. Do not know
10. Risk of hypertension can be reduced by
- a. Smoking occasionally
 - b. Consuming limited quantity of alcohol everyday
 - c. Avoiding physical activity
 - d. Reducing the weight
 - e. Do not know
11. Medicines for hypertension
- a. Can be suggested by a relative who has been taking medicines for high BP for prolonged period
 - b. Cannot deviate from the prescribed medication under any circumstance
 - c. For any reason, if the prescribed medicine is unavailable, the medicines used by other hypertensive patients can be taken temporarily
 - d. When one forgets to carry the medicine while going out, it can be skipped
 - e. Do not know
12. In a patient of Hypertension, if suddenly one side of face starts drooping, speech becomes difficult, arm becomes weak then it is possibly a
- a. Brain stroke

- b. Heart attack
- c. Heart failure
- d. Kidney Failure
- e. Do not know

13. Commonly used drugs to treat hypertension are:

- a. Beta blockers and diuretics
- b. Diuretics and hormones
- c. Vasodilators and steroids
- d. Sodium bicarbide and calcium carbonate
- e. Do not know

14. Which one of the following is wrong?

- a. Medications should be taken on time every day
- b. When the B.P is normal, medications can be stopped
- c. Take the medicine irrespective of other problems like fever or cold
- d. Doctor should know all the medications being taken
- e. Do not know

15. What should be done if a person misses a dose of medication?

- a. It is good to take skipped dose along with the next dose together
- b. Skip the next dose also and start fresh from next morning
- c. Take the dose as early as possible
- d. It is good to skip routinely to avoid over dose
- e. Do not know

16. Warning signal during a heart attack is

- a. Person suffers from fever & chills
- b. Person experiences headache
- c. Person suffers from dizziness, pain in the chest and shortness of breath
- d. Person suffers from swelling of feet
- e. Do not know

17. Which of the following is correct?

- a. Decrease medication dosage when the symptoms disappear
- b. Medication can be skipped once in a way
- c. Have a routine for taking medication
- d. Increase the dosage when the symptoms are severe
- e. Do not Know

18. Hypertension is blood pressure recording more than

- a. 100/80
- b. 110/70

- c. 120/80
- d. 140/90
- e. Do not know

19. Life style modification for treating Hypertension include:

- a. Resting a lot
- b. Regulating diet and exercise
- c. Living in quite locality
- d. Controlling anger
- e. Do not know

20. Which of the following statements is wrong?

- a. Eat less red meat and sweets
- b. Eat food that are high in magnesium, potassium, and calcium
- c. Eat food with more sodium
- d. Eat more whole grain products and fish
- e. Do not Know

21. Damage caused by high blood pressure to body include:

- a. Heart attack, heart failure, brain stroke
- b. Damage of blood vessels, eyes, kidneys
- c. Gaining lot of weight
- d. Both A and B are true
- e. Do not know

22. All are true statements about Hypertension except:

- a. Genes, Obesity, Stress are some of risk factors
- b. Walking long distances is harmful for patients with high B.P
- c. Headaches, chest, pain breathing difficulty can be symptoms when B.P is High
- d. It Can Sometimes be a “Silent Killer” with very little symptoms
- e. Do not know

MEDICAL OUTCOMES STUDY SOCIAL SUPPORT SURVEY**APPENDIX A3**

People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it? Choose the option you think is most appropriate for you based on the extent to which you agree with each statement.

1 = NONE OF THE TIME

2 = A LITTLE OF THE TIME

3 = SOME OF THE TIME

4 = MOST OF THE TIME

5 = ALL OF THE TIME

S. NO.	STATEMENT	1	2	3	4	5
HOW OFTEN DO YOU HAVE						
1.	Someone you can count on to listen to you when you need to talk?					
2.	Someone to give you information to help you understand a situation?					
3.	Someone to give you good advice about a crisis?					
4.	Someone to confide in or talk to about yourself or your problems?					
5.	Someone whose advice you really want?					
6.	Someone to share your most private worries and fears with?					
7.	Someone to turn to for suggestions about how to deal with a personal problem?					

8.	Someone who understands your problems?					
9.	Someone to help you if you were confined to bed?					
10.	Someone to take you to the doctor if you needed it?					
11.	Someone to prepare your meals if you were unable to do it yourself?					
12.	Someone to help with daily chores if you were sick?					
13.	Someone who shows you love and affection?					
14.	Someone to love and make you feel wanted?					
15.	Someone who hugs you?					
16.	Someone to have a good time with?					
17.	Someone to get together with for relaxation?					
18.	Someone to do something enjoyable with?					
19.	Someone to do things with, to help you get your mind off things?					

REVISED HEALTH HARDINESS INVENTORY -24**APPENDIX A4**

The following statements aim to understand your beliefs related to health. Each statement has five options on the right side. Choose the option you think is most appropriate for you based on the extent to which you agree with the statement.

1 = STRONGLY DISAGREE 2 = DISAGREE 3 = NEITHER AGREE NOR DISAGREE
4 = AGREE 5 = STRONGLY AGREE

S. NO.	STATEMENT	1	2	3	4	5
1.	Efforts to improve your health are a waste of a time.					
2.	It is difficult for me to find effective solutions for health problems that come my way.					
3.	I can be as healthy as I want to be					
4.	I am bored by all the attention that is paid to health and disease prevention					
5.	Typically, my plans for my health don't work out well					
6.	I handle myself well with respect to my health					
7.	I don't give up easily on efforts to improve my health					
8.	I am willing to make daily sacrifices for good health					
9.	What's the use of concerning yourself about your health-you'll only worry yourself to death					
10.	There is too much emphasis on personal responsibility for health in today's world					
11.	No matter how hard I try, my health doesn't turn out the way I would like					
12.	I am determined to be as healthy as I can be					

13.	Most things that affect my health happen to me by accident					
14.	No matter what I do, if I am going to get ill, I will get ill					
15.	I am in control of my health					
16.	I take care of my health as a matter of principle					
17.	I find efforts to change things I don't like about my health, are ineffective					
18.	I can pretty much stay healthy by taking care of myself					
19.	I am generally able to accomplish my goals with respect to my health					
20.	I succeed in the projects I undertake to improve my health					
21.	When something goes wrong with my health, I do everything I can to get to the root of the problem					
22.	When I stay healthy, I am just plain lucky					
23.	The main thing that affects my health is what I do myself					
24.	I am directly responsible for my health					

SLEEP QUALITY SCALE

APPENDIX A5

The following statements aim to understand the quality of your sleep in the last one month. Each statement has 4 options on the right. Mark the option you think is most appropriate for you.

0 = RARELY (None / 1-3 times a month)

1 = SOMETIMES (1-2 times a week)

2 = OFTEN (3-5 times a week)

3 = AMOST ALWAYS (6-7 times a week)

S. NO.	STATEMENT	0	1	2	3
1.	I have difficulty falling asleep.				
2.	I fall into a deep sleep.				
3.	I wake up while sleeping.				
4.	I have difficulty getting back to sleep once I wake up in the middle of the night.				
5.	I wake up easily because of noise.				
6.	I toss and turn.				
7.	I never go back to sleep after awakening in the middle of my sleep.				
8.	I feel refreshed after waking up.				
9.	I feel unlikely to sleep after waking up.				
10.	Poor sleep gives me headaches.				

11.	Poor sleep makes me irritated.				
12.	I would like to sleep more after waking up.				
13.	My sleep hours are adequate.				
14.	Poor sleep makes me lose my appetite.				
15.	Poor sleep makes it hard for me to think.				
16.	I feel energetic after waking up.				
17.	Poor sleep makes me lose interest in work or others.				
18.	My fatigue is relieved after waking up.				
19.	Poor sleep causes me to make mistakes at work.				
20.	I am satisfied with my sleep.				
21.	Poor sleep makes me forget things more easily.				
22.	Poor sleep makes it difficult for me to concentrate at work.				
23.	Sleepiness interferes with my daily life.				
24.	Poor sleep makes me lose my desire in all things.				
25.	I have difficulty getting out of bed.				

26.	Poor sleep makes me easily tired at work.				
27.	I have a clear head after waking up.				
28.	Poor sleep makes my life miserable.				

HYPERTENSION COMPLIANCE SCALE

APPENDIX A6

The following statements try to understand the extent to which you follow your treatment regimen in the management of your high blood pressure. Each statement has five options on the right side. Choose the option you think is most appropriate for you based on the frequency of your behaviour in the past ONE MONTH.

0 = NOT A SINGLE DAY IN A MONTH

1 = SOMETIMES

2 = MOST OF THE TIME

3 = ALMOST EVERYDAY

4 = NOT APPLICABLE / DO NOT KNOW

S. NO.	STATEMENT	0	1	2	3	4
1.	How often do you forget to take your medicine for high blood pressure (BP)?					
2.	How often do you decide not to take your medicine?					
3.	How often do you eat salty food?					
4..	How often do you eat fast food?					
5.	How often do you add extra salt to your food?					
6.	How often do you get the next appointment before you leave the clinic?					
S. NO.	STATEMENT	0	1	2	3	4

7.	How often do you run out of BP medicine?					
8.	How often do you miss taking your medicine because you feel better?					
9.	How often do you miss taking your medicine because you fell sick?					
10.	How often do you take someone else's BP medicine?					
11.	How often you just don't bother about taking your BP medicine?					
12.	How often do you check your blood pressure level?					
13.	How often do you do the prescribed exercises e. g. morning walk?					
14.	How often do you substitute your exercise with house hold chores/ running errands?					
15.	How often do you cut short the duration of your exercise?					

HYPERTENSION CLINICAL SYMPTOMS CHECKLIST

APPENDIX A7

This list consists of various symptoms related to high blood pressure. One may not experience all these symptoms. Some people experience many of them while others may experience a few. Yet others, may not experience any of these symptoms. Please read each of these symptoms carefully and try to recall how often, you experienced the same in the last 4 weeks. Choose the option you think is most appropriate for you based on the frequency of that experience.

ALMOST ALWAYS = symptom experienced every alternate day or more

OFTEN = symptom experienced twice a week

SOMETIMES = symptom experienced once a week

RARELY = symptom experienced once or twice in the past 4 weeks

NEVER = symptom not experienced at all in the past 4 weeks

S. No	Symptom	Almost Always	Often	Sometimes	Rarely	Never
1.	Headache					
2.	Giddiness					
3.	Fast heartbeat or palpitations					
4.	Reeling sensation in the head					
5.	Chest discomfort					
6.	Bleeding from nose					
7.	Blurred vision					
8.	Swelling in the feet					

9.	Shortness of breath					
10.	Inability to sleep					
11.	Fatigue or exhaustion					
12.	Sweating					
13.	Tingling & numbness in finger tips & toes					
14.	Weakness					
15.	Nausea/vomiting					
16.	Confusion/loss of orientation					

COVID-19 PANDEMIC STRESS SCALE

APPENDIX A8

The COVID-19 pandemic has brought about drastic changes in our lifestyles. Our daily routine has changed, we experienced changes in the work environment, home environment, job and family requirements. We also learned to integrate the COVID-19 guidelines into our daily living. This includes health guidelines such as wearing a mask, maintaining social distance, hand sanitization, etc. Apart from this, we are required to adapt to the new challenges of online school/college for the children. More than anything we have no choice but to minimize socializing which is a strongly rooted need for us.

All these and many other demands and constraints brought by the pandemic situation may have induced stress in many of us. This stress may not directly relate to the COVID-19 situation but may have been caused due to the various factors associated with it.

This scale measures the stress experienced by adults during the pandemic situation. The statements in this scale ask you about your feelings, thoughts and behaviours during the pandemic (March 22, 2020 – Present). For each statement, you are required to mark how often you felt/thought/behaved that way (this may be during the lockdown or not during the lockdown).

0 = Never / Not Applicable 1 = Almost Never 2 = Sometimes 3 = Often 4 = Always

S. No.	Statement	0	1	2	3	4
1.	Work from home is stressful for me					
2.	Face difficulties in doing equal justice to professional demands and household chores					
3.	Feel strained due to the absence of household help during the pandemic					
4.	Feel stressed due to the unending demands of the family members on me					
5.	Find it stressful to run errands due to fear of catching the COVID-19 virus					
7.	Feel suffocated to have all the family members at home all the time					
9.	Miss my face-to- face interaction with friends					
10.	Experience anxiety with the constant flow of information related to the pandemic (e.g., in the news, on social media, people around me discussing)					
12.	Feel disturbed due to news about the infection and death rate of COVID-19					

13.	Feel stressed when I hear about my family/acquaintances/friends suffering from the COVID-19 disease					
17.	Feel burdened with a sense of loss of freedom due to imposed restrictions in movements (for e.g. going out for a movie/mall/shopping)					
24.	Feel embarrassed when people make fun of my meticulous compliance to COVID-19 guidelines such as hand sanitization, social distancing and wearing mask					
25.	Feel stressed when pinpointed for not complying with the COVID-19 guidelines					
26.	Feel irritated when people around me overdo the COVID-19 precautionary guidelines					
27.	Feel anxious about my career growth					
28.	Feel anxious about the uncertainty prevailing around the COVID-19 situation					
29.	Experience pressure from my job front					
33.	Feel stressed adapting to a new normal					
38	Bothered by the problems associated with children's online classes					
39	Apprehensive about the health of the elderly member(s) in the family					
41.	Worried about the decision of my children's school/college reopening when the pandemic is not yet controlled					
42.	Feel responsible until the elderly member(s) of the family are vaccinated					
44.	Feel I am at risk when I to go to my workplace, since the pandemic is not yet controlled					
45.	Bothered when a family member goes to the workplace, since the pandemic is not yet controlled					
46.	Worried when a family member uses the public transport regularly					
47.	Feel frustrated as I do not meet my friends/colleagues regularly					

48.	Feel stressed having to manage the children in the house all the time					



UNIVERSITY OF HYDERABAD
INSTITUTIONAL ETHICS COMMITTEE DECISION LETTER



IEC No.	UH/IEC/2021/32	Date of review	09-03-2021
Application No:			
Project Title:	Hypertension Management during the COVID-19 Pandemic: Role of associated Psychosocial factors		
Principal Investigator/ Co-PI:	PI: Oindrila Mukherjee CI: NA		
Participating Institutes if any	----	Approval from Participating Institute	---
Documents received and reviewed	Application, proposal, consent form, participant information sheet and CV submitted		
In case of renewal submission of update	----		
Decision of the IEC:	Approved Duration: One year from date of approval		
Any other Comments Requirements for conditional Approval	----		
Members Present	Dr. A.S.Sreedhar, Prof. B. R. Shamanna, Dr. M. Varalakshmi, Sri.A. Madhava Rao, Dr. M. Srinivas, Dr. Deepa Srinivas, Dr. M.K. Arunasree and Ms. A. D. Shobhavath		

Please note:

- Any amendments in the protocol must be informed to the Ethics committee and fresh approval taken.
- Any serious adverse event must be reported to the Ethics Committee within 48 hours in writing (mentioning the protocol No. or the study ID)
- Any advertisement placed in the newspapers, magazines must be submitted for approval.
- If the conduct of the study is to be continued beyond the approved period, an application for the same must be forwarded to the Ethics Committee.
- It is hereby confirmed that neither you nor any of the members of the study team participated in the decision making/voting procedures and declared conflict of interest.

A. S. Sreedhar
09/03/2021

Chairman

(Dr. A S Sreedhar)

B. R. Shamanna
9/3/21

Member Secretary

(Prof. B.R.Shamanna)

M. Varalakshmi
09/03/2021

Convenor

(Dr. M. Varalakshmi)

Address: School of Medical Sciences, University of Hyderabad, C. R. Rao Road, Gachibowli, Hyderabad-5000046
Tel (O): +91-040-23135470/23135471 Email: iec_uoh@uohyd.ernet.in, deanmd@uohyd.ernet.in

INFORMED CONSENT FORM

APPENDIX B2

Centre for Health Psychology

University of Hyderabad

Title of the Study : Hypertension management during COVID-19: Associated Psychosocial Factors

Investigator : Oindrila Mukherjee

You are being asked to take part in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and why you are being approached. Please read the following information carefully to know more about the study and your role in it. Please contact the investigator if you have any questions or if you need more information.

What is the purpose of this study?

Hypertension or high blood pressure is the most significant risk factor for cardiovascular diseases. It is a chronic condition that cannot be cured but only managed. Management of hypertension involves following the prescribed medication, diet and exercise regimen along with effective stress management. The present study attempts to explore the psychosocial factors associated with hypertension management during the COVID-19 pandemic. The aim is to understand how psychosocial factors such as stress, coping, sleep quality, optimism, social support, etc. play a role in the management of high blood pressure in individuals during the COVID-19 pandemic. A better understanding of these factors will help in the development of psychosocial interventions to aid in the effective management of hypertension.

What is your role in this study?

You are being approached to participate in this study with the purpose of collecting relevant information from you, as you have been diagnosed with hypertension. This study will require you to fill in surveys/questionnaires related to the way in which you manage your hypertension and the psychosocial factors that influence it. If you agree to participate in this study, you will be contacted by the investigator. The questionnaires will be provided to you either online or offline, based on your convenience. You will be given 8 measures that are related to your hypertension, psychological state and social aspects. The number of questions in the tools range between 10 – 70. Each time you are given the tools, you will have to spend about 15-20 minutes in responding to the questions. You will not be administered all the tools in one go. They will be given to you in three parts on the day and time mutually convenient.

Will my answers be confidential?

The data collected from you will be strictly confidential and utilized strictly for research purposes only. Your identity will not be disclosed. Your name will be converted to a code number and the information provided by you will remain only with the investigator.

Are there any risks involved?

You will have no risk in participating in this study.

What are the benefits of participating in this study?

There are no direct benefits of participating in this study. However, your contribution towards the outcomes of the study will enable researchers to improve hypertension management in individuals. No compensation will be provided to you if you choose to participate in this study.

I request you to read the above details carefully and understand the nature of this study. In order to seek clarifications for your doubts, you may contact me through the details mentioned below. If you agree to participate in this study, you will be required to sign this consent form. However, your participation is voluntary and you can withdraw your consent at any point during your participation in this study.

Consent

I, _____ (your name), have read all the above-mentioned details carefully. I understand that I am participating in research related to the psychosocial factors affecting hypertension management during the COVID-19 pandemic. I understand that the data I provide will be treated confidentially. I have clarified all my doubts related to this study and I consent to participate in this study.

Signature**Name:****Date:****Investigator Details:**

Oindrila Mukherjee

PhD Psychology (Pursuing)

Centre for Health Psychology

University of Hyderabad

Ph.: +91 9515294207

Email: oindrilamukherjee25@gmail.com

The initially developed 48 items of the COVID-19 Pandemic Stress Scale were administered on a sample of 98 individuals as part of the pilot study.

An Exploratory Factor Analysis (EFA) was carried out to finalize the scale. The principal components extraction method, followed by varimax rotation method were used. The sample was first evaluated for its suitability for factor analysis. Bartlett's Test of Sphericity (Bartlett, 1954) was highly significant ($p < .001$) and the Kaiser—Meyer—Olkin (KMO) measure of sampling adequacy value was 0.89. This supported the factorability of the matrix (Tabachnick & Fidell, 2013). The communalities are presented in Table 3.3. None of the items had a communality value of less than 0.30.

Table 3.3

Communalities for items of 48-item COVID-19 Pandemic Stress Scale

Items	Extraction	Items	Extraction	Items	Extraction	Items	Extraction	Items	Extraction
1	.679	11	.564	21	.491	31	.645	41	.614
2	.720	12	.664	22	.580	32	.693	42	.638
3	.565	13	.601	23	.547	33	.588	43	.417
4	.632	14	.539	24	.521	34	.531	44	.548
5	.531	15	.529	25	.647	35	.451	45	.560
6	.492	16	.615	26	.577	36	.577	46	.656
7	.599	17	.617	27	.601	37	.414	47	.640
8	.629	18	.569	28	.549	38	.655	48	.600
9	.641	19	.460	29	.684	39	.559		
10	.624	20	.481	30	.557	40	.592		

The criteria that were used to determine factor extraction were the scree plot and Kaiser's eigen value > 1 . The scree plot (Fig. 3.1) and Kaiser's eigen value > 1 criterion resulted in the extraction of 11 factors. From Table 3.4, it was observed that the Factors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11 accounted for 21.8%, 9.8%, 4.2%, 4.0%, 3.4%, 2.9%,

2.7%, 2.6%, 2.4%, 2.2% and 2.1% respectively of the explainable variance. That is, 58.09% of the total variance was explained by these eleven factors. The factor solution converged in 19 iterations within a simple structure. Items 6, 8, 11, 20, 21, 30, 31, 32, 34, 35, 36 and 37 were removed due to cross loading on multiple factors. Items 14, 15, 16, 18, 22, 23, 40 and 43 were dropped as they were not representative of any factor. Item 19 was dropped due to a very poor factor loading. As a result of this, the number of factors reduced from 11 to 9. Each item loaded 0.30 or greater on its expected factor. The COVID-19 pandemic stress scale items, pattern coefficients (factor loadings), along with percentage of explained variance is presented in Table 3.4.

Figure 3.1.

Factor Extraction Based on the Scree Plot

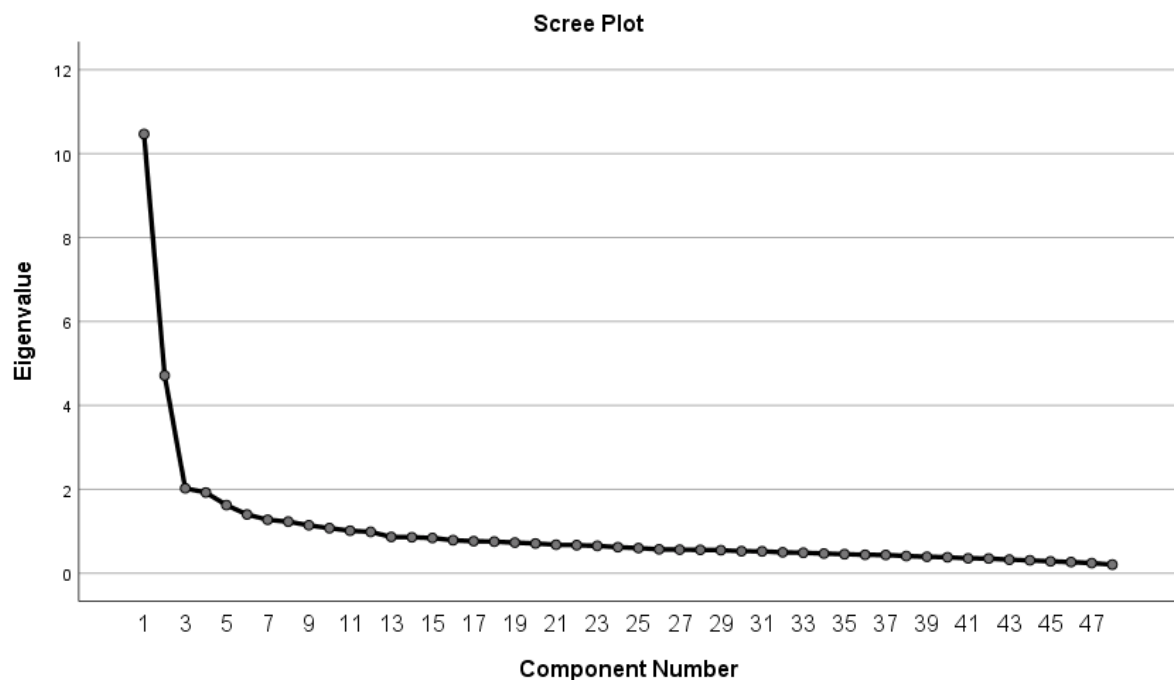


Table 3.4

Pattern Matrix for Principal Components with Varimax Rotation of 11 Factor Solution of the COVID-19 Pandemic Stress Scale

Pattern Matrix											
Original Item Nos.	Item Statements	Component									
		1	2	3	4	5	6	7	8	9	10 11
CVPSS12	Feel disturbed due to news about the infection and death rate of COVID-19	.743									
CVPSS13	Feel stressed when I hear about my family/acquaintances/friends suffering from the COVID-19 disease	.703									
CVPSS10	Experience anxiety with the constant flow of information related to the pandemic (e.g., in the news, on social media, people around me discussing)	.665									
CVPSS14	Worry about the health of my family members who are staying away from me	.616									
CVPSS36	Worried about the health condition of my family members	.580									.398
CVPSS11	Bothered by the thought that I may get infected by the COVID-19 virus	.522					.360				
CVPSS40	Any news of death disturbs me a lot	.498									
CVPSS21	Experience problems related to sleep	.392								.350	
CVPSS25	Feel stressed when pinpointed for not complying with the COVID-19 guidelines		.733								
CVPSS26	Feel irritated when people around me overdo the COVID-19 precautionary guidelines		.729								
CVPSS24	Feel embarrassed when people make fun of my meticulous compliance to COVID-19 guidelines such as hand sanitization, social distancing and wearing mask		.643								
CVPSS23	Subjected to abuse (physical/verbal/emotional) during the pandemic		.583								
CVPSS35	Worried that my screen time has progressively increased		.343								.330
CVPSS03	Feel strained due to the absence of household help during the pandemic			.698							
CVPSS04	Feel stressed due to the unending demands of the family members on me			.677							
CVPSS07	Feel suffocated to have all the family members at home all the time			.564							
CVPSS08	Experience lack of privacy with all family members at home during the lockdown			.552				.358			

CVDPSS05	Find it stressful to run errands due to fear of catching the COVID-19 virus		.546	
CVDPSS06	Find it stressful to run errands due to fear of catching the COVID-19 virus		.500	.403
CVDPSS02	Face difficulties in doing equal justice to professional demands and household chores		.766	
CVDPSS01	Work from home is stressful for me		.752	
CVDPSS29	Experience pressure from my job front		.673	
CVDPSS27	Feel anxious about my career growth		.571	
CVDPSS44	Feel I am at risk when I to go to my workplace, since the pandemic is not yet controlled		.551	
CVDPSS38	Bothered by the problems associated with children's online classes		.758	
CVDPSS41	Worried about the decision of my children's school/college reopening when the pandemic is not yet controlled		.713	
CVDPSS48	Feel stressed having to manage the children in the house all the time		.574	
CVDPSS37	Worried about the casual attitude of some of my family members towards following the COVID-19 guidelines	.332	.389	
CVDPSS33	Feel stressed adapting to a new normal		.680	
CVDPSS32	Worried about my gradual increase in smoking	-.381	.539	
CVDPSS28	Feel anxious about the uncertainty prevailing around the COVID-19 situation		.522	
CVDPSS34	The pandemic has created a new fear of death in me	.337	.500	
CVDPSS31	Worried about my gradual increase in alcohol consumption		.367	.487
CVDPSS09	Miss my face-to- face interaction with friends			.669
CVDPSS47	Feel frustrated as I do not meet my friends/colleagues regularly			.666
CVDPSS17	Feel burdened with a sense of loss of freedom due to imposed restrictions in movements (for e.g., going out for a movie/mall/shopping)			.615
CVDPSS19	Engage in compulsive hoarding/purchasing of groceries/medical supplies/other essential commodities			
CVDPSS46	Worried when a family member uses the public transport regularly			.721
CVDPSS45	Bothered when a family member goes to the workplace, since the pandemic is not yet controlled			.632
CVDPSS43	Get worried with thought of the possible side-effects of COVID-19 vaccination			.394

CVPDPSS22	Worried about my health as I am unable to take part in my regular fitness activities									.575			
CVPDPSS18	Feel stressed due to the financial strain caused by reduced income due to the lockdown									.518			
CVPDPSS20	Worried about the fact that medical facilities are difficult to access								.362	.431			
CVPDPSS15	Bothered due to difficulty in accessing transportation									.414			
CVPDPSS42	Feel responsible until the elderly member(s) of the family are vaccinated										.647		
CVPDPSS39	Apprehensive about the health of the elderly member(s) in the family										.636		
CVPDPSS16	Feel lonely											.498	
CVPDPSS30	Suffer severe boredom									.350			.492
	Percentage of Variance Explained	21.8%	9.8%	4.2%	4.0%	3.4%	2.9%	2.7%	2.6%	2.4%	2.2%	2.1%	

After the identification of the nine factors from the 27 items of the COVID-19 Pandemic Stress Scale based on EFA, factors were named as per their contents:

1. **F1 (12, 13, 10) – COVID-19 Disease-Related Stress**
2. **F2 (25, 26, 24) – COVID-19 Precautionary Guidelines-Related Stress**
3. **F3 (3, 4, 5, 7) – Home/Household Stress**
4. **F4 (1, 2, 27, 29, 44) – Work Stress**
5. **F5 (38, 41, 48) – Children-Related Stress**
6. **F6 (28, 33) – Uncertainty**
7. **F7 (9, 17, 47) – Lack of Socialization**
8. **F8 (45, 46) – Travel-Related Stress**
9. **F9 (39, 42) – Health of the Elderly**

Research Article

DOI: <http://dx.doi.org/10.22192/ijamr.2021.08.09.002>

Effect of Illness Duration and Gender on Coping Skills Deficiency among Chronic Illness Patients

Meera Padhy *: Assistant Professor, Centre for Health Psychology, University of Hyderabad

Meena Hariharan: Professor, Centre for Health Psychology, University of Hyderabad

Oindrila Mukherjee: Research Scholar, Centre for Health Psychology, University of Hyderabad

Suma Lavanya Mutnury: Research Scholar, Centre for Health Psychology,
University of Hyderabad

Varsha Anand: Research Scholar, Centre for Health Psychology, University of Hyderabad

***Corresponding Author:** Meera Padhy

Centre for Health Psychology, University of Hyderabad, Hyderabad Central University Rd, CUC,
Gachibowli, Telangana - 500046

E-mail: meerapadhy@yahoo.com

Abstract

Keywords

coping skills
deficiency,
illness duration,
gender,
ANOVA

This quantitative study examines the coping skills deficiency among chronic illness patients based on their illness duration and gender, and the interaction between the two. A clinical sample of 1198 patients were recruited using purposive sampling technique. The data were analyzed using two-way ANOVA. Results showed a significant difference in coping skills deficiency with respect to illness duration. On the dimensions of anxiety and frustration, no significant difference was found between men and women. Further, no interaction effect was observed. Coping skills deficiency was exhibited more by individuals who were recently diagnosed with their chronic condition and had been living with it for less than 4 years compared to individuals who had it for more than 4 years. Recommendations for future research may include a qualitative understanding of individualized perceptions rather than collective perceptions related to chronic illness-related coping mechanisms.

Introduction

Medical technology has been developing rapidly. Despite the advancements in medical technology, human beings are not free from chronic illnesses and associated negative consequences, both physical and psychological. One of the major contributing factors towards an individual's chronic illness is their lifestyle. A chronic illness is understood as any illness sustaining for a period of more than 6 months and with a prolonged dormancy of clinical course; of multi-factorial aetiology; with no certain cure. Non-communicable diseases contribute towards 60% of the total deaths in India (Nethan, Sinha & Mehrotra, 2017). According to WHO (2021), the leading chronic illnesses are cardiovascular diseases, cancers, respiratory diseases and diabetes. Global disability adjusted life years for several non-communicable diseases increased by 40.1% as on 2017 (Kyu et al., 2017).

The risk factors for developing chronic illnesses may include environmental factors, cultural factors, political factors, and socioeconomic factors. Besides these heredity, age, and familial factors may also contribute to the development of certain chronic diseases. Furthermore, the urbanization and globalization have also been contributing to the risk factors for NCDs as these phenomena influence the lifestyle and health behaviour of people immensely.

Larsen and Lubkin(2006)define chronic illness as the lived experience of the individual and family diagnosed with chronic disease. The values of individual and family impact the perceptions and beliefs of the health behaviours. These values are influenced by demographic, technological, cultural, and environmental factors. Thus, it can be argued that the chronic illness affects the individuals in their totality including biological domain such as physiological status and physical symptoms; psychological domain such as perception and beliefs about illness, emotional well-being, self-efficacy, coping mechanisms; and social domain including interpersonal relationships and perceived social support.

Coping with Chronic Illness

Coping is a dynamic process involving the interaction and influence between the individuals and their environment. People differ in the way they handle or cope with any chronic illness and the associated problems they face (Sarafino & Smith, 2014). Coping is the action by which individuals try to handle any perceived discrepancy that they appraise in a stressful situation, between the demands presented and the available resources (Sarafino & Smith, 2014). These individual differences in coping with chronic illness are attributed to typical coping strategies people adopt. These strategies include information seeking, avoidance, selective ignoring, learning about illness-related aspects and seeking comfort from others (Felton & Revenson, 1984).

Crisis theory (Moos, 1982) focuses on the factors influencing the coping process such as illness-related factors (treatment regimen, use of artificial devices), background and personal factors (personality traits, age, gender) and social factors (health facilities, interpersonal relationships, and nature of social support). These factors are mutually interrelated and affect the coping process collectively. The coping process starts with an individual's cognitive appraisal of the health problem or perception of the illness. This cognitive appraisal facilitates the person to devise adaptive tasks and to exercise numerous coping skills in order to manage these tasks. Two main types of adaptive tasks involve 'tasks related to the illness or treatment' (managing illness symptoms and adjusting to the illness-related procedures) and 'tasks related to general psychosocial functioning' such as controlling negative affect, maintaining healthy interpersonal relationships, and retaining a positive sense of self (Sarafino & Smith, 2014).

Chronic illnesses have adverse psychological consequences which are seldom addressed in clinical settings. Individuals often rely on their internal and external resources for coping by

managing the stress related to their chronic illness. Coping strategies differ in their type and style across chronic conditions. Individual differences highly affect the nature and types of coping strategies used. Personality traits are an important predictor of coping as they operate in almost all situations unlike coping styles which come into play only when encountered with a stressful situation (Taylor, 2015).

The individuals diagnosed with chronic conditions often experience a high level of frustration and anxiety due to fear and the inability to deal with symptoms and consequences of the illness. Maladaptive coping is correlated with poorer quality of life, depressive and anxiety symptoms in individuals with diabetes (Burns et al., 2016; Clarke & Goosen, 2009; Smari & Valtysdottir, 1997; Zhang et al., 2009). Rheumatoid arthritis patients engaging in dysfunctional coping were found to be suffering from depression (Ziarko et al., 2014). Another study found that emotion-focused coping results in adverse consequences while problem-focused coping results in beneficial consequences in relation to anxiety and depression in an adult sample with Crohn's disease (Knowles et al., 2011). Maladaptive coping acts as a mediator between illness perception and depression and anxiety in chronic illness patients. (Hagger et al., 2017; Knowles et al., 2017). This maladaptive coping is reflected in individuals with chronic illnesses through their coping skills deficiency.

In the current study, coping skills deficiency is measured on the dimensions of anxiety, frustration, disappointment, rejection and disapproval; which are some of the negative emotions, an individual suffering from a chronic illness experiences. Coping with these dimensions is very important in adapting successfully to a chronic condition. Anxiety as a resultant of fear is often seen in patients diagnosed with a chronic condition, especially in patients awaiting test results. Frustration is caused due to the inability of an individual in being able to deal with the symptoms of the disease and hassles that come along with it. Also, frustration is often

experienced as a resultant of reduced mental and physical abilities which can be as incapacitating as the chronic illness itself. Disappointment when occurring due to a minor issue pertaining to our everyday lives is easier to cope with rather than in the context of a more severe situation such as a disabling or threatening chronic condition. Rejection is often experienced by chronically ill individuals during the course of their treatment from their families, friends and spouses which affects their adjustment patterns.

Therefore, it is imperative to investigate the existing level of coping skills in individuals with chronic illness and which individuals experience higher coping skills deficiency.

Coping in individuals with chronic illness is affected by several clinical, demographic and psychosocial factors. Illness duration and gender are two such factors that have been sparingly explored in relation to coping with chronic illnesses.

Illness Duration and Coping in Chronic Illness

The amount of time that passes after the diagnosis of any chronic illness has an impact on the individual's experience of the chronic illness. Illness duration has been positively associated with adherence, sleep problems and quality of life (Bhandari, 2016; Jankowska-Polańska et al., 2017; Uchmanowicz et al., 2019) across various chronic illnesses. Most research on chronic illnesses study participants who have a long illness duration. Thus, there is less knowledge available about those who are in the nascent stages of their illness (Kneck et al., 2011).

Out of the limited studies that have assessed the correlation between illness duration and coping behaviour, one study (Rassart et al, 2014) found a positive correlation between duration of illness and two ways of coping – passive resignation and avoidant coping – in diabetic individuals from Belgium. In another study; Brown, Brown and Jason (2010) found that participants with a longer illness duration had greater use of coping strategies like planning and acceptance, positive

reframing, active coping, and lower use of behavioural disengagement than those in the shorter illness duration group. Such findings demonstrate a need for researchers to explore the effect of illness duration on coping in individuals with chronic illness.

Gender and Coping in Chronic Illness

“Gender” is a multi-faceted variable including biological, social and psychological differences (Moller-Leimkuhler, 2007). Literature related to the role of gender in physical morbidities is limited in comparison to understanding the differences in mortality (Read & Gorman, 2010). Gender differences related to chronic illnesses can be reflected in individuals’ illness perception, health-seeking behaviour, perceived stigma, support system, coping mechanisms and psychological adjustment amongst others.

Gender related differences are reflected in the usage of coping skills at the physical and psychological level attributed to sexual dimorphism in the brain, physiological make up of sex hormones, hormonal differences etc. (Sinha & Latha, 2018).

Gender differences were reported among individuals suffering with Type-2 diabetes where men showed increased adjustment, coping, integration, quality of life, and wellbeing in comparison to women (Sridhar et al., 2007). Though elevated symptoms of anxiety were observed in both men and women in a diabetic sample, prevalence of the symptoms were more among the women compared to men (Grigsby et al., 2002) and additionally, the type of coping strategy employed was seen to affect the individual’s anxiety and depression levels differently among men and women (Duangdao & Roesch, 2008).

A study by Farcas and Nastasa (2011) also showed gender plays a significant role in selecting a coping mechanism. In their study, women frequently used seeking social and emotional support, denial and positive thinking, venting of emotions and on the other hand men employed, mental and behavioural disengagement, and seeking instrumental social support as coping mechanisms. In older (65-79 years), depressive, anxious or patients with multiple comorbidities venting of emotions was used as a passive type of coping.

Living with chronic illness is often challenging. Every individual experiences a unique combination of life events, processes, and outcomes underlying their adjustment to a chronic illness. Based on the literature discussed above, the following objectives were made:

Objective 1: To find out the effect of illness duration on coping skills deficiency.

Objective 2: To find out the difference between men and women on coping skills deficiency.

Objective 3: To find out the interaction effect of illness duration and gender on chronic illness deficiency.

Based on the objectives, the following hypothesis were formulated:

Hypothesis 1: There would be an effect of illness duration on coping skills deficiency.

Hypothesis 2: There would be a difference between men and women on coping skills deficiency.

Hypothesis 3: There would be an interaction effect of illness duration and gender on coping skills deficiency.

Materials and Methods

The objective of this causal comparative study is to determine chronic illness patients' coping skills deficiency based on illness duration as well as gender. The research design employed in this study is a 3 (Illness Duration) X 2 (Gender) independent groups factorial design with unequal cell sizes. The independent variables are illness duration (Group 1: 1 month-4 years; Group 2: above 4 years-9 years; Group 3: above 9 years to 20 years) and gender (men and women). The dependent variable is coping skills deficiency. A two-way ANOVA will be utilized to compare the independent groups based on the dependent variable.

Participants

The participants considered for this study were persons with chronic illness (es) from different parts of India. Purposive sampling technique was used to employ a total of 1198 chronic illness patients (589 men and 609 women). The age range was 25-75 years ($M = 51.07$, $SD = 11.61$). The sample consisted of participants with different chronic illnesses such as cardiovascular diseases, arthritis, asthma, cancer, diabetes, and thyroid disorders with the illness duration ranging from 1 month to 20 years, and were categorized into three groups based on the illness duration (Group 1: 1 month - 4 years; Group 2: above 4 years - 9 years; Group 3: above 9 years - 20 years). Group 1 consisted of 404 (190 male, 214 female;

33.7%), Group 2 consisted of 396 (192 male, 204 female; 33.1%), and Group 3 consisted of 398 (207 male, 191 female; 33.2%) participants respectively. Levene's test of equality of variances indicated the homogeneity of variances across the three groups.

Measure

The coping skills deficiency scale (Sharoff, 2004) was used for this study to measure the level of coping skills deficiency of the participants. The scale consists of 18 items in the form of questions. These items measure 4 dimensions of coping skills deficiency which are anxiety, frustration, disappointment, rejection and disapproval. It is a 6-point Likert scale with options ranging from 0 (none at all) to 5 (an exceptional amount). A high score reflects a high level of coping skills deficiency i.e. a low score shows higher coping ability. Similarly, a low score reflects a low level of coping skills deficiency i.e. a high score shows lower coping ability. The maximum score that could be obtained is 90 and the minimum score that could be obtained is 0. Cronbach's alpha for the scale for this study is .81.

Results

This multivariate study used a two-way ANOVA (Analysis of Variance) to test the hypotheses. The independent variables were illness duration and gender. The dependent variable was coping skills deficiency.

Table 1: Group Descriptive Statistics Dependent Variable: anxiety, Frustration, Disappointment, Rejection and disapproval

Illness Duration	Anxiety		Frustration		Disappointment		Rejection and disapproval			
	Gender	M	SD	M	SD	M	SD	M	SD	N
1	M	6.64	2.20	7.53	2.22	14.21	4.47	13.92	5.52	190
	F	7.04	2.44	7.75	2.15	15.07	4.77	15.06	5.34	214
	Total	6.85	2.34	7.52	2.19	14.66	4.65	14.52	5.45	404
2	M	6.34	2.18	6.74	2.09	12.29	4.91	11.45	5.28	192
	F	6.57	2.56	7.24	2.34	13.55	5.27	12.91	6.08	204
	Total	6.46	2.38	7.00	2.23	12.93	5.13	12.21	5.74	396
3	M	6.16	2.23	6.99	2.01	12.55	4.90	12.03	5.63	207
	F	6.31	2.36	7.04	2.22	14.17	4.96	13.45	6.07	191
	Total	6.24	2.29	7.01	2.11	13.33	4.99	12.71	5.87	398
Total	M	6.37	2.21	7.08	2.13	13.00	4.83	12.45	5.57	589
	F	6.66	2.47	7.27	2.24	14.28	5.04	13.84	5.89	609
	Total	6.52	2.35	7.18	2.19	13.65	4.98	13.16	5.77	1198

The assumption of homogeneity of variances was determined using Levene's test which is given in Table 2. No violations to Levene's test were

found and the assumption of homogeneity of variances was met. See Table 1 for Levene's Test of Equality of Error Variances.

Table 2: Levene's Test of Equality of Error Variances

Dependent variable	F	Df1	Df2	Significance
Anxiety	1.87	5	1192	.10
Frustration	1.31	5	1192	.25
Disappointment	1.67	5	1192	.14
Rejection and disapproval	1.45	5	1192	.21

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

As Levene's test of equality of error variances tests homogeneity of variances, the non-significant results indicate that there is

homogeneity of variances across groups in all four dimensions.

Table 3 ANOVA performed on Anxiety score of the participants' illness duration and gender

Anxiety					
Sources	SS	df	MS	F	Effect size
Illness Duration (A)	74.09	2	37.04	6.76**	.01
Gender (B)	20.47	1	20.47	3.74	
A x B	3.41	2	1.71	0.31	
Error	6531.165	1192	5.48		

** p = .001

Anxiety (dimension of coping skills deficiency)

A two-way between groups analysis of variance was conducted to explore the impact of illness duration and gender on anxiety (dimension of coping skills deficiency). Participants were divided into three groups according to the illness duration (Group 1: 1 month-4 years; Group 2: above 4 years-9 years; Group 3: above 9 years). The interaction effect between illness duration and gender was not statistically significant $F(2, 1192) = .31, p > .05$. There was a statistically significant main effect for illness duration $F(2,$

1192) = 6.76, $p < .01$; however, the main effect was small (partial eta squared = .01). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the participants from group 1 ($M = 6.85, SD = 2.34$) was significantly different from group 2 ($M = 6.46, SD = 2.39$) and group 3 ($M = 6.24, SD = 2.30$) in terms of anxiety ($MD=0.39, p<0.05$), ($MD=0.62, p<0.01$) respectively. Group 2 did not statistically differ from Group 3 in terms of anxiety. The main effect for type of gender was not statistically significant $F(1, 1192) = 3.74, p > .05$.

Table 4. ANOVA performed on Frustration score of the participants' illness duration and gender

Frustration					
Sources	SS	Df	MS	F	Effect size
illness duration (A)	71.24	2	35.62	7.51***	.01
Gender (B)	9.14	1	9.14	1.93	
A x B	15.58	2	7.79	1.64	
Error	5654.16	1192	4.74		

*** p = .001

Frustration (dimension of coping skills deficiency)

A two-way between groups analysis of variance was conducted to explore the impact of illness duration and gender on frustration (dimension of coping skills deficiency). Participants were divided into three groups according to the illness duration (group 1: 1 month-4 years; group 2: above 4 years-9 years; group 3: above 9 years). The interaction effect between illness duration and gender was not statistically significant $F(2, 1192) = 1.64, p > .05$. There was a statistically

significant main effect for illness duration $F(2, 1192) = 7.51, p < .01$; however, the main effect was small (partial eta squared = .01). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the participants from group 1 ($M = 7.52, SD = 2.19$) was significantly different from group 2 ($M = 7.0, SD = 2.23$) and group 3 ($M = 7.02, SD = 2.12$) in terms of frustration ($MD=0.52, p<0.01$), ($MD=0.50, p<0.01$) respectively. The group 2 did not statistically differ from group 3. The main effect for type of gender was not statistically significant $F(1, 1192) = 1.93, p > .05$.

Table 5 ANOVA performed on Disappointment score of the subjects in illness duration and gender

<i>Disappointment</i>					
Sources	SS	df	MS	F	Effect size
Illness Duration (A)	634.022	2	317.01	13.25***	.02
Gender (B)	465.709	1	465.71	19.46***	.02
A x B	28.72	2	14.36	.60	
Error	28522.14	1192	23.93		

*** p = .000

Disappointment (dimension of coping skills deficiency)

A two-way between groups analysis of variance was conducted to explore the impact of illness duration and gender on disappointment (dimension of coping skills deficiency). Participants were divided into three groups according the illness duration (group 1: 1 month-4 years; group 2: above 4 years-9 years; group 3: above 9 years). The interaction effect between illness duration and gender was not statistically significant $F(2, 1192) = .60, p > .05$. There was a statistically significant main effect for illness

duration $F(2, 1192) = 13.25, p < .001$; however, the main effect was small (partial eta squared = .02). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the participants from group 1 ($M = 14.66, SD = 4.65$) was significantly different from group 2 ($M = 12.94, SD = 5.13$) and group 3 ($M = 13.33, SD = 4.99$) in terms of disappointment ($MD=1.72, p<0.001$), ($MD=1.33, p<0.001$). The group 2 did not statistically differ from group 3. The main effect for type of gender was statistically significant $F(1, 1192) = 19.46, p < .001$; with a small effect (partial eta squared = .02).

Table 6: ANOVA performed on Rejection and disapproval score of the participants' illness duration and gender

<i>Rejection and disapproval</i>					
Sources	SS	df	MS	F	Effect size
Illness Duration (A)	1155.50	2	577.75	18.03***	.03
Gender (B)	535.28	1	535.28	16.71***	.01
A x B	5.68	2	2.84	.09	
Error	38188.98	1192	32.04		

*** p = .000

Rejection and disapproval (dimension of coping skill deficiency)

A two-way between groups analysis of variance was conducted to explore the impact of illness duration and gender on levels of rejection and disapproval (dimension of coping skill deficiency). Participants were divided into three groups according to the illness duration (**Group 1**

= 1 month-4 years; **Group 2** = above 4 years-9 years; **Group 3** = above 9 years). The interaction effect between illness duration and gender was not statistically significant $F(2, 1192) = .09, p > .05$. There was a statistically significant main effect for illness duration $F(2, 1192) = 18.03, p < .001$; however, the main effect was small (partial eta squared = .03). Post-hoc comparisons using the Tukey HSD test indicated that the mean score

for the participants from group 1 ($M = 14.52$, $SD = 5.45$) was significantly different from group 2 ($M = 12.21$, $SD = 5.74$) and group 3 ($M = 12.71$, $SD = 5.88$) in terms of rejection and disapproval ($MD=2.32$, $p<0.001$), ($MD=1.81$, $p<0.001$) The

group 2 did not statistically differ from group 3. The main effect for type of gender was statistically significant $F(1, 1192) = 16.71$, $p < .001$; with small effect size (partial eta squared = .01).

Table 7: Table showing mean comparisons using Tukey's HSD between the three groups of illness duration for the variables under study

Variables	Duration of Disease		
	Group I- Group II	Group I-Group III	Group II- Group III
Anxiety	.39*	.62**	.22
Frustration	.52**	.50**	.02
Disappointment	1.72***	1.33***	.39
Rejection and disapproval	2.32***	1.81***	.51

Note. Group I – One month –4years, Group II – Above 4-9 years, Group III – Above 9 years – 20 years
 $*p<0.05$, $**p<0.01$, $***p<0.001$

Discussion

The study aimed to explore the coping skills deficiency in chronic illness patients and examine the effect of illness duration and gender on their coping skills deficiency. The first hypothesis posited that there would be a difference in the level of anxiety, frustration, disappointment, rejection and disapproval among the three groups of chronic illness patients categorized on the basis of their illness duration.

This hypothesis was accepted as the results showed a difference in the level of the above-mentioned variables with respect to illness duration. It was seen that Group I (below 4 years) had higher coping skills deficiency than Group II (above 4 - 9 years) and Group III (Above 9 years). However, no significant differences were found between Group II and Group III in their overall coping skills deficiency. This indicates that duration of disease plays a considerable role in increasing patients' coping level. This finding is in tandem with a previous study that reported higher use of adaptive coping strategies among

patients with longer duration of disease (Brown, Brown & Jason, 2010).

The lower coping skills deficiency as duration increased, may be attributed to an increased knowledge of the chronic condition. Cecily (2016) found a significant relationship between illness duration and level of knowledge in Indian adults with diabetes and hypertension. Disease knowledge is further positively associated with coping ability (Moradkhani et al., 2011; Najjar et al., 2020) and adherence (Sweileh et al., 2014; Mandpe et al., 2014) in individuals with different chronic illnesses. Jankowska-Polańska et al. (2017) found a direct positive relationship between illness duration and adherence to pharmacological treatment in hypertensive individuals. One rare study by Dietrich (1996) reported that individuals newly diagnosed with diabetes find it difficult to adhere to a treatment plan and are in need of knowledge about self-management. Therefore, it can be said that as illness duration increases, patients' knowledge and adherence to their health care regimen also increases which in turn increases their coping skills.

Dealing with a chronic illness is quite challenging. Immediately post the diagnosis of a chronic illness, people realise the condition will accompany them for the rest of their lives and they might have to adhere to a prescribed medical regimen. The very thought of restrictions in diet, modifications in lifestyle and adherence to pharmacological treatment creates havoc in them. Acceptance of a disease condition is closely linked to treatment adherence. A higher acceptance of a disease state is linked to greater treatment adherence (Jankowska-Polańska, 2016). Baczewska et al. (2015) found a significant association between illness duration and acceptance of a disease indicating that an increase in illness duration is linked to an increase in illness acceptance. Further, a longer illness duration provides more time for psychological adaptation with the illness (Pinquart & Shen, 2011). Therefore, it can be observed that increased illness duration is associated with increased disease-specific knowledge, adherence to prescribed treatment and acceptance of illness; which in turn share a positive relationship with coping.

The second hypothesis postulated that there would be a difference in the level of anxiety, frustration, disappointment, rejection and disapproval between men and women. According to the results obtained for the difference between two groups, it can be inferred that men and women had a significant difference with respect to different dimensions of coping skills deficiency (disappointment, rejection and disapproval). The possible reasons for significant differences between men and women on coping skills might be attributed to the difference in their approach towards illness reflected in the way they respond to illnesses, acknowledge illnesses, their health behaviour and treatment received from their families and society (Vlasoff, 2007).

The mean scores of men and women in this study indicate that women experienced a higher amount of anxiety, frustration, disappointment and rejection compared to men. These differences in coping skills and the level of coping have been reported in previous literature as well (Frey, 2000;

Porter et al., 2000; Matud, 2004). However, no significant differences were found between the two genders on the dimensions of anxiety and frustration in the present study.

The third hypothesis stated that there would be an interaction effect of illness duration and gender on chronic illness deficiency. This hypothesis was rejected, indicating that the combined effect of illness duration and gender was not statistically higher than the sum of both the effects individually.

Implication

The knowledge of coping skills deficiency will be useful in helping individuals to cope well with chronic illnesses. This study would help design appropriate interventions to negate the detrimental effects of coping deficiencies. Illness duration and gender must be taken into account while providing interventions. It emphasizes that the differences among individuals must be focused on. Hence, the present study has the potential to improve the lives of people affected by chronic illnesses. Overall, these results indicate that illness duration and gender are important factors that relate independently to the coping skills in chronic illness patients.

References

1. Baczewska B, Kropornicka B, Sepioło J, Krzyżanowska E, Olszak C, Szymczuk E, Daniluk J. Acceptance of illness and satisfaction with life among patients with arterial hypertension. *Health Problems of Civilization*. 2015; 9(3).
2. Bhandari N, Bhusal BR, Takma KC, Lawot I. Quality of life of patient with hypertension in Kathmandu. *International Journal of Nursing Sciences*. 2016 Dec 1; 3(4):379-84.
3. Brown MM, Brown AA, Jason LA. Illness duration and coping style in chronic fatigue syndrome. *Psychological reports*. 2010 Apr; 106(2):383-93.

4. Burns RJ, Deschênes SS, Schmitz N. Associations between coping strategies and mental health in individuals with type 2 diabetes: Prospective analyses. *Health Psychology*. 2016 Jan; 35(1):78.
5. Cecily HS. Knowledge on Prevention of Cerebro Vascular Accident among Patients with Diabetes and Hypertension in India. *IJSR International Journal of Science and Research (IJSR)*. 2016; 5(3):1401-4.
6. Clarke D, Goosen T. The mediating effects of coping strategies in the relationship between automatic negative thoughts and depression in a clinical sample of diabetes patients. *Personality and individual differences*. 2009 Mar 1; 46(4):460-4.
7. Dietrich UC. Factors influencing the attitudes held by women with type II diabetes: a qualitative study. *Patient education and counseling*. 1996 Oct 1; 29(1):13-23.
8. Duangdao KM, Roesch SC. Coping with diabetes in adulthood: a meta-analysis. *Journal of behavioral medicine*. 2008 Aug 1 ;31(4):291-300.
9. Farcaş AD, Năstasă LE. Coping in patients with heart failure. *Religion*. 2011; 64:96.
10. Felton BJ, Revenson TA. Coping with chronic illness: a study of illness controllability and the influence of coping strategies on psychological adjustment. *Journal of consulting and clinical psychology*. 1984 Jun;52(3):343.
11. Frey JA. Gender differences in coping styles and coping effectiveness in chronic obstructive pulmonary disease groups. *Heart & lung*. 2000 Sep 1;29(5):367-77.
12. Grigsby AB, Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. Prevalence of anxiety in adults with diabetes: a systematic review. *Journal of psychosomatic research*. 2002 Dec 1;53(6):1053-60.
13. Hagger MS, Koch S, Chatzisarantis NL, Orbell S. The common sense model of self-regulation: Meta-analysis and test of a process model. *Psychological Bulletin*. 2017 Nov;143(11):1117.
14. Jankowska-Polańska B, Blicharska K, Uchmanowicz I, Morisky DE. The influence of illness acceptance on the adherence to pharmacological and non-pharmacological therapy in patients with hypertension. *European Journal of Cardiovascular Nursing*. 2016 Dec 1;15(7):559-68.
15. Jankowska-Polańska B, Chudiak A, Uchmanowicz I, Dudek K, Mazur G. Selected factors affecting adherence in the pharmacological treatment of arterial hypertension. *Patient preference and adherence*. 2017;11:363.
16. Kneck Å, Klang B, Fagerberg I. Learning to live with illness: experiences of persons with recent diagnoses of diabetes mellitus. *Scandinavian journal of caring sciences*. 2011 Sep;25(3):558-66
17. Knowles SR, Austin DW, Sivanesan S, Tye-Din J, Leung C, Wilson J, Castle D, Kamm MA, Macrae F, Hebbard G. Relations between symptom severity, illness perceptions, visceral sensitivity, coping strategies and well-being in irritable bowel syndrome guided by the common sense model of illness. *Psychology, health & medicine*. 2017 May 28;22(5):524-34.
18. Knowles SR, Wilson JL, Connell WR, Kamm MA. Preliminary examination of the relations between disease activity, illness perceptions, coping strategies, and psychological morbidity in Crohn's disease guided by the common sense model of illness. *Inflammatory bowel diseases*. 2011 Dec 1;17(12):2551-7.
19. Kyu HH, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, Abbastabar H, Abd-Allah F, Abdela J, Abdelalim A, Abdollahpour I. Global, regional, and national disability-adjusted life-years (DALYs) for 359 diseases and injuries and healthy life expectancy (HALE) for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*. 2018 Nov 10;392(10159):1859-922.

20. Lubkin IM, Larsen PD, editors. Chronic illness: Impact and interventions. Jones & Bartlett Learning; 2006.
21. Mandpe AS, Pandit VA, Dawane JS, Patel HR. Correlation of Disease Knowledge with Adherence to Drug Therapy, Blood Sugar Levels and Complications Associated with Disease among Type 2 Diabetic Patients. *J Diabetes Metab* 5: 369. doi: 10.4172/2155-6156.1000369 Page 2 of 5 *J Diabetes Metab* ISSN: 2155-6156 JDM, an open access journal Volume 5• Issue 5• 1000369. age ($p < 0.127$) and gender ($P < 0.385$) of patient with medication adherence (Table 1). Variables Freq fluency Adequate knowledge In adequ. 2014;3.
22. Matud MP. Gender differences in stress and coping styles. *Personality and individual differences*. 2004 Nov 1;37(7):1401-15.
23. Möller-Leimkühler AM. Gender differences in cardiovascular disease and comorbid depression. *Dialogues in clinical neuroscience*. 2007 Mar;9(1):71.
24. Moos RH. Coping with acute health crises. In *Handbook of clinical health psychology* 1982 (pp. 129-151). Springer, Boston, MA.
25. Moradkhani A, Kerwin L, Dudley-Brown S, Tabibian JH. Disease-specific knowledge, coping, and adherence in patients with inflammatory bowel disease. *Digestive diseases and sciences*. 2011 Oct 1;56(10):2972-7.
26. Najjar MA, D'emeh WM, Yacoub MI. Knowledge and Coping Strategies Among Patients Diagnosed With Type 2 Diabetes Mellitus. *Global Journal of Health Science*. 2020;12(2):1-69.
27. Nathan S, Sinha D, Mehrotra R. Non communicable disease risk factors and their trends in India. *Asian Pacific journal of cancer prevention: APJCP*. 2017; 18(7):2005.
28. Pinquart M, Shen Y. Depressive symptoms in children and adolescents with chronic physical illness: an updated meta-analysis. *Journal of pediatric psychology*. 2011 May 1; 36(4):375-84.
29. Porter LS, Marco CA, Schwartz JE, Neale JM, Shiffman S, Stone AA. Gender differences in coping: A comparison of trait and momentary assessments. *Journal of Social and Clinical Psychology*. 2000 Dec;19(4):480-98.
30. Rassart J, Luyckx K, Klimstra TA, Moons P, Groven C, Weets I. Personality and illness adaptation in adults with Type 1 diabetes: The intervening role of illness coping and perceptions. *Journal of clinical psychology in medical settings*. 2014 Mar 1;21(1):41-55.
31. Read JN, Gorman BK. Gender and health inequality. *Annual Review of Sociology*. 2010 Aug 11;36:371-86.
32. Sarafino EP, Smith TW. *Health psychology: Biopsychosocial interactions*. John Wiley & Sons; 2014 Jan 13.
33. Sharoff K. *Coping skills therapy for managing chronic and terminal illness*. Springer Publishing Company; 2004 Feb 2.
34. Sinha S, Latha GS. Coping response to same stressors varies with gender. *National J Physiol Pharm Pharmacol*. 2018;7:1053-7.
35. Smári J, Valtýsdóttir H. Dispositional coping, psychological distress and disease-control in diabetes. *Personality and Individual Differences*. 1997 Feb 1;22(2):151-6.
36. Sridhar GR, Madhu K, Veena S, Madhavi R, Sangeetha BS, Rani A. Living with diabetes: Indian experience. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*. 2007 Sep 1;1(3):181-7.
37. Sweileh WM, Sa'ed HZ, Nab'a RJ, Deleq MI, Enaia MI, Sana'a MN, Al-Jabi SW. Influence of patients' disease knowledge and beliefs about medicines on medication adherence: findings from a cross-sectional survey among patients with type 2 diabetes mellitus in Palestine. *BMC public health*. 2014 Dec;14(1):1-8.
38. Taylor SE. *Health psychology*. McGraw-Hill Education; 2015.

39. Uchmanowicz I, Markiewicz K, Uchmanowicz B, Kołtuniuk A, Rosińczuk J. The relationship between sleep disturbances and quality of life in elderly patients with hypertension. Clinical interventions in aging. 2019;14:155.
40. Vlassoff C. Gender differences in determinants and consequences of health and illness. Journal of health, population, and nutrition. 2007 Mar;25(1):47.
41. World Health Organization. Noncommunicable diseases. [Internet]. [place unknown]: [publisher unknown]; [updated 2021 April 13; cited 2021 July 10]. Available from: <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
42. Zhang CX, Tse LA, Ye XQ, Lin FY, Chen YM, Chen WQ. Moderating effects of coping styles on anxiety and depressive symptoms caused by psychological stress in Chinese patients with Type 2 diabetes. Diabetic medicine. 2009 Dec;26(12):1282-8.
43. Ziarko M, Mojs E, Piasecki B, Samborski W. The mediating role of dysfunctional coping in the relationship between beliefs about the disease and the level of depression in patients with rheumatoid arthritis. The Scientific World Journal. 2014 Oct;2014.

Access this Article in Online	
	Website: www.ijarm.com
	Subject: Psychology
Quick Response Code	
DOI: 10.22192/ijamr.2021.08.09.002	

How to cite this article:

Meera Padhy, Meena Hariharan, Oindrila Mukherjee, Suma Lavanya Mutnury, Varsha Anand. (2021). Effect of Illness Duration and Gender on Coping Skills Deficiency among Chronic Illness Patients. Int. J. Adv. Multidiscip. Res. 8(9): 13-25.
DOI: <https://dx.doi.org/10.22192/ijamr.2021.08.09.002>

Flourishing: Role of Perseverance and Passion for Long-Term Goals in Relation to Subjective Vitality

Meera Padhy¹, Meena Hariharan², Suma Lavanya Mutnury³,
Oindrila Mukherjee³

¹Assistant Professor, Centre for Health Psychology, University of Hyderabad, Telangana – 500046

²Professor, Centre for Health Psychology, University of Hyderabad, Telangana – 500046

³Research Scholar, Centre for Health Psychology, University of Hyderabad, Telangana – 500046

Corresponding Author: Meera Padhy

ABSTRACT

Several psychosocial factors contribute to flourishing which is a state of optimal human functioning. The objectives of this study were to explore the relationship between grit, vitality and flourishing; and to assess the impact of grit and vitality on flourishing. A correlational design was used to collect data from 449 participants (211 women and 238 men) aged between 18-57 years. The Flourishing Scale, the Grit Scale and the Subjective Vitality Scale were administered. The obtained data were scored and analyzed suitably. Results revealed positive relationships between all the variables. Further, hierarchical multiple regression analyses showed that grit and vitality significantly predicted flourishing. Results from this study indicate the need to further investigate the impact of grit and vitality on an important positive psychological construct like flourishing.

Keywords: flourishing, grit, vitality, regression, correlation, well-being

INTRODUCTION

Flourishing is a key indicator of well-being. It is a state of optimal human functioning as opposed to languishing and mental illness (Baumgardner & Crothers, 2015).^[1] Flourishing is associated with several aspects of mental as well as physical health. Fostering human flourishing is important to improve the quality of life of people. Therefore, the need arises for research to look into the correlates of flourishing. Not much research has been carried out to understand the relationship between important positive psychological variables like grit and vitality with flourishing. This calls for exploring flourishing by researchers cross-culturally.

Research previously focused on the importance of cognitive traits as indicators of success, specifically in the case of academic success. It was only recently that Duckworth et al. (2007)^[2] contributed to

the paradigm shift in research related to non-cognitive traits such as grit, concluding the effect of these traits on an individual's life and character. The non-cognitive traits are essentially understood as those variables associated with an individual's motivation, attitude and temperament among others rather than intellect (Stoffel & Cain, 2018).^[3]

The American Psychological Association (2020)^[4] defined grit as “a personality trait characterized by perseverance and passion for achieving long-term goals and grit entails working strenuously to overcome challenges and maintaining effort and interest over time despite failures, adversities, and plateaus in progress.” Though grit and resilience have been used interchangeably across literature, they are completely different constructs. Masten (2014)^[5] defined resilience as the capacity of a dynamic system to adapt

successfully to disturbances that threaten the viability, the function, or the development of that system; grit is explained as passion and perseverance towards long-term goals and having the stamina to stick with one's future to persist and pursue hard to turn that future into a reality for oneself (Duckworth et al., 2007).^[2]

Grit is also associated with other variables such as consistency of interest, perseverance of effort and ambition.

Consistency of interests refers to an individual's inclination towards cultivating and maintaining a specific range of interests regularly, over a long period of time. In other words, it refers to the uniformity in nurturing all of an individual's interest areas. Although strongly associated with grit in western studies, consistency of interests was not found to be relevant to collectivistic cultural groups. People in collectivist societies have demonstrated a lower need for consistency of interests (Datu et al., 2016).^[6]

In line with grit, the construct of perseverance of effort refers to the persistence and determination of an individual towards a goal. It indicates the hard work and sustained effort an individual shoulders, in spite of challenges, to achieve the desired goal. Gritty individuals are generally found to experience high levels of perseverance of effort (Datu et al., 2016).^[7]

Ambition is one of those variables closely associated with grit in the field of psychology (NKP & Shobanah, 2017).^[8] While grit is defined as a stable trait not requiring any immediate positive feedback to sustain a goal (Duckworth et al., 2007),^[2] ambition is understood as an intrinsic desire to gain recognition, power or success for one's achievements (Maltby et al., 2008).^[9]

Vitality has been associated with better psychological and cognitive functioning. Subjective vitality is defined as a feeling of liveliness and a sensation of personal energy (Ryan & Fredrick, 1997).^[10] Ryan and Deci (2001)^[11] considered vitality to be an aspect of eudaimonic well-being. It essentially refers

to the state of organismic well-being, feeling alive and alert, as being vital and energetic contributes to a fully functioning and psychologically sound individual. Ancient Eastern practices like tai chi, yoga, and meditation are also known to result in the experience of vitality. And vitality is seen to enhance problem-solving, concentration, performance, and greater readiness for new challenges. Vitality is distinct from happiness and subjective well-being in that it constitutes higher levels of experienced activation or energy as well as positive affect (Lopez, Pedrotti & Snyder, 2018).^[12]

The growing interest in positive psychology has led to increased research in the area of flourishing. Conceptualized by Keyes (2002)^[13] and further developed by Fredrickson and Losada (2005),^[14] flourishing can be defined as living "within an optimal range of human functioning" (Fredrickson & Losada, 2005).^[14] It is a descriptor of well-being and positive mental health. Flourishing individuals experience a high level of positive emotions, psychological functioning and social functioning (Keyes, 2002).^[13] It is the opposite of mental illness and has been contrasted with languishing over a long period of time (Baumgardner & Crothers, 2015).^[1]

Languishing is a state described by people as being 'hollow', 'empty' or 'stagnant'. The languishing state creates a division in the illness-wellness continuum with respect to an individual's psychological health. The languishing state is characterized by few symptoms of mental illness and few symptoms of mental health (wellness) as well. Therefore, languishing individuals have few symptoms of pathology but not enough to be diagnosed as being mentally ill. Flourishing, in other words, is a state of complete mental health. Flourishing individuals experience both positive and negative emotions but have more adaptive coping strategies than those who are languishing (Keyes, 2002;

Fredrickson & Losada, 2005; Baumgardner & Crothers, 2015).^[13, 14, 1]

Grit has been related to academic success (Hodge et al., 2018)^[15]; happiness (Singh & Jha, 2008)^[16]; satisfaction and a sense of belongingness (Bowman et al., 2015)^[17]; psychological well-being (Goodman et al., 2017)^[18]; value and self-efficacy (Muenks et al., 2017, 2018)^[19-20]; and self-esteem (Weisskirch, 2018)^[21] etc. It is important to understand the relationship between grit and psychological variables such as self-control, resilience and perceived stress amongst others (Kannagara et., 2018).^[22]

The construct of subjective vitality refers to the feeling of being alert, alive and full of energy (Ryan & Fredrick, 1997)^[10]. Although it has been studied in relation to different constructs, very limited research has examined the link between subjective vitality and flourishing. However, as subjective vitality is an aspect of well-being (Ryan & Deci, 2001; McMahan & Estes, 2011)^[11, 23] and flourishing is a measure of psychological well-being, it may be said that vitality and flourishing are connected to each other. The relationship between grit, vitality and flourishing has not been explored extensively yet and this study attempts to examine the same.

The current study aimed at assessing the impact of grit and vitality on flourishing.

MATERIALS AND METHODS

A correlational design was used in the study.

Participants

Purposive sampling technique was adopted to recruit participants for the study. The sample consisted of 449 participants (211 women and 238 men) across various socioeconomic groups, occupations and levels of education. The age range of the participants was 18-57 years ($M = 24.39$, $SD = 8.99$).

Tools

Three psychological tools have been used to collect data along with the demographic data sheet and informed

consent form of the participants. Demographic details such as age, gender, education level, occupation, marital status, and the duration of illness were collected from each participant. A brief description of the tools used in the study is given below:

The Flourishing Scale developed by Diener et al. (2010)^[24] consists of eight items describing important aspects of human functioning viz. positive relationships, feelings of competence, having meaning and purpose in life. The response of each item is on a 7-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). This measure has a high internal consistency with Cronbach's alpha of 0.87. Cronbach's alpha for this study was 0.89.

Grit Scale developed by Duckworth et al. (2007)^[2] consists of 17 items that measure the perseverance and passion for long-term goals. The response of each item is on a 5-point Likert scale ranging from 1 (Not like me at all) to 5 (Very much like me). In addition to grit, the scale consists of consistency of interest subscale, the perseverance of effort subscale and ambition subscale. This measure has a high internal consistency with Cronbach's alpha of 0.85. Cronbach's alpha for this study was 0.69.

The Subjective Vitality Scale was validated at both levels by Ryan and Frederick (1997).^[10] This was the original scale consisting of 7 items. Bostic, Rubio, and Hood (2000)^[25] using confirmatory factor analysis deduced a 6-item version of the scale from the original measure. This scale has a high internal consistency with Cronbach's alpha of 0.96 (Fini et al, 2010).^[26] Cronbach's alpha for this study was 0.73.

Procedure

The participants were approached and the purpose of the study was explained to them. The participants were assured of the confidentiality of their personal details and responses. Informed consent was obtained from those participants willing to

be a part of the study. Subsequently, the demographic details were collected and the participants were given the questionnaires.

Statistical Analysis

The quantitative data were analyzed using SPSS 23. The statistics used to analyze the data were descriptive statistics. Pearson's Product Moment Correlation (r) and multiple hierarchical regression were

performed. In the analysis, the predictors were grit, consistency of interest, ambition, perseverance of effort and vitality. The criterion was flourishing. Prior to hierarchical regression analysis, Pearson's r was computed to find a linear relationship between the predictors and criterion; and to identify the suitable predictors to be entered into the model.

RESULT

Table 1. The values of Pearson's r along with descriptive statistics (M and SD) (N=449)

	M	SD	1	2	3	4	5	6
1.Grit	37.68	6.63	1	.75**	.38**	.73**	.36**	.30**
2.Consistency of Interest	17.96	4.55		1	.07	.10*	.08	.06
3.Ambition	17.20	3.35			1	.51**	.44**	.45**
4.Perseverance of Effort	19.73	4.39				1	.46**	.39**
5.Vitality	28.81	7.25					1	.53**
6.Fourishing	41.17	9.49						1

$p < .05$ * $p < .01$

Hierarchical multiple regression was performed to investigate the ability of grit, ambition, and perseverance of effort to predict levels of flourishing, after controlling for vitality. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. Additionally, the correlations amongst the predictor variables included in the study were examined and these are presented in Table 1. All correlations between predictor variables and the criterion variable were moderate,

ranging between $r = .30$, $p < .01$ and $r = .53$, $p < .01$. This indicates that multicollinearity was unlikely to be a problem. All predictor variables were statistically correlated with flourishing which indicates that the data were suitably correlated with the dependent variable for examination through multiple hierarchical regression to be reliably undertaken. Only one predictor variable-consistency of interest subscale was not correlated with flourishing. Hence it was not included in the model.

Table 2: Hierarchical Regression Analysis for Grit and its dimensions and subjective vitality predicting flourishing

Model	B	SE	β	Adjusted R^2	R^2	ΔR^2
Model 1 (C=14.64, F=46.91***)				.24	.24	
Grit	.04	.09	.03			
Ambition	.97	.14	.34***			
Perseverance	.43	.14	.20**			
Model 2 (C=11.05, F=58.06***)				.34	.34	.10
Grit	.01	.08	.00			
Ambition	.68	.13	.24***			
Perseverance	.20	.13	.09			
Vitality	.49	.06	.38***			

Table 2 shows the summary of hierarchical regression. In the first step of hierarchical multiple regression the predictor variables grit, ambition, and perseverance of effort were entered. This model was statistically significant $F(3,445) = 46.91$, $p < .001$ and explained 24% of variance in flourishing. In the next step, vitality was entered and the results indicated

that the model was statistically significant $F(4,444) = 58.06$, $p < .001$ and explained 34 % of total variance in flourishing. The introduction of vitality explained an additional 10% of flourishing when controlling for grit, ambition, and perseverance of effort where R^2 change = 0.10. In the final adjusted model two out of four predictor variables were statistically

significant, with vitality recording a higher Beta value ($\beta = .38, p < .001$) than ambition ($\beta = .24, p < .001$).

DISCUSSION

The study was designed to determine the impact of grit and vitality on flourishing. Statistical analyses revealed a significant positive correlation between grit and consistency of interest, ambition, perseverance of effort, vitality and flourishing; between consistency of interest and perseverance of effort; between ambition and perseverance of effort, vitality and flourishing; between perseverance of effort and vitality and flourishing; and between vitality and flourishing. All the significant predictors (grit, ambition, perseverance of effort, vitality) of flourishing were entered into a hierarchical regression model.

Keyes (2005) [27] operationalized flourishing as elevated emotional, psychological, and social well-being. Though there is literature supporting the relationship between grit and well-being (Reed & Jeremiah, 2017) [28] and well-being and flourishing (Keyes, 2002; Diener et al., 2010) [13, 24] that suggest a plausible relationship between grit and flourishing, not many studies attempted to empirically establish the same. The findings of this study are supported by previous literature. A study on a sample of 240 participants (NCC Cadets and Non-NCC Cadets) revealed a relationship between grit and flourishing (Jain & Sunkarapalli, 2019) [29] and in another study conducted on 101 Indian postgraduate students, grit along with resilience and meaningfulness emerged as a strong predictor of flourishing (Aswini & Deb, 2017). [30]

Also, variables closely associated with grit have predicted flourishing. Ambition is an adaptive personality trait and can foster the state of flourishing in individuals. It is also seen to have a potential influence on the cognitive and everyday functioning of patients living with HIV (Moore et al., 2018). [31] Previous

literature has supported the relationship between perseverance of effort and flourishing. A study conducted on 606 Filipino students revealed that perseverance of effort positively predicted flourishing (Datu et al., 2016). [7] In two separate studies on Japanese undergraduate students and Filipino employees, Datu et al. (2021) [32] examined the link between grit and wellbeing outcomes. Their findings showed that perseverance of effort correlated with flourishing.

Vitality, being an aspect of well-being, is a strong indicator of an individual's complete functioning (Ryan & Deci, 2001). [11] Vitality has been associated with well-being in previous research. Toner et al. (2012) [33] observed a relationship between vitality and well-being in adolescents (N=501). Another study revealed the mediating role of subjective vitality between diet quality and subjective well-being in college students (Jackson & DiPlacido, 2019). [34] This may explain the relationship between subjective vitality and flourishing, as flourishing is a descriptor of well-being and is also used as a measure of well-being (Diener, et al., 2010). [24]

Based on the objective of this study, positive associations between grit and vitality; grit and flourishing and vitality and flourishing were established. The associations between these variables can be understood based on the role of character strengths in an individual's flourishing experience. A high level of grit ensures people to pursue their goals and never give up on the same, ultimately resulting in positive outcomes. Further, feeling energetic, vital and activated may help such individuals to sustain/persevere towards their goals. Both grit and vitality are variables that operate intrinsically, hence, individuals high on grit and vitality have better flourishing outcomes.

CONCLUSION AND IMPLICATIONS

Vitality, grit and flourishing are important variables in the context of positive psychology. Grit and vitality,

largely understood as components of character strengths need to be explored in order to see their impact on flourishing. Not much research has been conducted on these variables, especially in the Indian context. The results of this study establish the role of grit and vitality in predicting flourishing, which indicates the need to investigate these links further. It is important to foster flourishing across domains and life stages to ensure optimal functioning. In this regard, it is important to understand the variables associated with flourishing. Further, the results of this study will also contribute towards the development of positive psychological interventions (PPIs) beyond clinical settings.

ACKNOWLEDGEMENTS

We would like to acknowledge the contribution of the students of University of Hyderabad during data collection. We would also like to thank the participants for participating in the study.

Conflict of Interest: There is no conflict of interest

Source of Funding: None

Ethical Approval: Approved

REFERENCES

1. Baumgardner S, Crothers M. Positive psychology. Pearson Education India; 2015.
2. Duckworth AL, Peterson C, Matthews MD, Kelly DR. Grit: perseverance and passion for long-term goals. *Journal of personality and social psychology*. 2007 Jun;92(6):1087.
3. Stoffel JM, Cain J. Review of grit and resilience literature within health professions education. *American Journal of Pharmaceutical Education*. 2018 Mar 1;82(2).
4. American Psychological Association. APA Dictionary of Psychology [Internet]. Washington DC; 2020 [cited 2020 May 10]. Available from: <https://dictionary.apa.org/grit>.
5. Masten AS. Global perspectives on resilience in children and youth. *Child development*. 2014 Jan;85(1):6-20.
6. Datu JA, Valdez JP, King RB. Perseverance counts but consistency does not! Validating the short grit scale in a collectivist setting. *Current Psychology*. 2016 Mar 1;35(1):121-30.
7. Datu JA, Valdez JP, King RB. The successful life of gritty students: Grit leads to optimal educational and well-being outcomes in a collectivist context. In *The psychology of Asian learners 2016* (pp. 503-516). Springer, Singapore.
8. NKP, Shobanah, KR. A study on grit among MBA, MBBS and engineering students. *International Journal of Education and Psychological Research*. 2017; 6(2):37-43.
9. Maltby J, Day L, Giles D, Gillett R, Quick M, Lancaster-James H, Linley PA. Implicit theories of a desire for fame. *British Journal of Psychology*. 2008 May;99(2):279-92.
10. Ryan RM, Frederick C. On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of personality*. 1997 Sep;65(3):529-65.
11. Ryan RM, Deci EL. To be happy or to be self-fulfilled: A review of research on hedonic and eudaimonic well-being. *Annual review of psychology*. 2001;52(16):141-66.
12. Lopez SJ, Pedrotti JT, Snyder CR. Positive psychology: The scientific and practical explorations of human strengths. Sage Publications; 2018 Aug 6.
13. Keyes CL. The mental health continuum: From languishing to flourishing in life. *Journal of health and social behavior*. 2002 Jun 1;207-22.
14. Fredrickson BL, Losada MF. Positive affect and the complex dynamics of human flourishing. *American psychologist*. 2005 Oct;60(7):678.
15. Hodge B, Wright B, Bennett P. The role of grit in determining engagement and academic outcomes for university students. *Research in Higher Education*. 2018 Jun; 59(4):448-60.
16. Singh K, Jha SD. Positive and negative affect, and grit as predictors of happiness and life satisfaction. *Journal of the Indian Academy of Applied Psychology*. 2008 Apr;34(2):40-5.
17. Bowman NA, Hill PL, Denson N, Bronkema R. Keep on truckin' or stay the

- course? Exploring grit dimensions as differential predictors of educational achievement, satisfaction, and intentions. *Social Psychological and Personality Science*. 2015 Aug;6(6):639-45.
18. Goodman FR, Disabato DJ, Kashdan TB, Machell KA. Personality strengths as resilience: A one-year multiwave study. *Journal of personality*. 2017 Jun;85(3):423-34.
 19. Muenks K, Wigfield A, Yang JS, O'Neal CR. How true is grit? Assessing its relations to high school and college students' personality characteristics, self-regulation, engagement, and achievement. *Journal of Educational Psychology*. 2017 Jul;109(5):599.
 20. Muenks K, Yang JS, Wigfield A. Associations between grit, motivation, and achievement in high school students. *Motivation Science*. 2018 Jun;4(2):158.
 21. Weisskirch RS. Grit, self-esteem, learning strategies and attitudes and estimated and achieved course grades among college students. *Current Psychology*. 2018 Mar;37(1):21-7.
 22. Kannangara CS, Allen RE, Waugh G, Nahar N, Khan SZ, Rogerson S, Carson J. All that glitters is not grit: Three studies of grit in university students. *Frontiers in psychology*. 2018 Aug 29; 9:1539.
 23. McMahan EA, Estes D. Measuring lay conceptions of well-being: The beliefs about well-being scale. *Journal of Happiness Studies*. 2011 Apr;12(2):267-87.
 24. Diener E, Wirtz D, Tov W, Kim-Prieto C, Choi DW, Oishi S, Biswas-Diener R. New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social indicators research*. 2010 Jun 1;97(2):143-56.
 25. Bostic TJ, Rubio DM, Hood M. A validation of the subjective vitality scale using structural equation modeling. *Social Indicators Research*. 2000 Dec;52(3):313-24.
 26. Fini AA, Kavousian J, Beigy A, Emami M. Subjective vitality and its anticipating variables on students. *Procedia-Social and Behavioral Sciences*. 2010 Jan 1;5:150-6.
 27. Keyes CL. Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of consulting and clinical psychology*. 2005 Jun;73(3):539.
 28. Reed L, Jeremiah J. Student grit as an important ingredient for academic and personal success. In *Developments in Business Simulation and Experiential Learning: Proceedings of the Annual ABSEL conference 2017* (Vol. 44).
 29. Jain S, & Sunkarapalli G. (2019). Relationship between Grit and Flourishing among NCC and NON-NCC Students. *International Journal of Indian Psychology*. 2019 7(2), 560-570.
 30. Aswini S, Deb A. Flourishing among postgraduate students: the role of resilience, meaningfulness and grit. *Indian Journal of Community Psychology*. 2017 Mar 1;13(1):24.
 31. Moore RC, Hussain MA, Watson CW, Fazeli PL, Marquine MJ, Yarns BC, Jeste DV, Moore DJ. Grit and ambition are associated with better neurocognitive and everyday functioning among adults living with HIV. *AIDS and Behavior*. 2018 Oct;22(10):3214-25.
 32. Datu JA, McInerney DM, Žemojtel-Piotrowska M, Hitokoto H, Datu ND. Is grittiness next to happiness? Examining the association of triarchic model of grit dimensions with well-being outcomes. *Journal of Happiness Studies*. 2021 Feb;22(2):981-1009.
 33. Toner E, Haslam N, Robinson J, Williams P. Character strengths and wellbeing in adolescence: Structure and correlates of the Values in Action Inventory of Strengths for Children. *Personality and Individual Differences*. 2012 Apr 1;52(5):637-42.
 34. Jackson CE, DiPlacido J. Vitality as a mediator between diet quality and subjective wellbeing among college students. *Journal of Happiness Studies*. 2019 Jul 5:1-23.

How to cite this article: Padhy M, Hariharan M, Mutnury SL et.al. Flourishing: role of perseverance and passion for long-term goals in relation to subjective vitality. *Int J Health Sci Res*. 2021; 11(6): 6-12. DOI: <https://doi.org/10.52403/ijhsr.20210602>

Management of Chronic Illness through Music Therapy: A Review

Oindrila Mukherjee^{1*} & Suma Lavanya Mutnury²

Abstract

Chronic illnesses result in several undesirable physiological and psychological outcomes in patients which are seldom addressed in clinical settings. The transition from the biomedical model to the biopsychosocial model has led to the development of novel interventions for chronic illness management. Music therapy is a non-pharmacological intervention used to address patient needs in the aftermath of treatment. This review highlights the application of music therapy across chronic illnesses. Both, active and receptive music therapy have shown positive results across chronic illnesses; on physiological, physical and psychological parameters. The efficacy of music therapy interventions is enhanced when used in combination with other non-pharmacological interventions. However, contradictory results have also emerged and there is an urgent need to execute well-designed randomized studies with an adequate sample size to arrive at a definite conclusion.

Keywords: music therapy, chronic illness, Indian classical music, noncommunicable disease

^{1*& 2:} Research Scholar, Centre for Health Psychology, University of Hyderabad, Telangana – 500046

*Corresponding author: ✉ oindrilamukherjee25@gmail.com

Chronic illnesses or non-communicable diseases (NCDs) account for the main cause of death globally. According to estimates by the World Health Organization, approximately 71% (41 million) deaths occur due to NCDs globally each year (WHO, 2018). In India alone, 5.8 million people die annually as a result of a non-communicable disease. As stated by Patel et al. (2011), non-communicable diseases will give rise to almost three quarters of total deaths in India by the 2030s. Cardiovascular diseases, diabetes, cancers and respiratory illnesses constitute 80% of all premature NCD deaths (WHO, 2018). This gruesome statistic is hard hitting as most NCDs are manageable through simple lifestyle changes (Bennett et al., 2010).

The term 'chronic illness' is often used interchangeably with the term 'chronic disease' (Martin, 2007). Chronic disease is defined based upon the physical health status of the individual requiring medical attention; chronic illness refers to the subjective experience of the human living with the condition. This distinction is very important as it highlights the need for a holistic health management approach.

Any chronic condition cannot be managed only through a pathophysiological approach, but rather requires a management plan that is moderated through cognitive, emotional and interpersonal factors (Larsen & Lubkin, 2009). Medical, surgical and pharmacological treatments can only work to an extent and require the provision of continuous care and treatment in order to manage them. The psychological dimensions of chronic illnesses are often left unnoticed when medical care is considered (Turner & Kelley, 2000). Contemporary research is making efforts to address the psychological needs of individuals with chronic illnesses and has revealed that music is a powerful stimulator of socioemotional processes, thus, positively affecting emotional states and resulting in profitable health outcomes (Dileo & Bradt, 2009; Koelsch et al., 2006).

It is a hard fact that there is no absolute cure for chronic health diseases although several treatment approaches can effectively aid management and keep the deterioration in check. The inclusion of non pharmacological options along with pharmacological based treatment has taken advent, especially with the acceptance of the transitional shift from the biomedical model to the biopsychosocial model of health (Lehman et al., 2017). Physical exercise, biofeedback, neurofeedback, cognitive behavioural therapy, lifestyle modification, guided imagery, mindfulness-based stress reduction, movement therapy, behavioural activation and bright-light therapy are some examples of non-pharmacological interventions used in the management of various chronic illnesses (Goodill, 2018; Bozcuk et al., 2017; Blaskovits et al., 2017; Holvast et al., 2017; Oza & Garcellano, 2015; Chang et al., 2015; Ambrose & Golightly, 2015). Music Therapy is one such non-pharmacological intervention that has also been used in the management of chronic illnesses (Pothoulaki et al., 2012).

The Connection of Music and the Human Body

The connection between music and the human body dates back to the 5th century BCE when Greek philosophers used music as a medium to stimulate emotions and bring a sensation of relaxation to the body. The Greek philosopher Plato was of the opinion that different forms of music had various health benefits on an individual's body (Grocke & Wigram, 2007). The use of music has been prevalent in traditional Indian healing systems since ancient times. Certain Indian rituals that are practiced even now make use of musical sounds in order to alter states of consciousness and reduce pain perception. For example, *Thimithi*, a fire-walking festival originating in Tamil Nadu, India; requires devotees to walk on red hot fire made of coal. Another Indian festival – *Thaipusam* – requires devotees to pierce silver or steel pins and skewers in different sizes all over the body through the skin, back, cheeks and tongue. This ritual signifies that all human desires and evils are destroyed by the pins and the mind is

purified. Surprisingly, the devotees do not feel any sensation of pain in their bodies while doing this. These rituals are preceded by the loud beats of drums and shouts with religious fervor “*arohara*” and religious songs to take the devotees to an altered state of consciousness. It is this auditory environment that changes the state of consciousness in the devotees and eliminates the sensation of pain (Sundar, 2007).

India has a rich representation of various kinds of classical music. Contemporary music therapy practice in India makes use of Vedic verses (*archika*, *gathika* and *samika* verses) to improve focused attention, concentration and to enter deep meditative and relaxed states. These recitals are called *proto-ragas* and have shown improvement in the cognitive development and behaviours of children with special needs in educational settings. It has been observed that children with special needs respond readily to *proto-ragas* and fast rhythmic music when compared to moderately-paced ragas. (Sairam, 2006).

Any chronic illness is not only manifested in its disease specific symptoms but also accounts for invisible symptoms like pain, mood disturbances, fatigue, etc. Putting the need of music in context, it may be a useful way of tackling pain and the overdependence on pain medications that have severe side effects and may even trigger addiction (Schieffer et al, 2005).

Music has been used as a treatment modality for several years. There is a growing body of evidence-based research showing the beneficial effects of music therapy, as an intervention, on physiological and psychological health outcomes (Fotakopoulos & Kotlia, 2018; Hegde et al., 2017). Past research has shown that music has stress-reducing abilities and also alleviates depressive symptoms in those experiencing acute and chronic pain (Cepeda et al., 2006) as it helps to counteract helplessness and anxiety that arise through clinic visits or during hospitalization (Phipps et al., 2010). Music has its obvious linkage to the emotions of a person and can help reverse brain chemistries and activate neural pathways that get dampened due to

the effects of endogenous opioids (anti stress mechanisms in the body) and release oxytocin that mediate positivity in the person (Panksepp & Bernatzky, 2002; Uvnas-Moberg, 1998).

According to the American Music Therapy Association (2006), “music therapy is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program”. The therapeutic relationship between a music therapist and a client involves a variety of music making methods. Music therapists are recruited in several sectors including health and disability, community care, geriatric care and private practice. Music as a therapeutic intervention is applicable to various branches of medicine such as neurology, surgery, oncology, cardiology, palliative medicine, etc. (Mofredj et al., 2016). The therapeutic use of music differs from its use for entertainment purposes and music education.

Music therapy lays emphasis on the healing purpose of music and contributes towards the healthy functioning and wellbeing of an individual. Music therapists work with people irrespective of their age, ability, musical skills, culture and background (Australian Music Therapy Association, 2012). Music therapy uses interventional modules based on music and musical experiences in order to address non-musical treatment goals. Such interventions concentrate on improving the quality of life of individuals throughout the lifecycle. It is administered to the normal population as well as to individuals with disabilities and/or illnesses (Earl E. Bakken Center for Spirituality & Healing, 2016; Hagemann et al., 2018).

Similar to music therapy is another form of treatment called *music medicine* which does not engage the patients actively. Rather a pre-recorded music chosen by the therapist may be used as a means for listening (Bradt, Dileo, & Shim, 2013). In this treatment modality, interventions are provided via listening devices and patients may or may not be involved in the selection of the music.

Primarily, music therapy can be divided into two types: *Receptive Music Therapy* and *Active Music Therapy*. In Receptive Music Therapy the client engages in listening to live or pre-recorded music as guided by a music therapist. It helps in alleviating stress, improving mood, pain reduction, relaxation and minimizing anxiety. Further, it also helps with improving the coping skills of clients (Li et al., 2015). Also known as ‘expressive music therapy’ Active Music Therapy requires clients to create vocal or instrumental music through singing, instrument playing or music composition. A study by Yinger and Gooding (2014) showed that active music therapy activates a greater number of areas in the brain than receptive music therapy. Bernatzky et al. (2011) remarked that “the alleviation of pain and the reduction of anxiety which can exacerbate pain appear to be the most promising use of music therapy.”

The Bonny Method of Guided Imagery and Music (BMGIM) was established in the 1970s by Helen Bonny. It is a music-centered approach to imagery where selected sequences of classical music are used to facilitate the client in narrating their journey and experiences (Hayes School of Music, 2021; Association for Music and Imagery, 2021).

Music therapy has been used to address several health outcomes in patients. Apart from its widespread application in neurological disorders, music therapy is being increasingly used as one of the treatment modalities for chronic illnesses (Gallagher, 2011). Research in this area indicates the beneficial effects of music therapy with respect to psychological distress, anxiety, sleep quality, depressive symptoms, pain and various physical symptoms in persons with cardiovascular diseases, cancer, chronic respiratory diseases, diabetes, etc. (Bradt, Dileo & Potvin, 2013; Li et al., 2011; Canga et al., 2015; Mandel et al., 2013).

This paper is a comprehensive review of music therapy: its aspects, efficiency, outcomes, when it is administered to individuals suffering with various chronic illnesses (hypertension, diabetes, cancer, chronic obstructive pulmonary disease, arthritis). It aims to

outline aspects of music therapy application in chronic illness care. Studies conducted in the past 12 years have been discussed to understand the evolution of music in healthcare. Literature was gathered from Google Scholar, PubMed, EBSCO and ScienceDirect using the search strings ‘music therapy and chronic illness’, ‘music therapy and hypertension’, ‘music therapy and diabetes’, ‘music therapy and cancer’, ‘music therapy and COPD’ and ‘music therapy and arthritis’. Snowball referencing was also utilized to gather more information.

The studies have been organized by the application of music therapy for highly prevalent NCDs such as hypertension, diabetes, cancer, COPD, and arthritis, but its efficiency may not be restricted to these physical conditions only.

Music Therapy in Alleviation of the Chronic Illness Experience

Hypertension

Hypertension is a highly prevalent clinical condition characterized by elevated blood pressure i.e., a blood pressure reading above 140/90 mmHg. This condition does not pose any specific manifestation of symptoms though it may have some warning signs like headaches, chest pain, and breathing difficulty. Its major threat is to the cardiovascular functioning of the body leading to a stroke, heart attack, heart failure, vision loss or kidney disease (World Health Organization, 2021; American Heart Association, 2021). Current treatment plans usually comprise of lifestyle modification (diet, smoking cessation and physical activity) and medications and may be optimally managed by the same.

Music interventions have been found to have significant effects on vital parameters like systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate and respiratory rate (Chatterjee & Mukherjee 2020; Loomba et al., 2012). A meta-analytic review by do Amaral et al (2016) found that music significantly improved systolic blood pressure when compared with

the control group. Chatterjee and Mukherjee (2020) investigated the impact of a 30-day music therapy intervention on healthy males in the age group 50-60 years. Selected participants were assigned to two groups: the experimental group was exposed to a 20-minute session of listening to Raga Todi (instrumental) of Hindustani Classical Music and the control group was kept at rest for the same duration. Results showed a significant reduction in BP reading, pulse rate and respiratory rate in the experimental group, but no significant change in the control group. Further, Loomba et al. (2012), in a meta-analytic study also found a significant reduction in SBP, DBP and heart rate.

Numerous studies have documented the positive results of music therapy and music-related interventions on hypertensive individuals (Sari & Rekawati, 2019; Kuhlmann et al, 2016). Zanini et al. (2009) noted an improvement in blood pressure control and quality of life in hypertensive patients who took part in music therapy sessions on a weekly basis. Participants belonged to both genders (men and women) and were aged above 50 years with stage 1 hypertension. In this controlled clinical study, participants were allotted to two groups and the experimental group was exposed to a combination of active and receptive music therapy intervention. In a literature review carried out between 2008-2018, Sari and Rekawati (2019) identified 15 studies that found the efficacy of music therapy in reducing blood pressure in elderly individuals. Further, Kuhlmann et al. (2016) conducted a meta-analytic study of 10 randomized controlled trials (between 1990 – 2014) which revealed a significant decreasing trend in SBP and DBP in adult hypertensive samples.

Different types of music have been used for therapeutic purposes in hypertensive patients. A randomized controlled trial by Im-oun et al. (2018) exposed participants (in stage-2 hypertension) in the experimental group to Thai instrumental folk music once a day, for thirty days. The home blood pressure and office blood pressure of all participants were recorded.

Findings showed a significant reduction in home SBP and home DBP in the experimental group as compared to the control group, however no difference was found with respect to office blood pressure.

Certain Indian studies have utilized Indian classical music or *ragas* for therapeutic purposes (Hegde et al., 2017; Deshmukh et al., 2009; Balan et al., 2009). Godbole and Basavaraj (2014) performed a randomized controlled trial to assess the effect of Indian classical music on 120 geriatric hypertensive patients aged between 60-85 years. Only the experimental group was exposed to four 20-minute sessions of pre-recorded Indian classical music. In comparison with the control group, statistically significant reductions in blood pressure levels, respiratory rate, pulse rate and state anxiety were observed in the experimental group.

In a study on 40 hypertensive Indian educators aged 30 and above, Angeline (2018) found a reduction in the mean SBP and DBP of the participants after listening to Abhibhairav raga for 20-30 minutes for five sessions. Another study attempted to study the impact of Bhimpalas raga on the autonomic functions of hypertensive individuals (Kunikullayaa, 2015). One hundred participants (30-60 years) were randomly allotted to one experimental and one control group. The music therapy intervention was provided to the experimental group for 15 minutes daily (5 days/week) for a period of 3 months along with lifestyle modifications. Participants in the control group only received lifestyle modifications. Findings indicated a significant decrease in stress levels, SBP and DBP in both the groups. There was a rise in heart rate variability indicators in both the groups as well. As there was no significant difference between the results of the two groups, it is unclear whether the music intervention played a role in the study.

In a contradictory study, Bekiroglu et al. (2013) did not find any significant differences between the experimental and control groups with respect to blood pressure and anxiety after

being exposed to Turkish classical music. Although, there was a higher reduction in mean systolic and diastolic blood pressure in the experimental group in comparison to the control group, the difference was not statistically significant. This result may be attributed to the type of music chosen for the intervention (Turkish classical music) as different types of music affect blood pressure levels differently. Further, participants in this trial were not given the option to choose their preferred music type, which in turn may have reduced the efficacy of this intervention.

Music therapy has been used in combination with progressive muscular relaxation (PMR) to examine its effects on hypertension. Astuti et al. (2019) recorded a decrease in systolic BP and diastolic BP in hypertensive individuals who engaged in progressive muscle relaxation and music therapy. This study followed a quasi-experimental design and divided a sample of 100 hypertensive adults (employed through stratified random sampling) into an experimental and control group. The experimental group received the intervention for 11 sessions (15 minutes each). However, it is difficult to point out the efficacy of a combined intervention (PMR + Music Therapy) over a PMR only / Music Therapy only intervention.

A combination of lifestyle modification intervention and music listening resulted in lower anxiety, lower systolic and diastolic BP (Kunikullaya et al., 2015). In another study, 100 hypertensive adults were assigned to two groups: one received a combined intervention of device-guided slow breathing exercises along with music listening; the other was exposed only to the music listening intervention. Results showed a decline in SBP and DBP in the first group that received a combined intervention (Nord, 2012). Another study by Purnomo et al. (2020) assessed the effect of a combined intervention of self-hypnosis and instrumental music on the blood pressure levels of hypertensive individuals. A sample of 46 hypertensive adults was divided into two groups. The experimental group received self-hypnosis and music therapy for

three days in addition to standard pharmacological treatment whereas the control group received pharmacological treatment only. The experimental group showed significant decreases in SBP and DBP.

Although a large amount of literature points towards the beneficial effects of music and music therapy on improving physiological parameters (SBP, DBP, pulse rate, respiratory rate) in hypertensives, the focus on psychological parameters has been minimal suggesting the need for clinically stringent music based trials. Most studies have roughly considered the same outcome measures. Moreover, the 24-hours ambulatory blood pressure measurement should be used to study the changes in blood pressure on a day/night basis in hypertensive individuals receiving music therapy interventions.

Psychosocial factors like health-related quality of life, perceived stress, mood, sleep quality, anger, optimism, social support, etc. should be explored in future research. Some studies do not have an adequate sample size for generalizability of results. A majority of the studies have used receptive music therapy with music-listening being the prominent form of intervention. Further, considering that music choices are specific to cultural backgrounds, a specific form of music may not bring about the same results when applied to individuals from different cultures (Good et al, 2000).

Diabetes

Diabetes mellitus is a metabolic disease, causing high glucose levels in the body, either due to the inability of the pancreas to produce insulin or the inability of the body to use the produced insulin (World Health Organization, 2021). There are different types of diabetes conditions. Type 1 diabetes refers to an autoimmune condition in which the immune system attacks the pancreatic cells rendering them unable to produce insulin. Type 2 diabetes is a more prevalent chronic condition in which the body becomes resistant to insulin. Gestational diabetes

is another kind found in pregnant women, in which the placenta produces insulin resistant hormones thereby increasing glucose levels.

Commonly reported symptoms in a diabetic condition include excessive hunger, fatigue, lethargy, frequent urination, weight loss, etc. At an early stage these are mild and may go unnoticed. Type 2 diabetes is caused by a combination of factors such as a genetic predisposition, obesity, stress, poor nutrition, lack of exercise, and may be managed with medication and lifestyle modifications like changes in diet, exercise and stress management. If left untreated, diabetes can affect the nerves, kidneys, eyes and other important organs of the body (Watson, 2020). This condition can be debilitating in daily life and is often associated with distress, negative emotions, depression, anxiety and delirium (Kalra et al., 2018). Studies assessing the effect of music therapy on diabetes are scarce, however, most of them point towards its beneficial effects either in terms of disease management or impact on associated psychosocial factors.

A study by Cioca (2013) aimed to find the effect of music on variations in glycaemia. This experimental study recruited 120 adults divided into 3 groups of forty each: an experimental group of diabetic adults, a control group of diabetic adults and another control group of healthy adults. The mean age of all participants ranged between 56-60 years. Except the control group of diabetics, participants from both the groups were exposed to joyful and relaxing music and it was observed that blood glucose levels significantly decreased for the experimental diabetic group. No significant changes were observed in the control groups. Additionally, it was found that relaxing music and joyful music had no differential impact in lowering blood glucose levels.

Another study in India, compared the difference between silent music interventions (writing the experiences of music, likes and dislikes of music, listening to music) and active

music interventions (singing devotional songs in 'lead and follow' manner) in achieving autonomic balance in 29 diabetic patients (Rao & Nagendra, 2014). The participants (mean age = 56 years) received both silent and active music interventions, each for a period of 45 minutes. Active music intervention was found to have a superior effect to silent music intervention although both the interventions showed a significant change in their Gas Discharge Visualisation (GDV) parameters which is an indicator of autonomic balance.

The combined effect of music therapy and a non-pharmacological intervention on diabetes have also been assessed. Mandel et al. (2013) examined the impact of a diabetes self-management education / training (DSME/T) programme implemented along with music therapy facilitated by a board-certified music therapist (MT) on the health outcomes of diabetic patients. The sample included 199 diabetics (30-85 years) who had either type 1, type 2 or pre diabetes and were divided into 3 groups: DSME/T group, DSME/T plus MT group and DSME/T plus music-assisted relaxation and imagery via CD recording (MARI CD) group. The MARI CD group was exposed to music selected by the researcher and verbal suggestions, while the MT group was exposed to relaxing and energizing music selected by the participants. This study illustrated that DSME/T correlated with all measured outcomes such as blood pressure, glycosylated hemoglobin (A1C), body mass index (BMI), trait anxiety, state anxiety, and stress. The music intervention groups (MT and MARI CD) had significantly larger reductions in SBP and DBP. The study highlighted that music therapy facilitated by a board-certified music therapist along with patient education may help elevate diabetes management.

Music media therapy has also been used along with lower extremity exercise in a study by Ji et al. (2015) to find its effects on diabetic patients' adherence to exercise. A sample of 72 diabetic adults were allotted to an intervention group ($N=34$) and a control group ($N=38$). Participants in the intervention group were exposed to a composed instrumental piano song of

4/4 beat from the 'soothing aesthetic' genre (selected by participants) while engaging in 15 minutes of lower extremity exercise daily for 6 months. The intervention group showed higher adherence to the exercise regimen even after three months in comparison to the control group. After six months, the intervention group showed improvements in physiological indicators of blood circulation as well.

Contradictory evidence has also been found by Groener et al. (2015) in their investigation of group singing as a therapeutic technique for insulin-dependent diabetic patients. Thirty-five diabetic adults were selected to participate in the trial, 18 were allocated to the experimental group and 17 were allocated to the control group. Both groups completed a diabetes education programme; the experimental group further participated in a group singing intervention (led by a trained music teacher) for 3 days after attending the education program. The study found a weak effect of group singing on patients' mood and no significant effect on glucose control, quality of life and stress. The result could be attributed to the short duration of the intervention (3 days). A longer duration of the intervention might be able to bring about better results.

An Indian study (Singh et al., 2015) reported yoga to have superior effects compared to music therapy or standard care alone in diabetic individuals. This randomized controlled trial recruited diabetic adults into 3 groups: 112 in a yoga group (mean age = 50 years), 110 in a music group (mean age = 50 years) and 115 in a control group (mean age = 49 years). The yoga group practiced pranayama and yoga-asanas for 6 months after a training period of 2 weeks. The music group received receptive music therapy and listened to Indian classical instrumental music for 30 minutes twice a day over a period of 6 months. After 6 months, the outcome measures showed that practicing yoga as well as music therapy had positive effects on glycemic control, lipid profile, BMI, anxiety, depression, self-efficacy and quality of life in

diabetes patients. Significant improvements were observed in the music group; however, the changes were much higher in the yoga group. It is important to note that the music intervention was not facilitated by a board-certified music therapist in this study.

Paucity of evidence makes it difficult to assess the role of music therapy in diabetes care. Replication of research is required with higher sample sizes to arrive at a definite conclusion. Further, there is an absence of a licensed music therapist in most of the studies. These limitations should be confronted in future research.

Cancer

A cancer diagnosis brings with itself immense fear and stress for patients as well as their families. Cancer refers to a group of diseases that involve uncontrollable and abnormal cell growth in one or more parts of the body. Carcinoma, sarcoma, lymphoma, leukemia and melanoma are some types of cancer. The most common cancers in the year 2020 were cancers of the breast, lung, colon and rectum, prostate, skin and stomach (Ferlay et al., 2020). A genetic predisposition in combination with physical carcinogens (UV rays, ionizing radiation) or chemical carcinogens (asbestos, tobacco smoke, arsenic) or biological carcinogens (infections due to bacteria, viruses or parasites) causes malignant tumours to grow and metastasize. The symptoms of this disease vary with the type of cancer and they usually include, but are not limited to, fatigue, lumps in the body, cough or hoarseness, night sweats, sudden weight changes, bladder/bowel changes, etc. All types of cancers are treated through surgery, chemotherapy and/or radiation therapy. During the early stages of the disease, chances of complete cure are high if intervened in a timely and effective manner (National Cancer Institute, 2019; World Health Organization, 2021).

While music does not directly help in the treatment of cancer, it has been found to reduce patients' symptomatic complaints. Music therapy when used in conjunction with

conventional cancer treatments, has been found to positively control or reduce symptoms of pain, discomfort, fatigue and improving overall quality of life in cancer patients as well as survivors (Krishnaswamy & Nair, 2016; Alcântara-Silva et al., 2018; Hilliard, 2003).

The psychosocial impact of cancer involves a range of negative emotions along with changes in personal relationships (Stanczyk, 2011). Anxiety, depression, denial, uncertainty, fear of death, poor quality of life, anger, isolation, body image issues, etc. are common psychological outcomes of dealing with cancer. Although conventional treatment focuses on treating the disease through surgery, chemotherapy and radiotherapy; it does not target such psychosocial factors which also play a role in maintaining the disease state. Further, as a consequence of medical treatment, cancer patients experience secondary effects like pain, nausea, fatigue, loss of appetite, loss of interest, isolation, body image issues, and depressive symptoms (Carelle et al, 2002).

A large body of research points towards the beneficial effects of music therapy in cancer care. Several studies have confirmed the positive effects of music therapy on symptom management of cancer. Music as a therapeutic intervention has been found to alleviate pain, anxiety, depression, nausea, fatigue and other side-effects of radiation and chemotherapy. Patients also experienced improvement in overall quality of life and relaxation (Rossetti et al., 2017; Jasemi et al., 2016; Hilliard, 2003; Potvin et al., 2015).

Music therapy has been targeted to improve the sleep quality of cancer patients. Vinayak et al. (2017) found an enhancement in sleep quality in hospitalized cancer patients. This RCT was carried out on 184 patients who were assigned to a control group and two experimental groups – active music therapy group (AMT) and receptive music therapy group (RMT). The AMT group participated in daily 20–30 minute sessions of playing a musical instrument (guitar) and singing along with it for 10 days; whereas the RMT group participated

in music-listening sessions of their preferred songs for the same duration. The control group ascribed to normal routine medical care. Post-test results showed a significant improvement in sleep quality scores in the experimental groups. Further, active music therapy was found to be more effective than receptive music therapy.

In another study, Lafci and Oztunc (2015) studied sixty hospitalized breast cancer patients (27-69 years) who were divided into an experimental (N=30) and a control (N=30) group. The experimental group was exposed to a music-listening session of Turkish soft classical music every night before bedtime for a period of 7 days while the control group continued with standard medical care. Sleep quality of the experimental group significantly improved whereas sleep quality of the control group worsened during their stay at the hospital.

Music therapy has also been associated with themes of spirituality in cancer patients. McClean et al. (2012) conducted a qualitative study on 23 cancer patients who attended a 5-day residential retreat programme at a cancer care center. The active music therapy sessions were facilitated by a music therapist for duration of 1.5 hours. Post session telephonic interviews with the participants revealed the emergence of themes related to spirituality such as transcendence, connectedness, search for meaning, and faith and hope. Studies have also found an increase in spiritual well-being in patients after music therapy sessions in hospital/hospice settings (Renz et al., 2005). Cook and Silverman (2013) conducted a mixed-methods study on 17 hospitalized cancer patients to examine the effect of music therapy on spirituality. Participants were randomly divided in 2 groups (experimental and control). A certified music therapist conducted three sessions of active music therapy in the experimental group. Posttest results showed significant increases in peace and faith scores in the experimental group. A qualitative analysis revealed that music therapy helped them feel closer to God and also improved their mood.

A review by Gramaglia et al. (2019) showed that music therapy has been used in combination with non-pharmacological interventions in several studies to improve quality of life and reduce depression, anxiety and pain perceptions. A RCT was conducted by Zhou et al. (2015) on 170 breast cancer patients to examine the effect of music therapy coupled with progressive muscle relaxation training (PMR) on health outcomes. A sample of 170 participants were divided into 2 groups (experimental and control). The experimental group (N=85) received music therapy and PMR within 48 hours of radical mastectomy, twice a day for 30 minutes. Results reported a reduction in depression, anxiety and length of hospital stay in the experimental group after receiving music therapy coupled with progressive muscle relaxation training.

The Bonny Method of Guided Imagery and Music (BMGIM) has been used by Burns (2001) to investigate its effect on cancer patients. A sample of eight cancer patients were equally divided into an experimental and a control group. In the experimental group, BMGIM elevated mood, improved quality of life and increased well-being (physical, psychological and spiritual) too. Interestingly, participants' scores on mood and quality of life continued to increase even after the intervention was completed. A doctoral dissertation used qualitative methods to assess the impact of BMGIM for 10 sessions with cancer survivors (N=6). The intervention was conducted by a therapist twice a week for 5 weeks. Participants exposed to this intervention reported improved mood, new perspectives on past/present/future, enhanced hope, improved self-understanding, coming to terms with life and death; and opening towards spirituality (Bonde, 2005).

BMGIM was also utilized by in another doctoral dissertation work by Bhana (2016) on a sample of 24 cancer patients. Quantitative analyses indicated improvements in psychological and spiritual well-being, and decrease in fatigue and pain severity. In addition, qualitative

analysis surfaced four themes: development of coping strategies, experience of physical wellbeing, psychological wellbeing, and spiritual wellbeing.

Bradt et al. (2015), in their study on cancer patients, compared the effect of music therapy and music medicine on psychological outcomes. The study followed a mixed methods approach in a sample of 31 adult cancer patients who were exposed to two sessions of music therapy (involving interactive music making) facilitated by a music therapist and two sessions of listening to pre-recorded music. According to the quantitative data obtained, both the interventions were equally effective in improving symptom management. Themes such as hope for survival and connecting to a pre-illness self emerged. However, participants preferred to choose music therapy over music medicine as they believed it helped them embrace their creative and playful side.

Chronic Obstructive Pulmonary Disease (COPD)

Chronic Obstructive Pulmonary Disease is a group of progressively declining lung diseases that are characterized by emphysema, inflammation of the lungs and obstruction of airflow resulting in breathing difficulty, dyspnea, sputum production, cough and wheezing. Smoking is one of the major reasons of COPD. Long-term exposure to fumes/dust or genetic causes may also result in the development of COPD. Treatment includes taking inhalers and regular medication, pulmonary rehabilitation, surgery/lung transplant and making lifestyle choices such as quitting smoking. In the absence of treatment, symptoms progressively deteriorate (British Lung Foundation, 2019).

Music therapy is studied on both physiological and psychological parameters in COPD patients. A randomized control trial in China (Liu et al., 2019) examined the effects of group singing on depressive symptoms and quality of life in individuals diagnosed with COPD. A sample of sixty participants was recruited for this study. The experimental group (N=30)

engaged in group singing once a week for 24 weeks and received routine health education. The control group received routine health education only for the same period. Results showed a reduction in depressive symptoms and an increase in quality of life scores at 3 months and 6 months after intervention.

Another study compared the effects of a singing intervention and a handicraft intervention, when coupled with physiotherapy on pulmonary function parameters and quality of life in 30 COPD patients (Bonilha et al., 2009). Participants were equally put into two groups. The singing practice intervention was conducted by a singing teacher and a physiotherapist. The intervention consisted of relaxation exercises followed by various singing exercises. On the other hand, the handicraft intervention led by a physiotherapist and a handicraft work teacher consisted of relaxation exercises followed by the execution of handicraft work like paper folding, collage and drawing. A comparison between the health outcomes of the two groups indicated that the singing group showed improvements on maximal expiratory pressure, dyspnea, and inspiratory capacity ($p = 0.01$), and decreases of expiratory reserve volume. Both the groups displayed improved scores of quality of life.

McNaughton et al. (2016) conducted individual interviews and focus group discussions with COPD patients to explore the ways in which community singing group participation affected their health and well-being. Group singing was described as a highly positive experience for the participants. Four key themes that emerged out of the study were: being in the 'right space', connection with others, experience of purpose and growth and participation in a meaningful activity.

Canga et al. (2015) examined the impact of active music therapy as an adjunct to pulmonary rehabilitation in COPD patients through an RCT. A sample of 98 COPD patients diagnosed with GOLD stages II/III/IV (48-88 years) were selected for the study. Certified

music therapists provided music therapy to the experimental group through live music visualizations, wind instrument playing inclusive of clinical improvisation, and singing in addition to pulmonary rehabilitation for a duration of six weeks. The control group received standard pulmonary rehabilitation only. Active music therapy in combination with pulmonary rehabilitation was found to decrease depressive symptoms, perceived dyspnea and enhance a sense of control in COPD patients; in comparison to pulmonary rehabilitation only. This study strongly suggests the implementation of music therapy as an adjunct therapeutic technique.

Further, Singh et al. (2009) employed a sample of 72 Indian COPD patients who underwent a recent episode of exacerbation to assess the impact of music therapy (MT) and progressive muscle relaxation (PMR) on health outcomes through a randomized controlled study. The experimental group received music therapy by listening to music selected by the participants ranging from 60-80 beats per minute for a period of 30 minutes. The control group practiced PMR through a pre-recorded audio set of instructions. After two sessions, significant results were found in both groups. However, compared to the PMR group, COPD patients exposed to the MT group experienced reduced anxiety, dyspnea, systolic blood pressure, pulse rate and heart rate.

Another study compared the difference between the effect of Western classical music and Turkish classical music on physiological and psychological measures of 96 hospitalized COPD patients (Horuz et al., 2017). Participants were divided into 3 groups: one was exposed to Western classical music; another was exposed to Turkish classical music and the third group was a control group. Although both experimental groups showed decreased anxiety, systolic blood pressure and diastolic blood pressure, in comparison to the controlled group; no significant differences between the two groups were observed.

The effect of music therapy has been studied on various outcome measures in COPD patients. A Chinese five-element music therapy intervention based on the midnight-noon ebb-flow theory was used to examine its effect on the sleep quality of COPD patients (Zhang et al., 2017). A sample of sixty patients were allocated to an experimental group (N=30) and a control group (N=30). Music-listening sessions were provided to the experimental group for 30 minutes over a period of 8 weeks. Standard medical care was provided to the control group. Findings indicated an improvement in sleep quality and reduction in daytime fatigue in the experimental group in comparison with the control group.

Another study recorded the beneficial effect of rhythmically enhanced music to increase 6-minute walk distance in COPD patients (Hernandez et al., 2020). Twenty five men with moderate-to-severe COPD were selected to complete three 6-minute walk tests: with music, with rhythmically enhanced music and with no music. Results showed that participants walked 12 meters farther ($p=.015$) during the test in the rhythmically enhanced music condition when compared with the other two conditions.

Evidence related to this section is inconclusive as several gaps in literature exist. Though, a majority of the studies showed positive results of music therapy on COPD patients, elaborate investigations are required to assess the impact of music therapy on COPD. There is insufficient information with regard to the effect of combined interventions on the illness. Further, differences between active and passive music interventions need to be examined.

Music Therapy and Arthritis

Arthritis refers to a group of diseases that affect the joints of the body and the tissues that surround the joints. Degenerative arthritis, inflammatory arthritis, infectious arthritis and metabolic arthritis are the different types of arthritis. Symptoms of this condition include pain, swelling, stiffness of joints and a decreased range of motion. It is more common

in women, than men; and is managed using medication, physical or occupational therapy, assistive aids, patient education and support, and joint replacement surgery. If left untreated, the condition will progressively worsen and lead to disability (Nichols, 2017).

The outcome of music therapy on arthritis is documented by only a handful of studies. Although sparse, studies do show the beneficial effect of music therapy on lessening pain due to arthritis and osteoarthritis (McCutchen, 2007; Santos & Carvalho, 2012; McCaffery & Freeman, 2003).

Ottaviani et al. (2012) evaluated the impact of a music therapy intervention on osteoarthritis patients undergoing knee joint lavage surgery. A sample of 62 participants (mean age = 68.8 years) were randomly allocated to an intervention group ($N=31$) and a control group ($N=31$). The intervention group was exposed to recorded music that was played during the preparation for the procedure as well as during the entire procedure. No intervention was given to the control group and participants underwent standard medical procedure. Participants belonging to the intervention group reported a decrease in pain, heart rate and perioperative anxiety levels. Additionally, tolerability of the surgical procedure was also found to be higher in these patients. However, no difference in SBP or DBP was found compared to the control group.

Four case studies aimed to inspect the effect of music therapy on the management of hand osteoarthritis in older adults (Zelazny, 2001). Four participants received a music therapy intervention for 30 minutes, 4 days a week over a period of 4 weeks. The intervention involved playing melodies on an electronic keyboard. The researcher found that keyboard playing decreased arthritic discomfort and increased finger strength/dexterity, range of motion and finger pinch meter in the participants. In addition, participants also found an improved structure of their leisure time and increased socialization.

Jeong et al. (2010) recruited a sample of 31 women with osteoarthritis who received a Korean music therapy intervention (Jang-Gu) twice a week, for 12 weeks. Findings indicated a decrease in body discomfort but no changes in depression, stress and pain scores. Further, a comparative study by Innes (2018) aimed to assess the impact of mantra meditation versus music listening on health outcomes of older adults with knee osteoarthritis. A sample of 21 participants were randomized into a mantra meditation (MM) group (N=11) and a music listening (ML) group (N=11). Both groups were instructed to practice their respective interventions for 15-20 minutes twice every day, for a period of 8 weeks. Both groups showed significant decreases in pain and discomfort along with greater improvements in sleep, mood and quality of life; however, greater changes were noted in the MM group as compared to the ML group.

As the literature available in this area is still in its infancy, more studies are required to assess the effect of music therapy on arthritis and to replicate results. The limited evidence available is not decisive as most of the studies have an inadequate sample size and an absence of a control group. Further, there is a lack of clarity regarding the presence of a trained music therapist while delivering the intervention. Majority of the studies have used receptive music therapy on the participants, therefore, the effect of active music therapy on arthritis should also be investigated.

Conclusion

In summary, it may be said that this review found a trend of therapeutic properties of music therapy on chronic illnesses. Music therapy is associated with positive outcomes across different chronic illnesses. It does not affect the disease itself but focuses on the physiological and psychological needs that arise from treatment. However, a cause-effect relationship cannot be established between the two as there is a lack of sufficient literature.

The application of music therapy in chronic illness care is in its nascent stages and plenty of studies are required to assess and replicate the role of music therapy in chronic illness. Such studies need to be well-designed, randomized and controlled with a high sample size. Studies comparing different types of music need to be carried out. Further, the combined effect of music therapy and other interventions may be explored. It is imperative to keep in mind that the presence of a music therapist is essential for the facilitation of music therapy. However, most experimental studies do not have certified music therapists to deliver interventions. This aspect should be looked into during the research process.

Music therapy is widely used in developed countries. Majority of music therapists who belong to the United States work in the field of oncology (Stanczyk, 2011). Although music therapy is not a new concept to India, it is not an established profession in the Indian healthcare system due to lack of awareness and scientific research. The healing effects of Indian classical music have been documented in ancient Indian texts like the *Vedas* but there is a dearth of Indian scientific studies assessing the impact of music therapy in health and illness.

Music therapy is a valuable, harmless and cost-effective non-pharmacological intervention. Interactive music therapy can be used to develop rehabilitation programmes for cardiac and pulmonary disease patients. Therefore, further research should be carried out to throw light on its therapeutic effects for holistic patient care.

References

- Alcântara-Silva, T. R., de Freitas-Junior, R., Freitas, N. M. A., de Paula Junior, W., da Silva, D. J., Machado, G. D. P., ... & Soares, L. R. (2018). Music therapy reduces radiotherapy-induced fatigue in patients with breast or gynecological cancer: a randomized trial. *Integrative cancer therapies*, 17(3), 628-635.
- Ambrose, K. R., & Golightly, Y. M. (2015). Physical exercise as non-pharmacological treatment of chronic pain: why and when. *Best practice & research Clinical rheumatology*, 29(1), 120-130.
- American Heart Association (2021). *High Blood Pressure*. Retrieved from <https://www.heart.org/en/health-topics/high-blood-pressure>
- American Music Therapy Association. (2006). *What is Music Therapy?* Retrieved from <https://www.musictherapy.org/about/quotes/>
- Angeline, K. (2018). Impact of Ahibhairav Raga on Hypertension among Primary Educators in Selected Schools at Puducherry. *Inte Jr Cardiac Scie and Res: IJCSAR*-105.
- Association for Music and Imagery (2021). *Frequently Asked Questions*. Retrieved from <https://ami-bonnymethod.org/about/faq>
- Astuti, N. F., Rekawati, E., & Wati, D. N. K. (2019). Decreased blood pressure among community dwelling older adults following progressive muscle relaxation and music therapy (RESIK). *BMC nursing*, 18(1), 36.
- Australian Music Therapy Association (2012). *What is Music Therapy?* Retrieved from <https://www.austmta.org.au/content/what-music-therapy>

- Balan, R., Bavdekar, S. B., & Jadhav, S. (2009). Can Indian classical instrumental music reduce pain felt during venepuncture?. *The Indian Journal of Pediatrics*, 76(5), 469-473.
- Bekiroğlu, T., Ovayolu, N., Ergün, Y., & Ekerbiçer, H. Ç. (2013). Effect of Turkish classical music on blood pressure: a randomized controlled trial in hypertensive elderly patients. *Complementary therapies in medicine*, 21(3), 147-154.
- Bennett, H. D., Coleman, E. A., Parry, C., Bodenheimer, T., & Chen, E. H. (2010). Health coaching for patients with chronic illness. *Family practice management*, 17(5), 24.
- Bernatzky, G., Presch, M., Anderson, M., & Panksepp, J. (2011). Emotional foundations of music as a non-pharmacological pain management tool in modern medicine. *Neuroscience & Biobehavioral Reviews*, 35(9), 1989-1999.
- Bhana, V. M. (2016). *Implementation of Bonny Method of Guided Imagery and Music (BMGIM) to complement care provided in selected cancer interim homes in Gauteng province* (Doctoral dissertation, University of Pretoria).
- Blaskovits, F., Tyerman, J., & Luctkar-Flude, M. (2017). Effectiveness of neurofeedback therapy for anxiety and stress in adults living with a chronic illness: a systematic review protocol. *JBIM Evidence Synthesis*, 15(7), 1765-1769.
- Bonde, L. O. (2005). *The Bonny Method of Guided Imagery and Music (BMGIM) with cancer survivors: A psychosocial study with focus on the influence of BMGIM on mood and quality of life* (Doctoral dissertation, Institut for Musik og Musikterapi, Aalborg Universitet).
- Bonilha, A. G., Onofre, F., Vieira, M. L., Prado, M. Y. A., & Martinez, J. A. B. (2009). Effects of singing classes on pulmonary function and quality of life of COPD patients. *International journal of chronic obstructive pulmonary disease*, 4, 1.

- Bozcuk, H., Ozcan, K., Erdogan, C., Mutlu, H., Demir, M., & Coskun, S. (2017). A comparative study of art therapy in cancer patients receiving chemotherapy and improvement in quality of life by watercolor painting. *Complementary therapies in medicine*, 30, 67-72.
- Bradt, J., Dileo, C., & Potvin, N. (2013). Music for stress and anxiety reduction in coronary heart disease patients. *Cochrane Database of Systematic Reviews*, (12).
- Bradt, J., Dileo, C., & Shim, M. (2013). Music interventions for preoperative anxiety. *Cochrane Database of Systematic Reviews*, (6).
- Bradt, J., Potvin, N., Kesslick, A., Shim, M., Radl, D., Schriver, E., ... & Komarnicky-Kocher, L. T. (2015). The impact of music therapy versus music medicine on psychological outcomes and pain in cancer patients: a mixed methods study. *Supportive Care in Cancer*, 23(5), 1261-1271.
- British Lung Foundation. (2019). *What is copd?* Retrieved from <https://www.blf.org.uk/support-for-you/copd/what-is-copd>
- Burns, D. S. (2001). The effect of the bonny method of guided imagery and music on the mood and life quality of cancer patients. *Journal of music therapy*, 38(1), 51-65.
- Canga, B., Azoulay, R., Raskin, J., & Loewy, J. (2015). AIR: Advances in Respiration–Music therapy in the treatment of chronic pulmonary disease. *Respiratory medicine*, 109(12), 1532-1539.
- Carelle, N., Piotto, E., Bellanger, A., Germanaud, J., Thuillier, A., & Khayat, D. (2002). Changing patient perceptions of the side effects of cancer chemotherapy. *Cancer*, 95(1), 155-163.).

- Cepeda, M. S., Carr, D. B., Lau, J., & Alvarez, H. (2006). Music for pain relief. *Cochrane database of systematic reviews*, (2).
- Chang, K. L., Fillingim, R., Hurley, R. W., & Schmidt, S. (2015). Chronic pain management: nonpharmacological therapies for chronic pain. *FP essentials*, 432, 21-26.
- Chatterjee, S., & Mukherjee, R. (2020). Evaluation of the Effects of Music Therapy Using Todi Raga of Hindustani Classical Music on Blood Pressure, Pulse Rate and Respiratory Rate of Healthy Elderly Men. *Journal of Scientific Research*, 64(1).
- Cioca, I. E. (2013). Type 2 Diabetes–Psychosomatic disease approachable through music therapy. In *Proc. Rom. Acad., Series B* (Vol. 15, No. 1, pp. 38-46).
- Cook, E. L., & Silverman, M. J. (2013). Effects of music therapy on spirituality with patients on a medical oncology/hematology unit: a mixed-methods approach. *The Arts in Psychotherapy*, 40(2), 239-244.
- Deshmukh, A. D., Sarvaiya, A. A., Seethalakshmi, R., & Nayak, A. S. (2009). Effect of Indian classical music on quality of sleep in depressed patients: A randomized controlled trial. *Nordic Journal of Music Therapy*, 18(1), 70-78.
- Dileo, C., & Bradt, J. (2009). Medical music therapy: Evidence-based principles and practices. In *International handbook of occupational therapy interventions* (pp. 445-451). Springer, New York, NY.
- do Amaral, M. A. S., Neto, M. G., de Queiroz, J. G., Martins-Filho, P. R. S., Saquetto, M. B., & Carvalho, V. O. (2016). Effect of music therapy on blood pressure of individuals with hypertension: a systematic review and meta-analysis. *International journal of cardiology*, 214, 461-464.

- Earl E. Bakken Center for Spirituality & Healing (2016). *What is music therapy?* Taking charge of your health and wellbeing. <https://www.takingcharge.csh.umn.edu/common-questions/what-music-therapy>
- Ferlay, J., Ervik, M., Lam, F., Colombet, M., Mery, L., Piñeros, M. (2020). Global Cancer Observatory: Cancer Today. Lyon: International Agency for Research on Cancer.
- Fotakopoulos, G., & Kotlia, P. (2018). The Value of Exercise Rehabilitation Program Accompanied by Experiential Music for Recovery of Cognitive and Motor Skills in Stroke Patients. *Journal of Stroke and Cerebrovascular Diseases*, 27(11), 2932-2939. doi:10.1016/j.jstrokecerebrovasdis.2018.06.025
- Gallagher, L. M. (2011). The role of music therapy in palliative medicine and supportive care. In *Seminars in oncology* (Vol. 38, No. 3, pp. 403-406). WB Saunders.
- Godbole, M. M., & Basavaraj, A. (2014). The therapeutic effect of Indian classical music on physiological and psychological parameters of hypertension in geriatric patients. *Hypertension*, 64(suppl_1), A628-A628.
- Good, M., Picot, B. L., Salem, S. G., Chin, C. C., Picot, S. F., & Lane, D. (2000). Cultural differences in music chosen for pain relief. *Journal of Holistic Nursing*, 18(3), 245-260.
- Goodill, S. W. (2018). Accumulating evidence for dance/movement therapy in cancer care. *Frontiers in Psychology*, 9, 1778.
- Gramaglia, C., Gambaro, E., Vecchi, C., Licandro, D., Raina, G., Pisani, C., ... & Grossini, E. (2019). Outcomes of music therapy interventions in cancer patients—A review of the literature. *Critical reviews in oncology/hematology*, 138, 241-254.

- Grocke, D. E., & Wigram, T. (2007). *Receptive methods in music therapy: Techniques and clinical applications for music therapy clinicians, educators, and students*. London: Jessica Kingsley.
- Groener, J. B., Neus, I., Kopf, S., Hartmann, M., Schanz, J., Kliemank, E., ... & Nawroth, P. P. (2015). Group singing as a therapy during diabetes training—a randomized controlled pilot study. *Experimental and Clinical Endocrinology & Diabetes*, 123(10), 617-621.
- Hagemann, P. D. M. S., Martin, L. C., & Neme, C. M. B. (2018). The effect of music therapy on hemodialysis patients' quality of life and depression symptoms. *Brazilian Journal of Nephrology*, 41, 74-82.
- Hayes School of Music (2021). *The Bonny Method of Guided Imagery and Music (GIM)*. Retrieved from <https://music.appstate.edu/academics/special-programs/bonny-method>
- Hegde, S., Tumuluri, I., & Nagendra, H. (2017). Effectiveness of music therapy on focused attention, working memory and stress in Type 2 diabetes: An exploratory study. *International Journal of Yoga*, 10(3), 167. doi:10.4103/0973-6131.213471
- Hernandez, A., Bronas, U. G., Steffen, A. D., Marquez, D. X., Fritschi, C., Quinn, L. T., & Collins, E. G. (2020). Rhythmic auditory stimulation increases 6-Minute walk distance in individuals with COPD: A repeated measures study. *Heart & Lung*.
- Hilliard, R. E. (2003). The effects of music therapy on the quality and length of life of people diagnosed with terminal cancer. *Journal of Music therapy*, 40(2), 113-137.
- Holvast, F., Massoudi, B., Oude Voshaar, R. C., & Verhaak, P. F. (2017). Non-pharmacological treatment for depressed older patients in primary care: A systematic review and meta-analysis. *PloS one*, 12(9), e0184666.

- Horuz, D., Kurcer, M. A., & Erdoğan, Z. (2017). The effect of music therapy on anxiety and various physical findings in patients with COPD in a pulmonology service. *Holistic Nursing Practice*, 31(6), 378-383.
- Im-oun, S., Kotruchin, P., Thinsug, P., Mitsungnern, T., Techa-atik, P., & Pongchaiyakul, C. (2018). Effect of Thai instrumental folk music on blood pressure: A randomized controlled trial in stage-2 hypertensive patients. *Complementary therapies in medicine*, 39, 43-48.
- Jasemi, M., Aazami, S., & Zabihi, R. E. (2016). The effects of music therapy on anxiety and depression of cancer patients. *Indian journal of palliative care*, 22(4), 455.
- Jeong, Y. H., Kim, J. I., Kim, S., & Lim, K. O. (2010). Effect of jang-gu program and self-help management program on depression, stress, pain and body discomfort in women with osteoarthritis. *Journal of muscle and joint health*, 17(2), 212-221.
- Ji, L., Bai, J. J., Sun, J., Ming, Y., & Chen, L. R. (2015). Effect of combining music media therapy with lower extremity exercise on elderly patients with diabetes mellitus. *International Journal of Nursing Sciences*, 2(3), 243-247.
- Kalra, S., Jena, B. N., & Yeravdekar, R. (2018). Emotional and psychological needs of people with diabetes. *Indian journal of endocrinology and metabolism*, 22(5), 696.
- Koelsch, S., Fritz, T., v. Cramon, D. Y., Müller, K., & Friederici, A. D. (2006). Investigating emotion with music: an fMRI study. *Human brain mapping*, 27(3), 239-250.
- Krishnaswamy, P., & Nair, S. (2016). Effect of music therapy on pain and anxiety levels of cancer patients: a pilot study. *Indian journal of palliative care*, 22(3), 307.

- Kühlmann, A. Y., Etnel, J. R., Roos-Hesselink, J. W., Jeekel, J., Bogers, A. J., & Takkenberg, J. J. (2016). Systematic review and meta-analysis of music interventions in hypertension treatment: a quest for answers. *BMC cardiovascular disorders*, 16(1), 69.
- Kunikullaya, K. U., Goturu, J., Muradi, V., Hukkeri, P. A., Kunnavil, R., Doreswamy, V., Prakash, V. S., & Murthy, N. S. (2015). Music versus lifestyle on the autonomic nervous system of prehypertensives and hypertensives--a randomized control trial. *Complementary therapies in medicine*, 23(5), 733–740. <https://doi.org/10.1016/j.ctim.2015.08.003>
- Lafçi, D., & Öztunç, G. (2015). The effect of music on the sleep quality of breast cancer patients. *International journal of caring sciences*, 8(3), 633.
- Larsen, P. D., & Lubkin, I. M. (2009). *Chronic Illness Impact and Intervention*, Jones and Bartlett Learning. Sudbury, UK.
- Lai, H. L., Li, Y. M., & Lee, L. H. (2012). Effects of music intervention with nursing presence and recorded music on psycho-physiological indices of cancer patient caregivers. *Journal of clinical nursing*, 21(5-6), 745-756.
- Lehman, B. J., David, D. M., & Gruber, J. A. (2017). Rethinking the biopsychosocial model of health: Understanding health as a dynamic system. *Social and Personality Psychology Compass*, 11(8), e12328.
- Lehman, A. M., Lehman, D. R., Hemphill, K. J., Mandel, D. R., & Cooper, L. M. (2002). Illness experience, depression, and anxiety in chronic fatigue syndrome. *Journal of psychosomatic research*, 52(6), 461-465.

- Li, H. C., Wang, H. H., Chou, F. H., & Chen, K. M. (2015). The effect of music therapy on cognitive functioning among older adults: A systematic review and meta-analysis. *Journal of the American Medical Directors Association*, 16(1), 71-77.
- Li, X. M., Yan, H., Zhou, K. N., Dang, S. N., Wang, D. L., & Zhang, Y. P. (2011). Effects of music therapy on pain among female breast cancer patients after radical mastectomy: results from a randomized controlled trial. *Breast cancer research and treatment*, 128(2), 411-419.
- Liu, H., Song, M., Zhai, Z. H., Shi, R. J., & Zhou, X. L. (2019). Group singing improves depression and life quality in patients with stable COPD: a randomized community-based trial in China. *Quality of Life Research*, 28(3), 725-735.
- Loomba, R. S., Arora, R., Shah, P. H., Chandrasekar, S., & Molnar, J. (2012). Effects of music on systolic blood pressure, diastolic blood pressure, and heart rate: a meta-analysis. *Indian heart journal*, 64(3), 309-313.
- Lopez, G., Christie, A. J., Powers-James, C., Bae, M. S., Dibaj, S. S., Gomez, T., ... & Bruera, E. (2019). The effects of inpatient music therapy on self-reported symptoms at an academic cancer center: a preliminary report. *Supportive Care in Cancer*, 27(11), 4207-4212.
- Mandel, S. E., Davis, B. A., & Secic, M. (2013). Effects of music therapy and music-assisted relaxation and imagery on health-related outcomes in diabetes education: A feasibility study. *The diabetes educator*, 39(4), 568-581.
- Martin C. M. (2007). Chronic disease and illness care: adding principles of family medicine to address ongoing health system redesign. *Canadian family physician Medecin de famille canadien*, 53(12), 2086–2091.

- McCaffrey, R., & Freeman, E. (2003). Effect of music on chronic osteoarthritis pain in older people. *Journal of advanced nursing*, 44(5), 517-524.
- McClean, S., Bunt, L., & Daykin, N. (2012). The healing and spiritual properties of music therapy at a cancer care center. *The journal of alternative and complementary medicine*, 18(4), 402-407.
- McCutchen, A. (2007). Music therapy in the management of chronic osteoarthritis pain. *Kentucky nurse*, 55(3), 10-10.
- McNaughton, A., Aldington, S., Williams, G., & Levack, W. M. (2016). Sing your lungs out: a qualitative study of a community singing group for people with chronic obstructive pulmonary disease (COPD). *BMJ open*, 6(9), e012521.
- Mofredj, A., Alaya, S., Tassaioust, K., Bahloul, H., & Mrabet, A. (2016). Music therapy, a review of the potential therapeutic benefits for the critically ill. *Journal of critical care*, 35, 195-199.
- National Cancer Institute. (2019). *Risk factors for cancer*. Retrieved from <https://www.cancer.gov/about-cancer/causes-prevention/risk>
- National Health Portal. (2019). *Non-communicable disease*. Retrieved from <https://www.nhp.gov.in/healthyliving/ncd2019>
- Nichols, H. (2017). *What are the causes and types of arthritis?* Medical News Today. Retrieved from https://www.medicalnewstoday.com/articles/7621#_noHeaderPrefixedContent
- Nord, L. (2012). Effects of slow breathing exercises and music in patients with hypertension—15 months follow-up. *International Journal of Person Centered Medicine*, 2(3), 377-383.

- Ottaviani, S., Jean-Luc, B., Thomas, B., & Pascal, R. (2012). Effect of music on anxiety and pain during joint lavage for knee osteoarthritis. *Clinical rheumatology*, 31(3), 531-534.
- Oza, R., & Garcellano, M. (2015). Nonpharmacologic management of hypertension: what works?. *American Family Physician*, 91(11), 772-776.
- Panksepp, J., & Bernatzky, G. (2002). Emotional sounds and the brain: the neuro-affective foundations of musical appreciation. *Behavioural processes*, 60(2), 133-155.
- Patel, V., Chatterji, S., Chisholm, D., Ebrahim, S., Gopalakrishna, G., Mathers, C., ... & Reddy, K. S. (2011). Chronic diseases and injuries in India. *The Lancet*, 377(9763), 413-428.
- Pichler, A., & Pichler, M. (2014). Music therapy in cancer patients: fact or fiction?. *Future Oncology*, 10(15), 2409-2411.
- Phipps, M. A., Carroll, D. L., & Tsiantoulas, A. (2010). Music as a therapeutic intervention on an inpatient neuroscience unit. *Complementary therapies in clinical practice*, 16(3), 138-142.
- Pothoulaki, M., MacDonald, R., & Flowers, P. (2012). The use of music in chronic illness: Evidence and arguments. In R. A. R. MacDonald, G. Kreutz & L. Mitchell (Eds.), *Music, health & wellbeing* (pp. 239-256). Oxford University Press.
- Potvin, N., Bradt, J., & Kesslick, A. (2015). Expanding perspective on music therapy for symptom management in cancer care. *Journal of Music Therapy*, 52(1), 135-167.
- Purnomo, E., Nur, A., Rahim, R., & Pulungan, Z. S. A. (2020). The Effectiveness of Instrumental Music Therapy and Self-Hypnosis on Decreasing Blood Pressure Level among Hypertension Patients. *International Journal of Nursing and Health Services (IJNHS)*, 3(2), 214-223.

- Rao, T. I., & Nagendra, H. R. (2014). The effect of active and silent music interventions on patients with type 2 diabetes measured with electron photonic imaging technique. *Int J Humanit Soc Sci*, 3, 7-14.
- Renz, M., Mao, M. S., & Cerny, T. (2005). Spirituality, psychotherapy and music in palliative cancer care: research projects in psycho-oncology at an oncology center in Switzerland. *Supportive Care in Cancer*, 13(12), 961-966.
- Rossetti, A., Chadha, M., Torres, B. N., Lee, J. K., Hylton, D., Loewy, J. V., & Harrison, L. B. (2017). The impact of music therapy on anxiety in cancer patients undergoing simulation for radiation therapy. *International Journal of Radiation Oncology* Biology* Physics*, 99(1), 103-110.
- Sairam, T.V. (2006). Music Therapy: Designing Training Methods for the Mentally Retarded (MR) Children, in Sairam, T.V. (Ed.) *Music Therapy: The Sacred and the Profane*. (pp. 74 – 78).
- Santos, D. S. D., & Carvalho, E. C. D. (2012). Intervenções de enfermagem para o cuidado de pacientes com artrite: revisão integrativa da literatura. *Revista Brasileira de Enfermagem*, 65(6), 1011-1018. <https://doi.org/10.1590/S0034-71672012000600018>
- Sari, N. L. P. D. Y., & Rekawati, E. (2019). The Effect of Traditional Music Therapy on Blood Pressure Among Elderly with Hypertension: A Literature Review. *International Journal of Nursing and Health Services*, 2(2), 55-65. <https://doi.org/10.35654/ijnhs.v2i2.103>
- Schieffer, B. M., Pham, Q., Labus, J., Baria, A., Van Vort, W., Davis, P., ... & Naliboff, B. D. (2005). Pain medication beliefs and medication misuse in chronic pain. *The Journal of Pain*, 6(9), 620-629.

- Singh, V. P., Khandelwal, B., & Sherpa, N. T. (2015). Effect of yoga and music therapy with standard diabetes care in type II diabetes mellitus: A randomized control study. *International Journal of Advanced Research*, 3(6), 386-399.
- Singh, V. P., Rao, V., V, P., RC, S., & K, K.P. (2009). Comparison of the effectiveness of music and progressive muscle relaxation for anxiety in COPD—a randomized controlled pilot study. *Chronic respiratory disease*, 6(4), 209-216.
- Stanczyk, M. M. (2011). Music therapy in supportive cancer care. *Reports of Practical Oncology & Radiotherapy*, 16(5), 170-172.
- Sundar, S. (2007). Traditional healing systems and modern music therapy in India. *Music Therapy Today*, VIII(3). Retrieved April 26, 2019.
- Turner, J., & Kelly, B. (2000). Emotional dimensions of chronic disease. *The Western journal of medicine*, 172(2), 124–128. <https://doi.org/10.1136/ewjm.172.2.124>
- Uvnäs-Moberg, K. (1998). Oxytocin may mediate the benefits of positive social interaction and emotions. *Psychoneuroendocrinology*, 23(8), 819-835.
- Vinayak, S., Vinayak, R., & Dehkhoda, F. (2017). The effect of music therapy on sleep quality of cancer patients undergoing chemotherapy or radiotherapy: A randomized control trial. *Journal of Social Sciences (COES&RJ-JSS)*, 6(4), 734-743.
- Watson, S. (2020). Everything you need to know about diabetes. *Healthline*. Retrieved from <https://www.healthline.com/health/diabetes>
- World Health Organization. (2012). *Availability of data for monitoring noncommunicable disease risk factors in India*. <https://www.who.int/bulletin/volumes/90/1/11-091041/en/>

- World Health Organization. (2018). *Noncommunicable diseases*. [https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases#:~:text=Noncommunicable%20diseases%20\(NCDs\)%20kill%2041,%2D%20and%20middle%2Dincome%20countries](https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases#:~:text=Noncommunicable%20diseases%20(NCDs)%20kill%2041,%2D%20and%20middle%2Dincome%20countries).
- World Health Organization. (2021). *Cancer*. https://www.who.int/health-topics/cancer#tab=tab_1
- World Health Organization. (2021). *Hypertension*. <https://www.who.int/news-room/fact-sheets/detail/hypertension>
- World Health Organization. (2021). *Diabetes*. <https://www.who.int/news-room/fact-sheets/detail/diabetes>
- Yinger, O. S., & Gooding, L. (2014). Music therapy and music medicine for children and adolescents. *Child and Adolescent Psychiatric Clinics*, 23(3), 535-553.
- Zanini, C. R. D. O., Jardim, P. C. B. V., Salgado, C. M., Nunes, M. C., Urzêda, F. L. D., Carvalho, M. V. C., ... & Souza, W. K. S. B. D. (2009). Music therapy effects on the quality of life and the blood pressure of hypertensive patients. *Arquivos brasileiros de cardiologia*, 93(5), 534-540.
- Zelazny, C. M. (2001). Therapeutic instrumental music playing in hand rehabilitation for older adults with osteoarthritis: Four case studies. *Journal of Music Therapy*, 38(2), 97-113.
- Zhang, G., Lin, H., Ma, J., & Zhao, F. (2017). Effect of the five-element music therapy based on the midnight-noon ebb-flow theory on Somnopathy Patients with COPD Accompanied by Anxiety. *European Respiratory Journal*. 50(61).

Zhou, K., Li, X., Li, J., Liu, M., Dang, S., Wang, D., & Xin, X. (2015). A clinical randomized controlled trial of music therapy and progressive muscle relaxation training in female breast cancer patients after radical mastectomy: Results on depression, anxiety and length of hospital stay. *European journal of oncology nursing*, 19(1), 54-59.

Hypertension Management during the COVID-19 Pandemic: Associated Psychosocial Factors

by Oindrila Mukherjee



Librarian
Indira Gandhi Memorial Library
UNIVERSITY OF HYDERABAD
Central University P.O.
HYDERABAD-500 046.

Submission date: 06-Jun-2023 12:55PM (UTC+0530)

Submission ID: 2110130152

File name: during_the_COVID-19_Pandemic_Associated_Psychosocial_Factors.pdf (1.21M)

Word count: 39479

Character count: 222067

Hypertension Management during the COVID-19 Pandemic: Associated Psychosocial Factors

ORIGINALITY REPORT

9%

SIMILARITY INDEX

7%

INTERNET SOURCES

6%

PUBLICATIONS

2%

STUDENT PAPERS

PRIMARY SOURCES

1

dspace.uohyd.ac.in

Internet Source



2%

2

Submitted to University of Hyderabad,
Hyderabad

Student Paper

प्रोफेसर मीना हरिहरण / Prof. Meena Hariharan
स्वास्थ्य मनोविज्ञान केन्द्र
Centre for Health Psychology
हैदराबाद विश्वविद्यालय / UNIVERSITY OF HYDERABAD
हैदराबाद / HYDERABAD-500 046. भारत / INDIA.

1%

3

"Abstracts", Annals of Behavioral Medicine,
04/2012

Publication

<1%

4

www.ncbi.nlm.nih.gov

Internet Source

<1%

5

"Prehypertension and Cardiometabolic
Syndrome", Springer Science and Business
Media LLC, 2019

Publication

<1%

6

www.researchgate.net

Internet Source

<1%

7

core.ac.uk

Internet Source

<1%

www.science.gov

8

Internet Source

<1 %

9

scholarworks.gsu.edu

Internet Source

<1 %

10

scholarworks.wmich.edu

Internet Source

<1 %

11

Marie-Pierre St-Onge, Anja Mikic, Cara E Pietrolungo. "Effects of Diet on Sleep Quality", Advances in Nutrition, 2016

Publication

<1 %

12

"Pediatric Hypertension", Springer Nature, 2018

Publication

<1 %

13

Asher Andrew, Meena Hariharan, Sandra Roshni Monteiro, Meera Padhy, Usha Chivukula. "Enhancing Adherence and Management in Patients with Hypertension: Impact of Form and Frequency of Knowledge Intervention", Indian Heart Journal, 2022

Publication

<1 %

14

eprints.qut.edu.au

Internet Source

<1 %

15

eprints.nottingham.ac.uk

Internet Source

<1 %

16

dergipark.org.tr

Internet Source

<1 %

17	"Migraine in Medicine", Springer Science and Business Media LLC, 2022 Publication	<1 %
18	Submitted to Higher Education Commission Pakistan Student Paper	<1 %
19	Mohamed Hassan Elnaem, Wesley Nuffer. "Diabetes care and prevention services provided by pharmacists: Progress made during the COVID-19 pandemic and the need for additional efforts in the post-pandemic era", Exploratory Research in Clinical and Social Pharmacy, 2022 Publication	<1 %
20	Submitted to Pennsylvania State System of Higher Education Student Paper	<1 %
21	acikbilim.yok.gov.tr Internet Source	<1 %
22	"Abstracts 2014", Annals of Behavioral Medicine, 2014. Publication	<1 %
23	Submitted to La Trobe University Student Paper	<1 %
24	ir.lib.uwo.ca Internet Source	<1 %

25	ANDERS HIMMELMANN, THOMAS HEDNER, L. "Isolated Systolic Hypertension: an Important Cardiovascular Risk Factor", Blood Pressure, 2009 Publication	<1 %

26	d-nb.info Internet Source	<1 %

27	Submitted to University of Cincinnati Student Paper	<1 %

28	docshare.tips Internet Source	<1 %

29	Eric W. Schrimshaw, Karolynn Siegel, Helen- Maria Lekas. "Changes in Attitudes Toward Antiviral Medication: A Comparison of Women Living with HIV/AIDS in the Pre-HAART and HAART Eras", AIDS and Behavior, 2005 Publication	<1 %

30	Submitted to University of Northumbria at Newcastle Student Paper	<1 %

31	"Abstracts", Journal of Sleep Research, 2012 Publication	<1 %

32	www.researchprotocols.org Internet Source	<1 %

33	nrl.northumbria.ac.uk Internet Source	<1 %

34	Hoefelmann, Luana P., Adair da Silva Lopes, Kelly Samara da Silva, Shana Ginar da Silva, Luciana Gatto A. Cabral, and Markus Vinicius Nahas. "Lifestyle, self-reported morbidities, and poor sleep quality among Brazilian workers", Sleep Medicine, 2012. Publication	<1 %
35	kclpure.kcl.ac.uk Internet Source	<1 %
36	repository.up.ac.za Internet Source	<1 %
37	Submitted to University of Central England in Birmingham Student Paper	<1 %
38	archive.org Internet Source	<1 %
39	researchspace.ukzn.ac.za Internet Source	<1 %
40	Dawn K. Wilson, Tyler C. McDaniel, Sandra M. Coulon. "Chapter 15-2 The Role of Dietary Electrolytes and Childhood Blood Pressure Regulation", Springer Science and Business Media LLC, 2022 Publication	<1 %
41	www.slideshare.net Internet Source	<1 %

42	2022.ehps.net Internet Source	<1 %
43	Dentato, Michael P.. "Social Work Practice with the LGBTQ+ Community", Social Work Practice with the LGBTQ+ Community, 2022 Publication	<1 %
44	epe.lac-bac.gc.ca Internet Source	<1 %
45	www.patientcareonline.com Internet Source	<1 %
46	Huaguo Zhang, Guorong Wang, Jina Zhang, Ying Lu, Xiaolian Jiang. "Patient delay and associated factors among Chinese women with breast cancer", Medicine, 2019 Publication	<1 %
47	Taizan SHIRAKAWA. "Differential Impact of Family History on Age-Associated Increase in the Prevalence of Hypertension and Diabetes in Male Japanese Workers", Hypertension Research, 2006 Publication	<1 %
48	ore.exeter.ac.uk Internet Source	<1 %
49	repository.ribat.edu.sd Internet Source	<1 %

50	"Abstracts of the 78th Annual Scientific Meeting of the American Psychosomatic Society (scheduled for March 2020; cancelled due to the COVID-19 pandemic)", Psychosomatic Medicine, 2020 Publication	<1 %
51	academic.oup.com Internet Source	<1 %
52	edoc.pub Internet Source	<1 %
53	researchdirect.westernsydney.edu.au Internet Source	<1 %
54	www.medrxiv.org Internet Source	<1 %
55	Mejía Terrazas Gabriel Enrique. "Asociacion de polimorfismos en los genes TRPV1, DRD2, OPRM1, OPRK1, OPRD1, GCH1 y CACNG2 con dolor neuropático en población mexicana", TESIUNAM, 2022 Publication	<1 %
56	Mirella Vasquez Brooks. "Health-Related Hardiness and Chronic Illness: A Synthesis of Current Research", Nursing Forum, 7/2003 Publication	<1 %
57	Yoichi Nozato, Koichi Yamamoto, Hiromi Rakugi. "Hypertension management before	<1 %

and under the COVID-19 pandemic: lessons
and future directions", Hypertension
Research, 2023

Publication

58

amity.edu

Internet Source

<1 %

59

ispub.com

Internet Source

<1 %

60

pure.port.ac.uk

Internet Source

<1 %

61

researcharchive.vuw.ac.nz

Internet Source

<1 %

62

scholarworks.utep.edu

Internet Source

<1 %

63

www.hindawi.com

Internet Source

<1 %

64

Annah Rufu, Kudakwashe Chitindingu, Shakemore Chinofunga, Beatrice Dupwa, Owen Mugurungi. "Designing, Developing, pilot implementation and evaluation of a mobile android based tool to improve health outcomes in adolescents and young adults living with HIV: An Agile model Human-Centered Design Science three-phase Methodology.", Research Square Platform LLC, 2022

Publication

<1 %

65	Submitted to Herzing University Student Paper	<1 %
66	Paul Norman. "Health locus of control and health behaviour: An investigation into the role of health value and behaviour-specific efficacy beliefs", Personality and Individual Differences, 1995 Publication	<1 %
67	Straits, Bruce C.. "Social Research", Oxford University Press Publication	<1 %
68	apollolife.com Internet Source	<1 %
69	en.wikipedia.org Internet Source	<1 %
70	infodemiology.jmir.org Internet Source	<1 %
71	link.springer.com Internet Source	<1 %
72	topsecretapiaccess.dovepress.com Internet Source	<1 %
73	Submitted to Drexel University Student Paper	<1 %
74	Submitted to Salisbury University Student Paper	<1 %

75

ia800601.us.archive.org

Internet Source

<1 %

76

ijcrr.com

Internet Source

<1 %

77

www.pregnancy-info.net

Internet Source

<1 %

78

["Sleep Disorders in Neurology", Wiley, 2018](#)

Publication

<1 %

79

A. Badoux. "Social support in healthy and psychologically distressed French populations", *Psychology Health & Medicine*, 5/1/2000

Publication

<1 %

80

Jinkook Lee, Jenny Wilkens, Erik Meijer, T. V. Sekher, David E. Bloom, Peifeng Hu. "Hypertension awareness, treatment, and control and their association with healthcare access in the middle-aged and older Indian population: A nationwide cohort study", *PLOS Medicine*, 2022

Publication

<1 %

81

Patrizia Natale, Jia Yi Ni, David Martinez-Martin, Ayano Kelly et al. "Perspectives and Experiences of Self-monitoring of Blood Pressure Among Patients With Hypertension: A Systematic Review of Qualitative Studies", *American Journal of Hypertension*, 2023

<1 %

82

Son, SeungHee Claire, and Mieko Fuse Peterson. "Marital Status, Home Environments, and Family Strain: Complex Effects on Preschool Children's School Readiness Skills : Marital Status and School Readiness", Infant and Child Development, 2016.

Publication

<1 %

83

Submitted to Southern New Hampshire University - Continuing Education

Student Paper

<1 %

84

Submitted to University of Nottingham

Student Paper

<1 %

85

digital.library.unt.edu

Internet Source

<1 %

86

slideplayer.com

Internet Source

<1 %

87

theemeraldmagazine.com

Internet Source

<1 %

88

timesofindia.indiatimes.com

Internet Source

<1 %