

ASSOCIATED RISK FACTORS OF HYPERTENSION AMONG ADULTS AT
LIAQUAT UNIVERISTY HOSPITAL HYDERABAD: A DESCRIPTIVE
CROSS-SECTIONAL STUDY

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Abstract

Introduction: Hypertension (HTN) is a leading risk factor for cardiovascular, renal, and cerebrovascular diseases globally and poses a serious public health challenge in Pakistan. Despite its high prevalence, awareness, control, and treatment of hypertension remain suboptimal. This study aimed to assess the prevalence and associated risk factors of hypertension among adults at Liaquat Hospital, Jamshoro/Hyderabad.

Methodology: A cross-sectional study was conducted from May 1st to June 27th, 2025, in various wards of Liaquat Hospital. A total of 80 hypertensive adults aged 20 years and above were selected through non-probability convenience sampling. Data were collected using a structured questionnaire focusing on demographic details, behavioral patterns, family history, and lifestyle factors. Descriptive statistics were used for analysis.

Results: The majority of participants were males (73.8%), aged between 30–49 years (76.3%), uneducated (47.5%), unemployed (73.8%), and belonged to a low socioeconomic background (76.3%). Behavioral risk factors included current smoking (30%), physical inactivity (47.5%), saturated fat use (41.3%), and sleep difficulty (65%). A significant proportion (73.8%) had a family history of hypertension, primarily parental. Notably, 38.8% of participants were underweight, while 10% were overweight or obese.

Conclusion: Hypertension among adults in this setting is associated with a range of modifiable and non-modifiable risk factors. The findings highlight the urgent need for community-based interventions focusing on early screening, health education, and lifestyle modification, particularly among socioeconomically disadvantaged populations with limited health literacy.

INTRODUCTION

A medical condition known as hypertension is characterized by a persistent increase in systemic arterial pressure above a certain threshold number. European Society of Cardiology and European Society of Hypertension (ESC/ESH) defines hypertension at a BP greater than 140/90 mm Hg (Riaz., et al., 2021) Considered as the silent killer high arterial Blood Pressure (BP) is the greatest causative agent for the mortality involved in cardiovascular diseases, renal failure and stroke). The studies conducted on global burden of Hypertension (HTN) reported that 25% of adults are having HTN and 9.2 % of the total deaths are because of high BP related events (bilal., et al., 2016) Numerous illnesses are directly linked to hypertension, which can harm the heart, kidneys, brain, lungs, and is linked to eventual organ failure. (Ishtiaq., et al., 2017)

Age, gender, ethnicity, socioeconomic level, education, smoking, body mass index (BMI), and access to basic medical care and treatment are all associated with hypertension (HTN), Multiple studies have demonstrated that factors linked to elevated blood pressure and inadequate illness management include advanced age, smoking, low income, poor dietary practices, and the lack of access to basic medical care Another risk factor for HTN in Asians is diabetes. BP control with diabetes is a serious health issue sedentary lifestyle, obesity and increased salt intake also contribute towards increased BP. Along with antihypertensive drug therapy, lifestyle modification should be adopted in HTN treatment to achieve better outcomes.8-10 HTN is a risk factor for kidney disease. It is not only a cause but a consequence of kidney problem as well because kidneys play pivotal role in maintaining salt concentrations the in body. So, kidney-related issues are directly linked with HTN. The risk factors linked to HTN are not well understood. Thus, the goal of the current study was to investigate risk factors for hypertension, with a particular emphasis on how these factors relate to age, smoking, educational attainment, family history, diabetes, and renal illnesses.(mubarik., et al., 2019) Moreover, family members frequently share the genetic and environmental variables that increase an individual's risk of developing hypertension, thus it is important to take family history into account when determining

an individual's risk; children of parents with hypertension are more likely to get the condition themselves. Indeed, the largest risk factor for high blood pressure (BP) in children is a family history of hypertension (HTN) that appears before the age of 55. Furthermore, even grandparents with hypertension may be 10% at risk for their grandkids. According to earlier studies, there is a 30–50% genetic variance in blood pressure. (Nuryunarsih ., et al., 2024)

According to estimates, between 20% and 50% of adults worldwide suffer from hypertension, with over 7 million cases reported annually. Global statistics indicates that approximately 1 billion persons had HTN in 2000, and by 2025, that figure is expected to rise to approximately 1.56 billion. HTN in Pakistan is the most common health disorder suffered by people over 40 years of age. Based on Pakistan's National Health Survey Report, HTN affects 18% of all adults, rising to 33% for those aged over 45 years. The prevalence of HTN in Pakistan in those aged over 15 years is 18%, with prevalence in urban residents of 21.6% and rural residents of 16.2%. Around 70% of patients suffering from HTN are unaware of their disease; almost 5.5 million men and 5.3 million women suffer from HTN, but less than 3% of the population is aware of having hypertension (Nuryunarsih., et al., 2024).

Hypertension is increasing globally, with a 40% prevalence in adults aged 25+ in 2008. In Pakistan, particularly Punjab, the prevalence ranges from 18% to 49.2%. Key risk factors include age, BMI, smoking, and diet. Understanding these factors is crucial for developing effective prevention and management strategies to combat hypertension. (Rehman, M. A. U., et al, 2022). Non-communicable diseases (NCDs) are the leading cause of death worldwide, with cardiovascular diseases accounting for 44% of all NCD deaths and 31% of all global deaths. Hypertension (HTN) is a major risk factor, contributing to 54% of strokes and 47% of ischemic heart disease. Despite this, HTN control rates vary significantly, with 65% in Canada and a mere 6% in Pakistan, where HTN prevalence is high, affecting 12.2% of 18-34-year-olds and 50% of 55-75-year-olds. Furthermore, awareness and knowledge about HTN are limited in Pakistan, with only 0.8% having adequate knowledge, highlighting the need for

educational interventions to improve HTN control. (Nadeem, M.K., et al., 2019). Cardiovascular diseases are a leading cause of death globally, accounting for 17 million deaths annually, with hypertension being a major contributor, responsible for over 50% of these deaths. South Asian populations, including those from India, Pakistan, and Bangladesh, bear the highest burden of cardiovascular diseases, with risk factors such as hypertension, diabetes, and obesity developing at a relatively younger age. Furthermore, South Asian migrant populations, such as those living in the UAE, are at increased risk due to lifestyle transitions and exposure to environmental factors, highlighting the need for targeted interventions to address this growing health concern. (Shah, S. M., et al., 2019). Hypertension is a significant public health concern, affecting an estimated 1.13 billion people worldwide and associated with over 9 million deaths annually, with countries like China, India, and Indonesia having high prevalence rates. The condition is diagnosed by elevated systolic and diastolic blood pressure readings, with varying thresholds for adults and adolescents. Southeast Asian countries, such as Malaysia, Thailand, and the Philippines, are experiencing rapid modernisation and lifestyle changes, which have contributed to a high prevalence of hypertension, with about one-third of adults affected. Modifiable risk factors such as diet, physical activity, and obesity, as well as non-modifiable factors like family history and age, contribute to the development of hypertension, which is exacerbated by urbanisation and associated lifestyle changes. (Mohammed Nawi, A., et al., 2021). Hypertension affects 26.4% (972 million) of adults worldwide, projected to increase to 29.2% (1.56 billion) by 2025. The prevalence is higher in developing countries. In Nepal, community-based data is limited. This study aims to measure hypertension prevalence and risk factors in men and women, with a focus on adults ≥ 18 years. (Chataut, J., et al., 2021). Hypertension is a significant public health challenge, affecting 40% of adults in some African settings, with prevalence ranging from 8.46.4% in Nigeria, 47.5% in Cameroon, and 25.441.1% in Tanzania. In Ethiopia, where urbanization and lifestyle changes are expanding, hypertension is a critical issue, particularly among adults ≥ 18 years, prompting the need for research to determine its prevalence and associated

risk factors. (Anteneh, Z., et al., 2015). According to the 2002 National Nutrition and Health Survey (NNHS), the prevalence of hypertension in adults aged 18 years and above in China was 18.8%, with alarming statistics regarding the lack of awareness, treatment, and control. Only 30% of hypertensive individuals were aware of their condition, 25% were receiving treatment, and a mere 6% had their hypertension under control [2]. These figures highlight the substantial public health challenge posed by hypertension, which remains inadequately managed despite its known contribution to CVD (Yang, L., et al., 2016). Hypertension is a major public health problem worldwide, responsible for 9.4 million annual deaths and affecting 50% of cardiovascular diseases globally. The prevalence of hypertension is highest in the African Region (46%) and Middle Eastern countries, including Iraq (40.4%). Low-income countries have inadequate access to healthcare and awareness of hypertension, leading to high morbidity and mortality rates. This study aims to determine the prevalence of hypertension and associated risk factors among older adults in Erbil City, Kurdistan, Iraq. (Saka, M., et al., 2020). Hypertension (HTN) is a significant public health concern globally, affecting 40% of people over 25 years, with the World Health Organization attributing 7.6 million premature deaths to high blood pressure. HTN increases the risk of coronary artery disease, cardiovascular and cerebrovascular diseases, and is a major risk factor for stroke and ischemic heart disease. The prevalence of HTN is particularly high in low- and middle-income countries, including India, where it is projected to rise alarmingly. In response, the Indian Government has launched programs for prevention and control of HTN, but reliable data on its prevalence and risk factors is scarce, highlighting the need for studies like this one, which aims to determine the prevalence of HTN and its risk factors in a rural area in Delhi. (Kishore, J., et al., 2016). Hypertension (HTN) is a major public health challenge worldwide, accounting for one out of eight mortalities globally. The prevalence of HTN has risen, affecting nearly one-third of the adult world population (31.1%, 1.39 billion), with two-thirds living in low- and middle-income countries. The Gulf countries, including Dubai, have seen rising trends of HTN due to rapid economic development,

urbanization, and lifestyle changes. This study aims to measure the prevalence of HTN and pre-hypertension among Dubai's adult population and identify associated sociodemographic characteristics, behavioral risk factors, and comorbidities. (Mamdouh, H.,2022). Hypertension is the leading risk factor for death and disability globally, disproportionately affecting low- and middle-income countries. It's the major cause of cardiovascular diseases, stroke, and heart failure, and a leading risk factor for fetal and maternal deaths, dementia, and renal failure. The prevalence of hypertension is increasing globally, predicted to affect over 500 million people by 2025. In Bangladesh, hypertension is a growing concern, with a prevalence of 13.7-34% among adults, and an increasing trend in urban areas. This study aims to determine the prevalence of risk factors for hypertension in an urban area in Dhaka, Bangladesh.

OBJECTIVES

1. To describe the demographic and clinical characteristics of adults with known

RESULTS

Table # 01

AGE DISTRIBUTION

Age Groups	Frequency	Percent
20-29 years	7	8.8
30-39 years	35	43.8
40-49 years	26	32.5
> 50 years	12	15.0
Total	80	100.0

The majority of participants (43.8%) were aged 30–39 years, followed by 32.5% in the 40–49 years group. Only 15% were above 50 years, while the youngest group (20–29 years) comprised 8.8% of the sample.

hypertension attending Liaquat Hospital Jamshoro/Hyderabad.

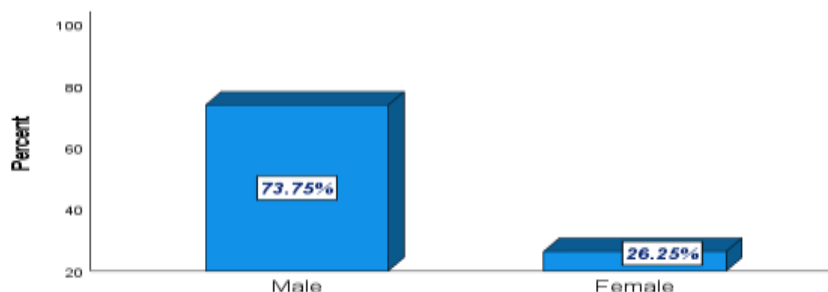
2. To identify and analyze the associated risk factors contributing to hypertension among these hypertensive adults.

MATERIAL AND METHOD

A descriptive cross-sectional study was conducted from May 1st to June 27, 2025, at Liaquat Hospital Jamshoro Sindh Pakistan. This study aimed to identify the associated risk factors of hypertension among adults. The target population comprised known cases of hypertension based on their medical history and self-reported criteria. The study area included all ward in hospital where known case of hypertension cases was found from which 80 participants were selected according to 100 population size, the sample size was collected through raosoft software using 95% confidence interval, 5% margin of error. A convenient sampling technique was used to collect the data.

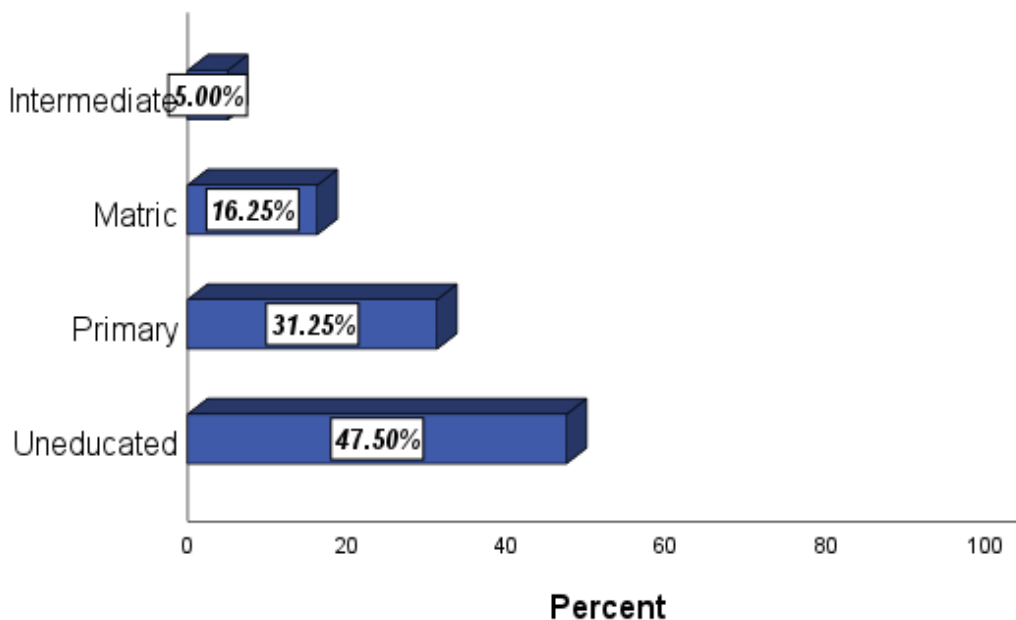
This shows that most participants were middle-aged adults, which is relevant given the age-related risk of hypertension.

GRAPH # 01: GENDER DISTRIBUTION



The majority of the study participants were male (73.75%), while females accounted for only 26.25% of the sample. This indicates a male-dominated study population, which may influence the interpretation of hypertension prevalence and associated risk factors by gender.

GRAPH # 02: EDUCATION LEVEL



Nearly half of the participants (47.5%) were uneducated, followed by 31.25% who had received primary education. Only 16.25% had studied up to matric level, and just 5% had intermediate education. This indicates that a

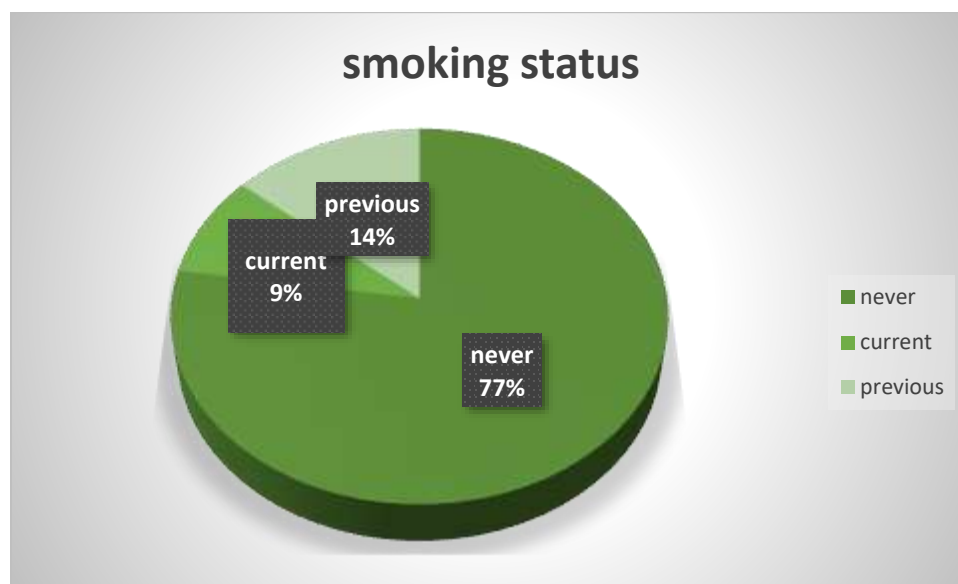
significant proportion of the study population had **low educational attainment**, which could be a contributing factor to the **risk and awareness levels of hypertension**.

Table # 02
SOCIOECONOMIC STATUS

Socioeconomic Status	Frequency	Percent
Low	61	76.3
Middle	19	23.8
Total	80	100.0

The majority of participants (76.3%) belonged to the low socioeconomic group, while only 23.8% were from the middle-income group. This suggests that most individuals in the study came from economically disadvantaged backgrounds, which may influence their access to healthcare and increase their vulnerability to hypertension.

Graph # 03



The majority of participants (77%) reported that they had never smoked, while 14% were previous smokers and 9% were current smokers. This indicates that **smoking was relatively uncommon** among the study population, although the presence of current and former smokers may still contribute to **hypertension risk** in a subset of participants.

TABLE # 03 SLEEPING ISSUES

A majority of participants (65%) reported experiencing sleeping issues, while 35% did not. This suggests that **sleep disturbances are common** in the study population and could be a potential **contributing factor to hypertension**, as poor sleep is known to affect blood pressure regulation.

TABLE # 04: ALCOHOL USE

Alcohol Use	Frequency	Percent
Never	62	77.5
Currently	7	8.8
Previous	11	13.8
Total	80	100.0

Most participants (77.5%) reported never consuming alcohol, while 13.8% were previous users and 8.8% were current users. This indicates that **alcohol consumption is relatively low** in the study population, though the presence of current and former users may still be relevant when examining its association with hypertension.

TABLE # 05: BMI STATUS

BMI	Frequency	Percent
Underweight	31	38.8
Normal	41	51.2
Overweight	6	7.5
Obese	2	2.5
Total	80	100.0

Among the participants, 51.2% had a normal BMI, while 38.8% were underweight. A smaller proportion were overweight (7.5%) or obese (2.5%). This indicates that the majority of the study population had normal or below-normal body weight, which may influence the patterns of hypertension observed.

Sleeping Issues	Frequency	Percent
Yes	52	65.0
No	28	35.0
Total	80	100.0

TABLE # 06: FAMILY HISTORY OF HTN

Family History	Frequency	Percent
Yes	55	68.8
No	25	31.3
Total	80	100.0

A majority of participants (68.8%) reported a positive family history of hypertension, while 31.3% had no such history. This suggests that **family history is a significant factor** among the study population and may contribute to the prevalence of hypertension.

DISCUSSION

The data reveals that the majority of respondents are aged between 30-49 years (76.3%), with the highest frequency in the 30-39-year range (43.8%). This finding is consistent with prior studies indicating that hypertension prevalence tends to increase from early

adulthood and peaks in middle age (Mills et al., 2020). A study conducted in urban Pakistan found the highest HTN prevalence among individuals aged 35-54 years, suggesting that this group should be prioritized for early screening and lifestyle interventions (Jafar et al., 2013). Another study from

Bangladesh reported that adults over 30 years have a significantly higher likelihood of being hypertensive (Rahman et al., 2015), supporting the association found in this dataset.

In this sample, males constitute 73.8% of the participants, which may reflect gender-related access patterns or cultural preferences in health participation. Globally, men are generally at higher risk of developing hypertension at earlier ages compared to women (Kearney et al., 2005). Research conducted in Karachi showed a higher prevalence of uncontrolled hypertension among men due to behavioral risk factors like tobacco use and sedentary lifestyle (Jafar et al., 2006). Similarly, a large-scale WHO study found significant gender differences in awareness, treatment, and control of HTN, with men often lagging behind (NCD Risk Factor Collaboration, 2017).

Nearly half of the sample (47.5%) is uneducated, while only 5% have completed intermediate education. Education is a well-established determinant of hypertension awareness and control. Individuals with low education levels are more likely to have poor knowledge of HTN and its complications (Zafar et al., 2017). In a national health survey in Pakistan, low literacy was associated with poor adherence to antihypertensive medication and lack of lifestyle modification (Nisar et al., 2015). Moreover, a study in India also identified low education as a barrier to hypertension control due to reduced health literacy (Anchala et al., 2014).

Low socioeconomic status (SES) dominates this sample (76.3%). Low SES has consistently been linked with higher HTN prevalence and poorer treatment outcomes (Braveman et al., 2010). In Pakistan, economic hardship limits access to medications and healthy foods, both of which are crucial for HTN control (Zafar et al., 2017). A systematic review confirmed that income inequality and financial insecurity significantly contribute to hypertension, especially in low- and middle-income countries (Addo et al., 2012).

Current smokers make up 30% of participants. Tobacco use is a well-known modifiable risk factor for hypertension and cardiovascular disease (Chow et al., 2013). According to the Global Adult Tobacco Survey (GATS), smoking prevalence in Pakistani males remains high and is associated with elevated systolic

and diastolic blood pressure (Nasir et al., 2015). Another study found that smoking combined with physical inactivity greatly increased HTN incidence among urban poor in Pakistan (Jafar et al., 2005).

More than half (65%) report sleep difficulties. Sleep disturbances are increasingly recognized as contributors to elevated blood pressure due to sympathetic nervous system activation (Palagini et al., 2013). A study in Karachi found that self-reported poor sleep was associated with a higher risk of hypertension among adults aged 30–60 years (Zahid et al., 2021). Moreover, insomnia and sleep apnea have been independently associated with poor BP control in hypertensive patients (Gottlieb et al., 2017). Only 8.8% are current users, likely reflecting religious norms against alcohol. Nonetheless, alcohol consumption remains a relevant risk factor for hypertension. Even moderate alcohol intake has been shown to raise blood pressure levels (Roerecke et al., 2018). While low consumption is reported in this sample, hidden or under-reported use may still pose risks. Studies from urban Pakistan also warn of alcohol misuse among certain high-risk groups, despite religious prohibitions (Khan et al., 2016).

About half (51.2%) report being physically active, while 47.5% are inactive. Physical inactivity is a major risk factor for hypertension (Booth et al., 2012). Research in South Asian communities has emphasized the importance of culturally tailored interventions to increase activity levels (Misra et al., 2011). A Pakistani study also found that hypertensive patients who exercised regularly were more likely to achieve BP control compared to sedentary individuals (Fatima et al., 2019).

While 51.2% have a normal BMI, 38.8% are underweight. This contrasts with typical HTN profiles where overweight and obesity are common. However, underweight individuals may suffer from nutritional deficiencies, which are also linked to poor cardiovascular health (WHO, 2021). In Pakistan, a "double burden" of malnutrition is often reported, where underweight and hypertension coexist due to poor-quality diets (Ali et al., 2017). Only 10% are overweight or obese, but this group remains at higher risk for hypertension-related complications (Mills et al., 2020).

A significant 73.8% report a family history of hypertension, a major non-modifiable risk factor.

Studies have demonstrated that individuals with a positive family history are twice as likely to develop hypertension (Ehret & Caulfield, 2013). Pakistani cohort studies affirm that early screening should be prioritized in individuals with a parental history of high BP (Zafar et al., 2017).

Most participants identified parents (68.8%) as having hypertension, compared to siblings (31.3%). Parental history is strongly predictive of future hypertension onset due to shared genetic and lifestyle factors (Kearney et al., 2005). Research from Karachi also found that early-onset parental hypertension increased the risk of pre-hypertension in young adults (Jafar et al., 2006).

CONCLUSION

The descriptive analysis of the study population highlights critical sociodemographic, behavioral, and health-related characteristics that are deeply interlinked with hypertension risk. The majority of participants were middle-aged, male, married, unemployed, and from low socioeconomic backgrounds, with limited educational attainment—factors that have consistently been associated with a heightened risk of developing and poorly managing hypertension (Jafar et al., 2006; Mills et al., 2020). The high proportion of participants reporting a family history of hypertension (73.8%) and sleep difficulties (65%) further underscores the importance of early screening and intervention strategies. Behavioral risk factors such as smoking (30%), physical inactivity (47.5%), and the use of saturated fats (41.3%) remain prominent concerns. Despite a promising proportion using unsaturated fats and reporting physical activity, these patterns suggest a significant segment of the population remains at risk due to modifiable lifestyle choices. Additionally, the high rate of underweight individuals (38.8%) points toward underlying nutritional deficiencies or comorbid conditions that must not be overlooked in hypertension management efforts. Overall, the findings reinforce the need for integrated, culturally-sensitive health promotion strategies that address not only individual behaviors but also the broader social determinants of health. Health education, community-based screening, and targeted lifestyle interventions—especially for those with a family history of hypertension—are essential. Interventions must also prioritize equitable access to

healthcare resources and consider the sociocultural context to effectively reduce the burden of hypertension in vulnerable populations.

REFERENCES:

- Nuryunarsih, D., Wahyuningsih, H. P., Rauf, S., Zaidan, M., & Herawati, L. (2024). Utilizing an apriori algorithm to examine attributes associated with hypertension and hypertension cardiovascular patients in Pakistan. *Journal of Medical Artificial Intelligence*, 7, 34-34. <https://doi.org/10.21037/jmai-24-15>
- Bilal, M., Haseeb, A., Lashkerwala, S. S., Zahid, I., Siddiq, K., Saad, M., Dar, M. I., Arshad, M. H., Shahnawaz, W., Ahmed, B., & Yaqub, A. (2015). Knowledge, awareness and self-care practices of hypertension among cardiac hypertensive patients. *Global Journal of Health Science*, 8(2). <https://doi.org/10.5539/gjhs.v8n2p9>
- Ishtiaq, S., Ilyas U., Naz, S., Altaf R., Afzaal, H., Muhammad, S., Zaman, S., Imran, M., Ali, F., Sohail, F., & Muhammad, S. (2017). Introduction Assessment of the risk factors of hypertension among adult elderly group in twin cities of Pakistan https://www.researchgate.net/publication/320408020_Introduction_Assessment_of_the_risk_factors_of_hypertension_among_adult_elderly_group_in_twin_cities_of_Pakistan
- Mubarik, S., Malik, S. S., Mubarak, R., Gilani, M., & Masood, N. (2019). Hypertension associated risk factors in Pakistan: A multifactorial case-control study. *JPMA. The Journal of the Pakistan Medical Association*, 69(8), 1070-1073.
- Tariq, M., Din, M. A. U., Mustafa, Z. U., Rana, S. A., Kazmi, R., Qamar, A., Ahmed, M., & Abbas, K. (2023). Assessment of the Risk Factors of Hypertension Among Adults in Pakistan. *Pakistan Armed Forces Medical Journal*, 73(November), S119-S123. <https://doi.org/10.51253/pafmj.v73iSUPPL-1.3910>

- adults in southern China, 2013. *PLOS ONE*, 11(1), e0146181. <https://doi.org/10.1371/journal.pone.0146181>
- Saka, M., Shabu, S., & Shabila, N. (2020). Prevalence of hypertension and associated risk factors in older adults in Kurdistan, Iraq. *Eastern Mediterranean Health Journal*, 26(3), 268-275. <https://doi.org/10.26719/emhj.19.029>
- Kishore, J., Gupta, N., Kohli, C., & Kumar, N. (2016). Prevalence of hypertension and determination of its risk factors in rural Delhi. *International Journal of Hypertension*, 2016, 1-6. <https://doi.org/10.1155/2016/7962595>
- Mamdouh, H., Alnakhi, W. K., Hussain, H. Y., Ibrahim, G. M., Hussein, A., Mahmoud, I., Alawadi, F., Hassanein, M., Abdullatif, M., AlAbady, K., Farooq, S., & Sulaiman, N. (2022). undefined. *BMC Cardiovascular Disorders*, 22(1). <https://doi.org/10.1186/s12872-022-02457-4>
- Islam, S. M., Mainuddin, A., Islam, M. S., Karim, M. A., Mou, S. Z., Arefin, S., & Chowdhury, K. N. (2015). Prevalence of risk factors for hypertension: A cross-sectional study in an urban area of Bangladesh. *Global Cardiology Science and Practice*, 2015(4), <https://doi.org/10.5339/gcsp.2015.43>
- Anchala, R., Kannuri, N. K., Pant, H., Khan, H., Franco, O. H., Di Angelantonio, E., & Prabhakaran, D. (2014). Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control. *Journal of Hypertension*, 32(6), 1170-1177. <https://doi.org/10.1097/HJH.00000000000000146>
- Asif, M., Aftab, R., & Saleem, S. (2020). Association of cooking oil/fat type with hypertension: A study in Lahore. *Pakistan Journal of Nutrition*, 19(1), 50-56.
- Chow, C. K., Teo, K. K., Rangarajan, S., et al. (2013). Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. *JAMA*, 310(9), 959-968.
- Ehret, G. B., & Caulfield, M. J. (2013). Genetics of hypertension. *The Lancet*, 381(9878), 901-911.
- Jafar, T. H., Levey, A. S., White, F. M., Gul, A., Jessani, S., Khan, A. Q., & Chaturvedi, N. (2003). Ethnic differences and determinants of diabetes and central obesity among South Asians of Pakistan. *Diabet Med*, 21(7), 716-723.
- Mills, K. T., Stefanescu, A., & He, J. (2020). The global epidemiology of hypertension. *Nature Reviews Nephrology*, 16(4), 223-237.
- Nisar, N., Qadri, M. H., & Fatima, K. (2015). Hypertension knowledge, awareness and compliance among hypertensive patients attending out-patient clinics of tertiary hospitals in Karachi. *J Ayub Med Coll Abbottabad*, 27(1), 164-167.
- Zafar, S. Y., Rehman, S. U., & Qureshi, R. (2017). Family history and knowledge as predictors of hypertension in Pakistani population. *Journal of Ayub Medical College*, 29(3), 423-428.