Frequency of Hypertension and its Associated Risk Factors in Hunza, Gojal

PROGRAM

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Abstract

Acceptance of hypertension as a significant community health concern that significantly reduces quality of life and contributes to cardiovascular morbidity and mortality is gradually gaining acceptance in Pakistan. Localized studies are essential in effective prevention planning since communities living at high altitudes such as Hunza Gojal can possess particular demographic, lifestyle, health associated variables and mental state that determine their hypertension proneness. The aim of this study was to determine the prevalence of hypertension among the adult population living in Hunza Gojal and also to examine the demographic, behavioral, and mental health determinants that are associated with the same. A cross-sectional study on convenience sampling selected 340 participants between 25 years and above. The data regarding sociodemographic characteristics, lifestyle, mental health indicators, and clinical history were collected via the structured questionnaire. After that, a descriptive and chi-square analysis were conducted. The findings indicated that 43.6 percent of the population self-reported having hypertension. Correlations between age (p=0.001), marital status (p=0.001), occupation (p=0.012), family history of hypertension (p=0.002), the level of physical activity (p=0.000), weight (p=0.001), height (p=0.046), anxiety (p=0.001), difficulty controlling anger (p=0.000), and mental fatigue were statistically significant (p=0.011). The comorbidities were diabetes, high cholesterol, and headaches that appeared to be common implying that chronic cases were high in the community. Screening in communities, customary health education, psychological assistance, and culture-sensitive interventions are among the most urgent requirements to lower the number of complications on hypertension and cardiovascular health in Hunza Gojal. These results demonstrate the combined effect of physical inactivity, psychosocial stressors, and demographic characteristics on the risk of hypertension.

Key words: *Prevalence, Mental, Psychological, Demographic, And Hypertension*.

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CHAPTER ONE

INTRODUCTION

1.1.1 Background of the Study

High blood pressure, or hypertension, is a significant non communicable disease that has been linked to a high rate of morbidity and mortality worldwide. Because it is a significant risk factor for heart failure, stroke, cardiovascular disease, and kidney dysfunction, it is given priority in global public health initiatives (World Health Organization [WHO], 2023). Approximately two-thirds of the 1.28 billion adults worldwide between the ages of 30 and 79 who have hypertension live in low- and middle-income countries, where access to diagnostic and preventative services is frequently insufficient (WHO, 2023). Hypertension is a very significant global issue which is determined by a multitude of factors such as old age, urbanization, sedentary lifestyle, and dietary shifts such as high eating of processed, sweetened, salty foods (Mills et al., 2020). Hypertension is a silent killer, as it does not show any symptoms until it leads to one of the following results of the heart attack, stroke, kidney failure, or blindness (Ferdinand & Nasser, 2017). This hidden course, poor screening levels, lack of knowledge and adherence to antihypertensive treatment has a bad effect on the overall health of the population. The detailed understanding of the local and population-specific risk factors is necessary to tackle the problem and develop the targeted preventative and intervention measures.

High blood pressure has proved to be a significant problem in Pakistan. It is estimated in Pakistan that hypertension is higher than normal in 33-46% of adults, which makes it one of the countries with the highest prevalence of hypertension in the South Asian region (Tareen et al., 2020). The condition affects more individuals aged above 40 due to sedentary lifestyle, metabolic modifications and aging of the vessels (Jafar et al., 2018). It is either caused by lifestyle habits, like eating too much salt, being overweight, not walking, and changing the diet towards consuming more fast food and processed food (Rizwan et al., 2019). Poor access to medical services, late diagnosis, and the general population are also among the factors that contribute to the clinical burden of hypertension in the country (Jafar et al., 2018). Topography and social factors may affect the results of health when compared to urban and low-altitude regions like Gilgit-Baltistan in northern Pakistan differently. Low prevalence of chronic illnesses in the past exists among Hunza communities and other communities of

Gilgit-Baltistan, who are active, eat natural and locally available foods, and have little exposure to industrialized food (Hussain et al., 2018; Berk, 2019). The traditional Hunza diet consisting of fruits, vegetables, whole grains, and apricots was considered to contribute to the prolongation of life as well as a decrease in hypertension along with an abundance of physical activity and minimal consumption of processed food versions (Berk, 2019).

These protective lifestyle habits are however changing with the current socioeconomic changes. These changes consist of better road connectivity, commercialization, patented and energy-unfriendly food, office employment, and contemporary requirements linked to work and education, making the health environment in Hunza be different (Khan et al., 2021). The changes can produce more people who may be at risk because of noncommunicable diseases, such as diabetes, high blood pressure, and cardiovascular disease. Hunza subdivision of Gojal that is found above 2500 meters above sea level offers a perfect location to study hypertension. Environmental factors which could have variable impacts on cardiovascular physiology in comparison to low-altitude populations include hypoxia, cold climate and heavy physical activities (Shen et al., 2017). Although a few of the studies indicate that high-altitude residents can undergo physiological adjustments like enhanced oxygenation usage and vascular expansion, others indicate that high-altitude residents can also have elevated blood viscosity, oxidative stress, and sympathetic activation, which predisposes them to hypertension (Sherpa et al., 2020; Julian et al., 2018). All these adaptations, combined with the modifications in the contemporary way of life, accentuate the importance of context-specific study of high-altitude people.

Numerous factors, both modifiable and unmodifiable, interact intricately to cause hypertension. Non-modifiable factors that affect risk throughout life include age, gender, genetic predispositions, and family history (Carey et al., 2018; Fox et al., 2017). Due to progressive arterial stiffness and endothelial dysfunction, age in particular is a strong predictor; however, gender differences indicate a higher frequency among men at younger ages and postmenopausal women later in life (Mills et al., 2020).

Excessive salt intake, obesity, sedentary lifestyles, smoking, stress, and poor eating habits are among the controllable factors.Traditional cooking methods in the majority of Pakistan's rural areas necessitate a high level of salt consumption, which is one of the main causes of high blood pressure in the world's population (He et al., 2020; Rizwan et al., 2019). Obesity raises the risk of hypertension, metabolic issues, and vascular resistance (Jafari et al., 2021).

Physical inactivity is a result of modernization and mechanization, which lowers cardiac efficiency and causes metabolic dysfunction (Hegde & Solomon, 2015). Smoking, stress, and insufficient mental health support are behavioral and psychosocial factors that increase the risk of hypertension (Ferdinand and Nasser, 2017; Sparrenberger et al., 2019).

1.2 Problem Statement

Although hypertension is becoming more common in Pakistan, little is known about its causes and incidence in Gojal, Hunza. Although there hasn't been much thorough research done in this high-altitude community, changes in lifestyle, increased salt consumption, decreased physical activity, modernization, and stress may all be factors in hypertension.

1.3 Objectives

- To find out the frequency of hypertension among adults in Gojal, Hunza.
- To determine the health-related variables, psychological and lifestyle factors linked to hypertension in this population.

1.4 Research Questions

- How common is hypertension among adults in Gojal, Hunza?
- Which lifestyle, health-related variables, and psychological factors are important predictors of hypertension?

1.6 Research Gap

There are significant gaps in our knowledge of the prevalence and contributing factors of hypertension in high-altitude communities like Gojal and Hunza, despite the fact that the majority of previous research has concentrated on urban populations or low-altitude areas. Previous research indicates that residents of Gilgit-Baltistan have historically benefited from protective lifestyle factors, such as increased physical activity and consumption of natural foods, which have decreased the prevalence of chronic illness. However, patterns of illness may have been impacted by recent dietary and socioeconomic changes, such as easier access to processed foods, less exercise, and more psychological stress. Despite these advancements, there is a lack of empirical information about how changing environmental factors and lifestyle choices affect the risk of hypertension in this region.

Furthermore, little is known about how mental health issues like stress, anxiety, and emotional control affect cardiovascular health, particularly in high-altitude populations where environmental stressors like hypoxia may have an even bigger effect. Traditional risk factors like age, obesity, and high salt intake have been found in a number of studies carried out in

Pakistan. In the context of Gojal, where distinct cultural and environmental features may result in distinct risk profiles, the combined effects of lifestyle, psychosocial, and demographic factors have also not been thoroughly investigated. Policymakers find it difficult to create interventions for this community because Hunza and its subdivisions lack region-specific data from recent national surveys. Thus, this study closes a major gap and advances our knowledge of the risk of hypertension in high-altitude communities undergoing rapid lifestyle changes by providing population-specific data on hypertension prevalence and multifactorial determinants in Gojal, Hunza.

1.5 Significance of the Study

The significance of this work lies in the information it provides about hypertension in Gojal, Hunza, which has been largely overlooked by national health studies. Even though hypertension is commonly recognized as one of the key issues of concern in the Pakistani population, there exists limited information regarding the prevalence of hypertension and other risk factors in high-altitude people experiencing specific environmental, cultural, and lifestyle barriers. This research fills a large knowledge gap regarding the occurring changes in health profile of the region by determining how prevalent hypertension was in the area and determining which lifestyle, health-related, psychological, and demographic risk factors. These findings will aid lawmakers, as well as health authorities and local institutions in developing more culturally specific interventions to mitigate the potential threat of hypertension. They may consist of screening programs carried out within communities, health education campaigns, lifestyle change programs and mental health services that are specifically tailored to isolated mountain communities. The study additionally gives the baseline data that could be used to guide the resource allocation, enhance the planning of the public health in Gilgit-Baltistan and inform future research.

Comprehensively, this research will help this country in the broader goal of reducing non communicable diseases, which will eventually translate to cardiovascular diseases and wellbeing of adults in Gojal, Hunza, as the study will offer contextual factors based on an under-researched population.

CHAPTER TWO

LITERATURE REVIEW

Hypertension is a complex chronic disease that is one of the major public health concerns in the world in the twenty-first century. It is also often called a silent yet progressive situation as it is not observed in the first stages of its course and may lead to significant issues such as stroke, myocardial infarction, renal failure, and premature death (Whelton et al. 2018). Demographic, socioeconomic, lifestyle, environmental, and genetic factors have been noted to have a close relationship with epidemiological patterns, causes, and outcomes of hypertension in most groups. Still focusing on mountain or high altitude dwellers such as Gojal, Hunza, this chapter reviews the scientific literature on prevalence, causes and other attributes of hypertension nationally and internationally.

2.1 Global Trends and Epidemiology of Hypertension.

Nearly two-thirds of the 1.28 billion individuals globally with hypertension reside in low- and middle-income nations, and many of them are not getting appropriate treatment, or appropriate care, especially in early-stage identification, continuous observation, and appropriate treatment (World Health Organization [WHO], 2023). The increase in hypertension across the globe is associated with rapid urbanization, changes in food habits to processed foods, aging, and obesity as well as the reduction in physically exertional activity (Mills et al., 2020). Stanaway et al. (2018) note that uncontrolled hypertension is the principal modifiable cardiovascular mortality risk factor that causes about 8.5 million deaths annually.

According to research, the disparity between the developed and developing nations is growing. Due to the improvement of screening, health education, and treatment, the prevalence of hypertension in the high-income countries has decreased. The infection is becoming more common and has a decreasing control rate among the poor countries especially in South Asia and Africa (Zhou et al., 2021). This global development supports the importance of understanding local determinants especially in remote locations such as Gojal where the surroundings, lifestyle, health care, and determinants of health of the population vary with that of the urban and low alterations.

2.2 Hypertension in Low and Middle-Income Countries.

Nutritional and demographic shifts have been associated with a swift rise in prevalence of hypertension in low- and middle-income countries (LMICs). LMIC studies have identified numerous problems, such as the low compliance with antihypertensive drugs, late presentation, lack of knowledge, and inadequate access to treatment (Adeloye et al., 2015). Social determinants of health that increase the prevalence of hypertension and contribute to its complications are low socioeconomic status, low educational levels, and lack of access to nutrient-rich foods (Bloom et al. 2019).

Moreover, consuming more energy dense foods puts the individuals in low and middle income nations at risk of obesity, metabolic syndrome, and high blood pressure. The traditional hard labor has been replaced by sedentary jobs that increase blood pressure (Misra & Khurana, 2017). These LMIC studies present comparative data similar to those examined by Gojal since Gojal is undergoing the same changes in lifestyle.

2.3 Prevalence and Burden of Hypertension in Pakistan.

Hypertension is a major problem in Pakistan and all of South Asia. According to national research, between 33 and 46 percent of adults over the age of 18 have hypertension; the prevalence is significantly higher in adults over 40 (Tareen et al., 2020). According to Jafar et al. (2018), hypertension is a significant cause of cardiovascular morbidity in Pakistan which has caused about 240,000 deaths annually.

There are inequalities in the urban and rural regions. Its prevalence is more extensive in urban residents due to their lifestyles such as obesity, lack of physical activity, and salt diets (Rizwan et al., 2019). However, hypertension is suddenly rising in rural rural regions, even in the north mountainous regions, due to urbanization, change in diet and low intensity in lifestyle. (Khattak et al., 2021).

2.4 Hypertension in Gilgit-Baltistan and Adjacent Regions.

It is unique to Gilgit-Baltistan as it is characterized by high altitudes, harsh weather, and a social culture that has historically supported healthy living. Not much has been researched on hypertension in this region. It was in the Ghizar district that one of the earliest studies to prove a predominance of approximately 14-percent and a steep rise in prevalence by the aged

population, was conducted (Shah et al., 2001). A large correlation existed between a favorable family history, age, and body mass index (BMI).

The last studies demonstrate the increases of hypertension in Gilgit-Baltistan due to the dietary shifts, the increased access to the food market and the decline in the influence of traditional agrarian activities (Hussain et al., 2018). In addition, it was also reported that in the high Hunza villages, including Gojal, people were more dependent on packaged and processed foods, which caused higher intake of calories and salt due to the more accessible roads and trade routes (Khan et al., 2021). On the one hand, regardless of these events, there are not a lot of extensive investigations on hypertension in Gojal, which underlines the gap that is crucial to the existence of this study.

2.5 Hypertension Determinants.

Hypertension is caused by a variety of factors. Socioeconomic, clinical, behavioral, psychosocial, environmental, and demographic factors can be used to broadly classify them.

2.5.1 Demographic Determinants

Age

One of the most well-known markers of hypertension is age. Extensive epidemiological studies consistently demonstrate a linear increase in blood pressure with aging due to arterial stiffness, endothelial dysfunction, and cumulative lifetime exposure to lifestyle risk factors (Whelton et al., 2018). Research from South Asian nations like Pakistan has shown that people over 40 are much more vulnerable (Tareen et al., 2020).

Gender

Due to hormonal changes in vascular elasticity, women's hypertension rates sharply increase after menopause, while men typically have higher rates at earlier ages (Mills et al., 2020). Several populations in LMICs have shown this gender trend.

Family Background

Genetic predisposition is a significant non-modifiable predictor of hypertension. The likelihood of having hypertension is two to four times higher in those whose parents have it (Fox et al., 2017). Common environmental and behavioral patterns increase this risk even more.

2.5.2 Lifestyle and Behavior Factors.

Lifestyle factors are among the most important modifiable determinants of hypertension.

Salt intake

Reducing salt intake dramatically lowers systolic and diastolic blood pressure, according to multiple clinical studies. Sodium intake is directly linked to high blood pressure (He et al., 2020). Pakistan's average daily sodium consumption is 10–12 grams, which is more than twice the WHO's recommended range (Rizwan et al., 2019). One of the main causes of Gojal is the hilly region, salted foods (pickles, dried meats), and sodium consumption.

Food Habits

The replacement of traditional foods with processed foods, sweet drinks, and refined grains has contributed significantly to the rise in hypertension (Popkin et al., 2020). Although Hunza diets used to be protective, recent dietary changes may make them more susceptible (Hussain et al., 2018).

Physical Inactivity

Sedentary lifestyles are closely associated with hypertension due to rising obesity, low cardiovascular fitness, and metabolic dysfunction (Hegde & Solomon, 2015). Gojal's automation and reduced reliance on agriculture could lead to inactivity.

Body Mass Index (BMI) and Obesity

One of the main causes is obesity, particularly central obesity. According to the study, excess fat leads to hormonal imbalance and vascular system resistance, both of which raise blood pressure (Jafari et al., 2021). It is pertinent because obesity is on the rise in Gilgit-Baltistan.

Smoking

Smoking accelerates endothelial deterioration and artery stiffening. Smokers are far more likely to develop hypertension than non-smokers (Ferdinand & Nasser, 2017). Smoking is becoming more popular among young people, despite the fact that it is less common in some parts of the north.

Drinking Alcohol

Due to cultural beliefs, alcohol consumption is less common in Pakistan; however, even infrequent use is associated with an increased risk of hypertension due to sympathetic stimulation and vasoconstriction (Oparil et al., 2018).

2.5.3 health-relatedHealth related variables: Determinants

Diabetes

Diabetes and hypertension frequently coexist. According to Zhang et al. (2020), hyperglycemia causes vascular stiffness and inflammation, which raises blood pressure. Studies have shown a strong correlation between Pakistan and nearby high-altitude regions.

Renal Disease

The kidneys use fluid balance to regulate blood pressure. Due to hormonal imbalance and sodium retention, kidney disease raises blood pressure (Oparil et al., 2018).

Dyslipidemia

Atherosclerosis and artery constriction are linked to high cholesterol, which increases the risk of hypertension (Carey et al., 2018).

2.5.4 Psychosocial Factors

One of the main, but poorly studied, causes of hypertension is psychosocial stress.

Prolonged Stress

Long-term stress increases cortisol levels and triggers the sympathetic nervous system, which results in a continuous increase in blood pressure (Sparrenberger et al., 2019). People who live in mountainous areas may encounter difficulties because of social expectations, migration, bad weather, and economic worries.

Depression and Anxiety

Mental health conditions such as anxiety and depression have been linked to behavioral factors and physiological arousal, which can lead to high levels of hypertension (Hildrum et al., 2011).

2.6 Environmental Factors: Effect of High Altitude.

Blood pressure is affected by high-altitude conditions, which vary depending on location and adaptation.

Other studies have shown that high altitude increases blood pressure due to a sympathetic response mediated by hypoxia (Shen et al., 2017). On the other hand, physiological adaptations like vasodilation and high capillary density may prevent hypertension in long-term high-altitude residents (Julian et al. 2018). People who live above 2500 meters have distinct cardiac adaptations that are not present in people who live at lower elevations, according to Sherpa et al. (2020).

2.7 Hypertension and High and Mountain Population.

Reports by the researchers of Nepal, Bhutan, Tibet, and north India reveal that the degree of hypertension among individuals in high altitudes has a wide range of variation. Cases of reduced prevalence with altitude due to traditional diets and active lifestyles have been reported (Moore et al., 2018). According to other studies, cold weather, high-salt diet, and the stress of difficult living conditions are all the factors that increase the risk of hypertension (Sherpa et al., 2020). These contradictory findings retrieve the relevance of regional studies. These places have similarity with Gojal in terms of height, temperature and changing their lifestyle hence a comparative literature would help it.

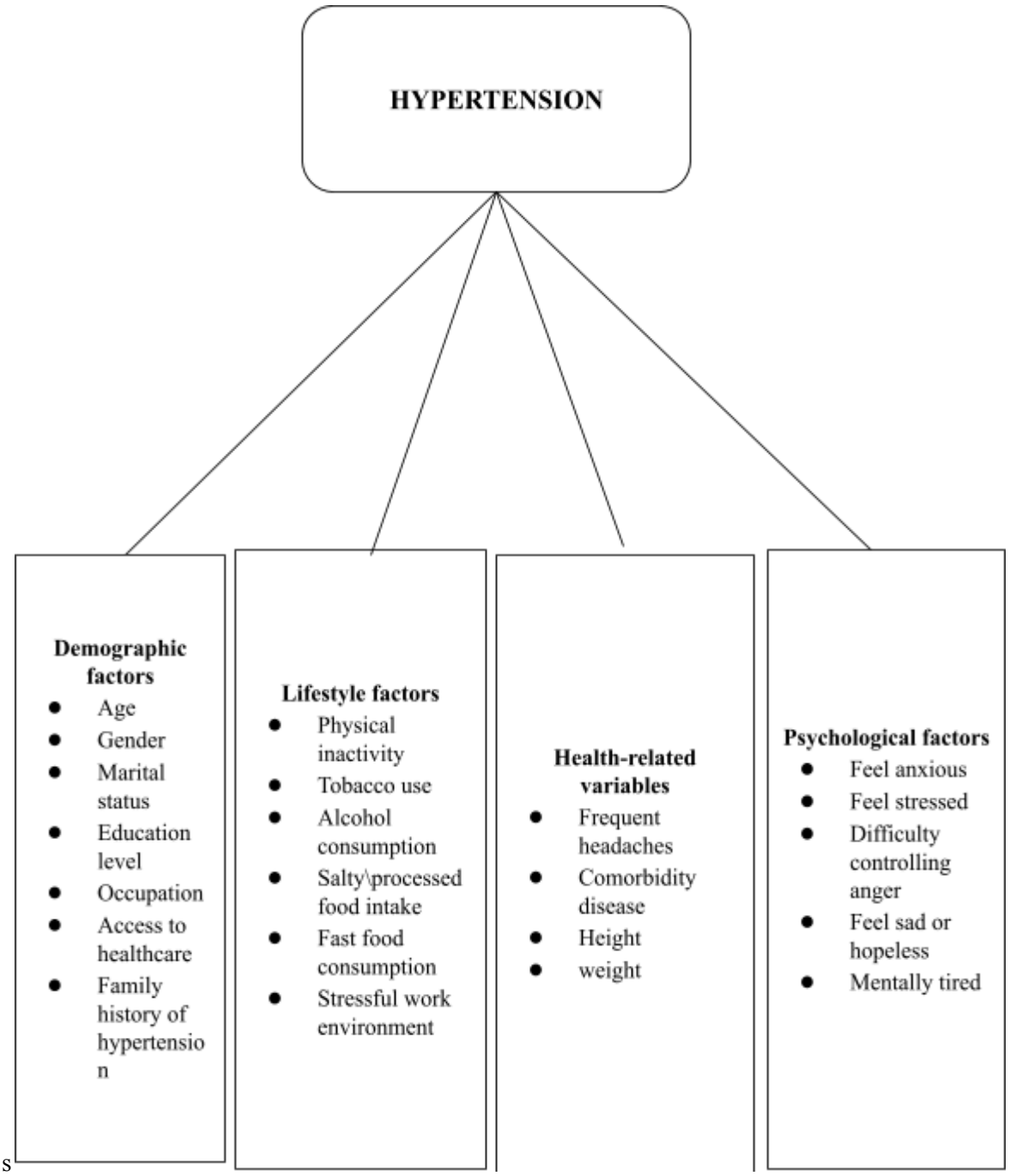
2.8 Identification of Knowledge Gaps

Despite extensive national and international research on the topic, some questions remain about the causes of hypertension in Pakistan's high-altitude regions. Despite the quick changes in lifestyle, there is little research on hypertension in Hunza or Gojal. There is still much to learn about how altitude affects Pakistan's environment. The relationship between stress, salt consumption, and hypertension in rural highlanders is unknown. Gojal's lifestyle, health-related variables, and psychosocial factors have not all been thoroughly investigated concurrently. The current shortcomings justify the existence of this study.

The findings indicate that hypertension is a complicated condition brought on by health-related variables, lifestyle, environmental, and demographic factors. In order to influence context-specific interventions for the population, this review of the literature highlights how crucial it is to carry out region-specific studies to learn about the prevalence and factors of hypertension in Gojal.

2.9 Conceptual and Theoretical Framework

Using a biopsychosocial model that considers relationships between biological predispositions, lifestyle choices, environmental exposures, and psychosocial stresses, the study investigates hypertension. According to the paradigm, high-altitude populations' risk of hypertension is influenced by lifestyle, psychological, mental health, and demographic factors; environmental adaptations may lessen the effects.



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CHAPTER THREE

RESEARCH METHADOLOGY

This chapter outlines research methodology to be employed in the study such as the research design, study area, targeted population, sampling, data collection methods, variables of the study, data analysis process, and ethical issues. In addition to considering the geographical and sociological factors of the Gojal region in Hunza, the framework was chosen critically and made sure that the results would be valid, accurate, and repeatable.

3.1 Research Design

The study was a cross sectional quantitative study. It was selected as it enables the researcher to consider the outcome variable as well as possibly a number of exposure variables of such lifestyle decisions, salt consumption, stress factors and considerations of health-related variables among a particular group of people. This is very useful in distant places such as Gojal where long term follow-up is impossible due to logistical and geographical reasons. Under this method, a faster and cheaper image of the prevalence of hypertension and other risk factors can be obtained and a possible correlation established which may be employed in future interventions. Epidemiology is among the fields where cross-sectional studies have been extensively employed to determine the prevalence of disease and the cause of the same in the local people.(Mills et al., 2020).

3.2 Population Framework

The case study was done on Gojal, a subdivision of the high-altitude, upper Hunza in Gilgit-Baltistan that encompasses the villages of Gulmit, Hussaini, Moorkhun, Passu, Shishkat, khyber, khudabad and Sost. There are limited healthcare centers in the area due to urbanization and dietary and lifestyle habits are rapidly shifting. Agriculture and other sedentary activities are practiced by the residents. Due to the unique geographic, environmental, and social factors of Gojal, this site is significant in looking at the hypertension issue especially considering living in high altitude and constant lifestyle change. The target population of the study was the adults of ages 25 to 60 years and permanent residents of Gojal. The age selection was picked to incorporate young people (50-60 years old), as they are more at risk of hypertension because of the changing lifestyles, and middle-aged adults (50-60 years old), who are more exposed to risk factors. The study

participants were required to live in the local area at least a year so that they can be exposed to a homogenized experience in the local environment and lifestyle.

3.5 Sampling and data collection method

The participants were recruited through convenience sampling because the population was widely spread geographically and the mountainous Hunza Gojal environment contributed to the method being logistically unattainable and consumed resources since probability sampling would have been resource-demanding. One hundred and forty individuals were picked depending on their availability and readiness to participate. The primary method of collecting information was a structured questionnaire, which ensured that the information received was accurate and clear. This was done to make sure that the validity of the questionnaire was correct, before data collection was carried out. This ensured similar acceptable validity, reduced possible section bias, and allowed needed changes and ensured the dependability and understanding of the instrument.

3.6 Sample Size calculation

It was calculated in OpenEpi Sample Size Calculator and based on the following assumptions: prevalence of hypertension was 33, the margin of error was 5, and the level of confidence was 95 (Mansoor, M., Ghaffar, A., and Aslam, S. 2021). Based on these specifications, at least 340 participants were needed to meet statistical power of the magnitude to discover significant correlations between hypertension and lifestyle, health-related variables, and psychosocial variables.

3.7 Tools for study

A standardized questionnaire was used to collect the data. The four sections of the questionnaire included health-related variables (BMI, diabetes, kidney disease, dyslipidemia, and cardiovascular history), lifestyle (physical activity, diet, salt intake, fast food intake, and occupational activity), sociodemographic (age, gender, marital status, education, occupation, income, smoking, alcohol use, and family history of hypertension), and psychological stress (measured with the help of in-person interviews).

3.9 Data Analysis Procedure

Data collected was coded before being entered into SPSS version 25 to be analyzed. Descriptive statistics worked to describe the prevalence of hypertension and demographic situation with frequencies, percentages, means and standard deviations. To examine the relationships between hypertension and potential risk factors, bivariate analysis which

included independent t-tests where continuous variables were used and chi-square tests where categorical data were used were conducted. In a multivariate analysis, the independent predictors of hypertension adjusted on confounding factors were uncovered with the help of binary logistic regression. Statistically significant value was pegged at p-value less than 0.05.

3.3 Inclusion and Exclusion Criteria.

Study subjects were aged between 25 and 60 years and were capable of giving informed consent; they had to have lived in Gojal permanently over a period of at least one year. The male respondents as well as the female respondents were identified to be fit to represent the population. The aim of the exclusion criteria was to reduce the number of confounding factors and ensure the quality of the findings. Pregnant women were left out due to the physiological changes that influence blood pressure, individuals with severe cognitive changes or critical illness were not included in this due to their inability to take part in the long term and visitors or temporary residents were not included due to their commitment to the environment and lifestyle.

3.10 Ethical Considerations

The research proved to be conducted in accordance with ethical norms. The consent was sought at the Institutional Review Board (IRB) of Bahria University. The study has informed the participants on the objectives of the study, and voluntarily the participants were made to give the written informed consent. The research informed the participants that they could drop out of the research at any time without any repercussions and confidentiality was guaranteed by the anonymity of all data gathered. They also advised study or rather the participants that were verified to be affected with high blood pressure to consult medical care at the local health facilities to ensure the safety of the study participants and ethical responsibility.

CHAPTER FOUR

Results

4.1 Sociodemographic Characteristics of Participants (N=340)

Table 1: Sociodemographic Characteristics of Participants

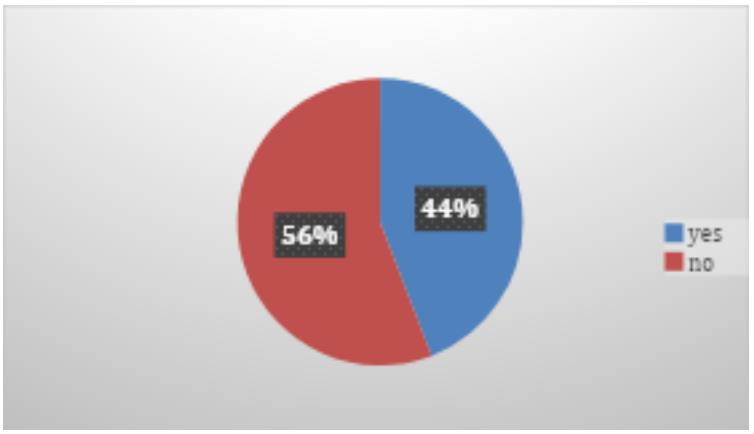
Variable	Category	Frequency (n)	Percentage (%)
Age	25–35 years	116	33.7
	36–45 years	104	30.2
	46–55 years	93	27.0
	56–60 years	26	7.6
Gender	Female	204	59.3
	Male	136	39.5
Marital Status	Single	56	16.3
	Married	285	82.8
Education Level	Primary	21	6.1
	Secondary	116	33.7

	Higher	203	59.0
Occupation	Student	30	8.7
	Business	74	21.5
	Housewife	112	32.6
	Job	87	25.3
	Teacher	38	11.0
Access to Healthcare	Yes	271	78.8
	No	69	20.1
Family History of Hypertension	Yes	136	39.5
	No	205	59.6

A total of 340 participants were included in the study. The age distribution showed that most respondents fell within the 25–35 years age group (33.7%), followed by those aged 36–45 years (30.2%) and 46–55 years (27.0%). Only 7.6% were in the 56–60 years category.In terms of gender**,** the majority were female (59.3%), while males constituted 39.5% of the sample. Most participants were married (82.8%), whereas only 16.3% were single. Regarding educational background**,** more than half (59.0%) had higher education, while 33.7% had completed secondary education, and 6.1% had only primary education. Participants' occupations varied, with the largest group being housewives (32.6%), followed by those in

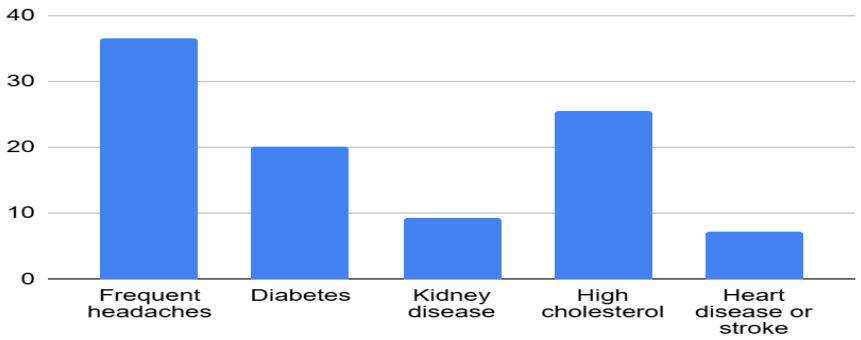
job employment **(**25.3%), business (21.5%), teaching (11.0%), and students (8.7%).A significant majority (78.8%) reported having access to healthcare, while 20.1% did not. Additionally, 39.5% of participants indicated a family history of hypertension**,** whereas 59.6% reported no such history.

Figure 1: Hypertension Diagnosis among Participants



The distribution of hypertension diagnoses is depicted in this figure. The proportion of respondents who had never been diagnosed with hypertension was slightly higher (55.2%) than the nearly half (43.6%) who had. This statistic illustrates the high prevalence of hypertension in the Gojal community and highlights a serious public health risk that necessitates both preventative and therapeutic measures.

Figure 2: *Frequency of Health Condition*



The prevalence of the different health problems that participants reported is displayed in Figure 2. Frequent headaches were the most common condition (36.6%), followed by diabetes (20.1%) and high cholesterol (25.6%). Heart disease or stroke (7.3%) and kidney disease (9.3%) were less frequently reported. The graphic shows how many comorbidities coexist with hypertension and the overall distribution of chronic health conditions in the study population.

4.6 Factors Associated with Hypertension

Table 2: Hypertension by Sociodemographic, Lifestyle, Health, and Mental Health Factors

Questions	Hypertension yes	Hypertension no	Chi-square	p-value
Age				
25-35	33	83	30.165	.000
36-45	47	56		
46-55	49	44		
56-60	21	5		
Gender				
Female	93	111	.556	0.456
male	56	79		
Marital status				
Married	13	43	11.882	0.001
single	137	147		

Education level				
Primary	13	13	4.515	0.211
Secondary	54	54		
Higher	83	83		
Occupation				
Students	5	25	12.907	0.012
Business	32	42		
Housewife	59	53		
Job	39	47		
teachers	15	23		
Do you have access to nearby healthcare?				
Yes	116	154	0.888	0.346
no	34	35		

Table 2 shows the relationship between hypertension and different sociodemographic and health-related factors. The results indicate that age**,** marital status, occupation, and family history of hypertension have significant associations with hypertension. Hypertension was more common in older participants**,** and the association with age was highly significant (p = 0.000). Married individuals also reported more hypertension cases than single participants (p = 0.001). Occupation showed a significant effect, with housewives and employed individuals having higher rates compared to students (p = 0.012). A strong association was found between family history of high blood pressure and hypertension (p = 0.002), suggesting genetic or shared lifestyle factors. However, gender**,** education level, and access to healthcare did not show significant associations with hypertension, as their p-values were above 0.05.

Table 3. Association of lifestyle factors and hypertension

Questions	Hypertension yes	Hypertension no	Chi-square	p-value
Do you use tobacco?				
Yes	28	23	2.921	0.087
no	121	167		
Do you drink alcohol?				
Never	116	146	0.011	0.915
Occasionally	34	44		
How often do you exercise or walk?				
Never	1	7	20.726	.000
1-2 times/week	37	27		
3-4 times/week	73	68		
5 or more times/week	39	88		
Are you currently taking any medication for blood pressure?				
Yes	69	21	52.202	0.000
no	81	168		
Do you eat salty or processed food regularly (e.g..achar, chips)?				
Yes	109	139	0.007	0.936
no	40	50		

Do you add extra salt to your meals?				
Yes	54	74	0.458	0.795
No	72	84		
occasionally	24	31		
How often do you eat fast food (e.g., burgers, fries)				
Never	52	74	0.531	0.767
Occasionally	72	83		
daily	24	31		
Do you work in a stressful environment (e.g.. noise, workload)?	14	30	3.173	.205
Yes	57	64		
No				
Height				
144-155	28	37		
156-165	49	68	8.010	0.046
166-176	53	76		
176-179	20	9		
Weight				
48-58	29	77		
59-68	52	65	26.236	0.001
69-78	52	43		
79-88	17	5		

Table 3 examines the association between different lifestyle factors and hypertension. The results show that exercise frequency**,** current use of blood pressure medication**,** height**,** and weight are significantly associated with hypertension. Participants who exercised more frequently (3–4 times or 5+ times per week) had higher hypertension rates compared to those who exercised less, and this association was significant (p = 0.000). Use of blood pressure medication was also strongly associated with hypertension (p = 0.000), indicating that many hypertensive individuals were already on treatment. Height (p = 0.046) and weight (p = 0.001) were significantly related to hypertension, suggesting possible links with body size and overall health status. However, tobacco use**,** alcohol intake**,** salt/processed food intake**,** adding extra salt**,** fast-food consumption**,** and stressful work environment did not show significant associations with hypertension, as their p-values were greater than 0.05.

Table 4. Association of psychological factors and hypertension

Questions	Hypertension yes	Hypertension no	Chi-square	p-value
Do you often feel anxious or nervous?				
Yes	111	108	10.999	0.001
no	38	81		
Do you feel stressed frequently (due to family/job)?				

Yes	62	69	0.891	0.345
no	88	121		
Do you have difficulty controlling anger?				
Yes	71	44	22.350	0.000
no	78	146		
Do you feel sad or hopeless for many days?				
Yes	23	31	0.553	0.758
No	120	153		
maybe	7	6		
Do you feel mentally tired or emotionally overwhelmed?				
Yes	75	69	6.515	0.011
no	74	120		

Table 4 explores the relationship between mental health factors and hypertension. The findings reveal several significant associations. Participants who often felt anxious or nervous were significantly more likely to have hypertension ($\chi^2 = 10.999, p = 0.001$). Similarly, difficulty controlling anger showed a strong and significant association with hypertension ($\chi^2 = 22.350, p = 0.000$). Feeling mentally tired or emotionally overwhelmed was also significantly related to hypertension ($\chi^2 = 6.515, p = 0.011$), indicating that emotional strain may contribute to or coexist with elevated blood pressure. On the other hand**,** frequent stress due to family or job, and feeling sad or hopeless for many days, did not show significant associations with hypertension, as their p-values were greater than 0.05.

Overall, the results indicate that anxiety, anger issues, and emotional exhaustion have significant comorbidity with hypertension, while general stress and sadness do not show statistically meaningful relationships in this study sample.

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.1 Discussion

This study aimed at establishing the incidence of hypertension and factors associated with the incidence among the participants aged 25 through 60 years in Gojal, Hunza. The results are valuable in understanding the lifestyle, health, mental and demographic characteristics of the population under study that it associates with hypertension.

There is a high occurrence of hypertension in the Gojal community since the study showed that 43.6% of the people had diagnosed hypertension. This conclusion agrees with international trends that show an increase in the prevalence of hypertension in the countries of low and middle-income, especially those populations that are changing their diet and lifestyle. Although over half of the respondents were also found to have normal blood pressure, a considerable number of them were found to have somewhat high or high blood pressure and only a quarter of the respondents were using antihypertensive drugs (Figure 1). A large number had normal blood pressure levels that were either a little high or high (Figure 1). This implies that a significant number of individuals may be undiagnosed, or treatment will not be received, which illustrates the weaknesses in treating hypertension and the consumption of healthcare services in the field. The detected incidence is in line with similar studies conducted in South Asia with prevalence rates of adult hypertension periods as high as 30 per cent and 50 percent based on age and urbanization. The minor increased frequency in this study can be connected with different aspects of a diet, lifestyle changes, and inheritable background because 39.5% of the respondents had a family history of hypertension.

Age and hypertension were considerably related with the older participants recording a greater prevalence as indicated by previous studies. Arterial stiffness, reduction in vascular compliance and accumulated exposure to lifestyle-related risk factors are most likely to cause the progressive rise in blood pressure with age.

There were higher hypertension rates among married people as compared to single people. This may be an example of the effects of stress, family requirements, and lifestyles on blood pressure. Occupation and incidence had a high correlation, as well, with the higher rates in housewives and owners of businesses, likely because of stress, sedentary lifestyles, and diets.

There was no significant correlation between hypertension and gender and education level, and the same result can be compared to the previous studies within the region since other studies have established higher prevalence of hypertension in males or among those with less education.

To the contrary, the relationship between the consumption of fast food, and the addition of extra salt, as well as the habitual consumption of processed foods, or salty food and hypertension was not significantly correlated. It may be a consequence of underreporting food intake or other subsidiary activities. Such insignificant correlation can be attributed to the fact that alcohol and tobacco use are low in this cohort.

An example of the wide spread noncommunicable diseases among the population is the dominant rates of comorbidities like diabetes (20.1%), high cholesterol (25.6%), and frequent headaches (36.6%). These problems are represented in Figure 2; the headaches and high cholesterol are more widespread. As it has been commonly reported in other studies that attributed high rates of high blood pressure to obesity and overweight, significant correlation was established between height and weight and high blood pressure.

All important predictors of hypertension were anxiety, inability to manage anger, and emotional stress. Individuals, who tended to become angry, anxious, or emotionally tired, had more hypertension. The results suggest that the causes of hypertension can be psychological stress and emotional dysregulation, potentially through neuroendocrine mechanisms such as arousal of the sympathetic nervous system. The scarcity of those who have reported experiencing stressful work environments, however, can be the reason why no significant correlation is obtained.

A family history of hypertension significantly correlated with an individual hypertension status, and this highlighted the genetic and familial factors of blood pressure control.

Current consumers of blood pressure medication also reported a more prevalence of diagnosed hypertension, as it was to be expected given that they had already been diagnosed, and they were receiving some treatment.

The findings indicate the prevalence of hypertension is high in Gojal and it is necessary to conduct screening, preventive strategies, and effective management resources in the community. Hypertension seems to be widespread in this population, which can be mitigated through more medication awareness and adherence and lifestyle modification such as more physical activities and lessening stress.

The research is also strong as it enables a deeper evaluation of what leads to hypertension because there are numerous domains that are included in the study, including the sociodemographic, lifestyle, health, and mental health factors.

5.2 Limitations

There are several issues that have to be noted with this study. Convenience sampling could have caused selection bias, which would restrict the extrapolation of findings on a larger population like those in Gojal. The cross-sectional method does not allow the setting of the causal relationship between hypertension and its variables. Self-reporting of most variables such as lifestyle habits, mental status indicators, and hypertension could have caused recollection bias or false reporting, e.g. their self-reported hypertension status. The unproven methods of measuring mental health symptoms and the qualitative but not quantitative assessment of the dietary habits could have resulted in an impact on the repeatability of the results.

5.3 Recommendations

Regardless of such limitations, the study makes a number of suggestions and important information regarding hypertension in the Gojal population. Returning to screening programs Community-based blood pressure screening The programs should be implemented in order to detect undetected cases. Health education campaigns should focus on healthy eating, exercise and reduction of stress. Preventive measures should include support of mental health when an individual is emotionally drained or anxious. Special monitoring and counseling should be given to families that have a history of hypertension. Healthcare, particularly checkups and hypertensive medication, should be more accessible to the lawmakers. Future research should adopt longitudinal designs, quantitative nutritional assessments and standardized mental health assessment in order to get to know more about the causes of hypertension.

5.4 Conclusion

The frequency of hypertension and the related sociodemographic, lifestyle, health related variables and psychological factors were studied in the Gojal community. The outcomes revealed that there was a significant prevalence of hypertension, and 43.6% of the people had a prior diagnosis. Although over half of the recognized persons had their normal blood pressure upon the last measuring, many of them were not under antihypertensive drugs, implying deficiencies in care usage and care continuity.

This research identified a number of risk factors of hypertension. An important predictor was age and the frequency was high among the elderly. Strong correlation was found between

anthropometric variables including height and weight, occupation, family history of hypertension, frequency of exercise and marital status and hypertension. Anxiety and difficulties.

Maintaining anger, emotional fatigue was also a significant contributing factor, and it is believed to be related to psychological and cardiovascular health.

Nonetheless, the features of gender, the level of education, alcohol and tobacco use, salt consumption, and consumption of fast-food did not have significant correlations. Poor diets among our population were common but they were not statistically significant predictors of hypertension implying that the outcomes of these variables could be different across geographic, cultural, or genetic settings.

It was also determined in the study that some of the chronic health conditions including the headache, high cholesterol, diabetes, and kidney disease are co-morbid and can predispose and exacerbate the hypertension incidence and severity. There were also high rates of mental health problems and this shows that the population was prone to them.

In general, this paper highlights the need to have comprehensive public health initiatives in Gojal. The strategies must focus on the early detection of the illness, creating heightened awareness, regular checking, altering lifestyles, mental health care, and medical service accessibility. An integrated intervention focusing on the physical and psychological wellbeing can be particularly effective in reducing the hypertension weight and enhancing the long-term heart failure outcomes in the area.

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