

Prevalence of Hypertension and Its Associated Risk Factors among Adults in Pakistan.

Ghazala Rasool¹, Sayed Khan², Aftab Hussain Abro³, Hasan Shafi^{4*}, Naseer Ahmed⁵, Noor us Sabah⁶

¹Assistant Professor, Medicine, Northern Border University, Arar, Saudia Arabia

²Assistant Professor, Community of Medicine, Gomal Medical College, Dera Ismail Khan, Pakistan

³Assistant Professor, Community of Medicine, SMBBMC Lyari, Karachi, Pakistan

^{4*}Assistant Professor, Anaesthesia, Khyber College of Dentistry, Peshawar, Pakistan

⁵Department of Community & Preventive Dentistry, Altamash Institute of Dental Medicine, Karachi, Pakistan

⁶Medical Officer, Fauji Foundation Medical Centre, Kahuta, Rawalpindi, Pakistan

***Corresponding author:**

Hasan Shafi,

Assistant Professor, Anaesthesia, Khyber College of Dentistry, Peshawar, Pakistan

Email: hasanshafi786@gmail.com

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ABSTRACT

Introduction: Hypertension is a non-communicable disease and a significant risk factor for cardiovascular morbidity and mortality worldwide. The incidence of hypertension in Pakistan is increasing, although community-level statistics about its factors are scarce. This study sought to evaluate the prevalence of hypertension and its related risk factors among individuals in several Pakistani communities.

Materials and Methods: A community-based cross-sectional study was performed from January to June 2024. A total of 88 participants aged 18 years and older were recruited by multistage sampling. Information regarding socio-demographic variables, lifestyle practices, medical history, and family history was gathered utilizing a pre-tested structured questionnaire. Blood pressure and anthropometric data were acquired using defined protocols. Hypertension is characterized by a systolic blood pressure of ≥ 140 mmHg, a diastolic blood pressure of ≥ 90 mmHg, or the current administration of antihypertensive medication. Data were evaluated utilizing SPSS v25, and logistic regression was employed to ascertain independent risk factors.

Results: The total prevalence of hypertension was 34.1% (30 out of 88). It was more prevalent among participants aged 45 years and older, those with a BMI of 25 kg/m² or above, and persons with low levels of physical activity. Smoking and a positive family history were substantially correlated with hypertension in bivariate analysis, although gender exhibited no significant correlation. In multivariable analysis, age ≥ 45 years (AOR = 3.12), BMI ≥ 25 kg/m² (AOR = 2.85), and low physical activity (AOR = 2.67) were identified as independent predictors of hypertension, with the total regression model demonstrating statistical significance and accounting for 34% of the variance in hypertension status.

Conclusion: Hypertension is prevalent among Pakistani adults, with modifiable risk factors including obesity and inactivity. Community-based screening and lifestyle interventions are essential to reduce its burden, and larger studies are needed to inform targeted prevention strategies..

Keywords: Hypertension, Risk factors, high BP, cardiovascular health, Obesity and hypertension, physical inactivity.

INTRODUCTION

Hypertension is a non-communicable disease and a significant cause of morbidity and mortality in the world. It is a high risk factor of cardiovascular diseases, stroke, kidney chronic disease and early mortality (1). The World Health Organization reveals that over one billion individuals on earth have hypertension and the disease causes a significant number of deaths which can be prevented (2). Urbanization, sedentary activities, poor eating habits, and aging of the population are proving to be the leading causes of hypertension burden in the low and middle-income countries.

Hypertension is a developing health issue in Pakistan. Elevated blood pressure rates among adults have been recorded to be.

high and increasing in the past according to other studies conducted by the previous national surveys such as the Pakistan Health Research Council (3,4). Poor diet (salt), weight, smoking, lack of physical exercise, stress, and lack of access to preventive health care services among other factors are major contributing factors to the burden. Nevertheless, awareness, treatment, and control rates are still poor especially in underserved urban and rural populations

Modifiable risk factors and the detection and identification of these factors at an early age are necessary to minimize complications and enhance long-term health outcomes. Community based research offers a good understanding of the scale of the issue and assist in establishing the high-risk population (5,6). Nonetheless, there are limited data on smaller community settings in Pakistan and there might be regional differences because some communities might have a difference in socioeconomic status, lifestyle and access to healthcare. Hence, local evidence should be updated in order to inform specific interventions and preventive measures.

The current study is noteworthy because it offers current community-based information about the rates of hypertension and the risk factors that are associated with this health condition in the context of adults in Pakistan. The results can guide policymakers, medical practitioners and the health departments to develop effective screening procedures and awareness strategies to alleviate the burden of hypertension and complications.

Objective

To determine the prevalence of hypertension and identify its associated risk factors among adults in Pakistan.

MATERIALS AND METHODS

The aim of this community based cross-sectional study was to establish the prevalence of hypertension and the risk factors of hypertension among the adults in Pakistan. This study was conducted in the period between January 2024 and June 2024 in the selected urban and rural populations in Pakistan. Adults over the age of 18 years, having lived in the chosen locations at least six months permanently, were taken into consideration. The study did not include pregnant women, critically ill people, and those who refused to give informed consent.

The sample size was determined using the single population proportion formula, with an anticipated hypertension prevalence of 30%, a 95% confidence range, and a 5% margin of error. Nonetheless, owing to feasibility limits and resource limitations, a total of 92 participants were recruited for the study. A multistage sampling method was utilized. Initially, one metropolitan area and one rural locale were chosen. Thereafter, households were chosen using systematic random selection. One eligible adult was selected from each chosen household using simple random selection.

Table 1: Sample selection

Stage	Description	Number (n)
1	Individuals assessed for eligibility	120
2	Excluded (not meeting inclusion criteria or declined participation)	28
3	Participants enrolled in the study	92
4	Completed questionnaire and physical measurements	90
5	Missed follow-up	2
6	Included in final analysis	88

The questionnaire was a structured and pre-tested questionnaire based on the WHO STEPwise approach to non-communicable disease surveillance used to collect the data. The questionnaire was divided into sections with socio-demographic variables (age, gender, education, occupation and socioeconomic status), behavioral risk factors (tobacco use, physical activity, dietary habits and salt intake), personal and family history of hypertension and comorbid conditions such as diabetes mellitus. The pre-test of the questionnaire was run on 10 percent of the sample within the same population to provide clarity and reliability and necessary changes were done before final data collection.

A calibrated digital sphygmomanometer was used to measure the blood pressure based on the standard procedures. The respondents were made to be comfortable at minimum five minutes prior to measurements. They were taken twice with a five minutes interval on the right arm and the mean of the two readings was taken. Hypertension was determined as systolic blood pressure of 140 mmHg and/or diastolic blood pressure 90mmHg or self-reported taking antihypertensive medication.

Standardized equipment was used in the anthropometric measurements. Body weight was determined by weighing the participants in a digital weighing scale in light clothes and bare feet. A stadiometer was used to measure height. Body mass index (BMI) was determined by dividing weight in kilograms by height in meters squared (kg/m²). The categories of BMI were based on WHO.

The quality control during the study was attended to. Data collectors were also trained before going to fieldwork and instruments were also calibrated on a daily basis. Data entry was made after reviewing the completed questionnaires on completeness and consistency.

Statistical Package of the Social Sciences (SPSS) version 25 was used to enter and analyze the data. To describe the characteristics of the participants, the descriptive statistics were calculated. Continuous variables (age and BMI) were reported as mean + SD, whereas categorical ones were reported as frequencies and percentages.

The proportion of participants that met the diagnostic criteria of hypertension was used as the prevalence of the health condition in the sample under analysis. The chi-square test or the Fisher exact test where applicable was applied in the estimation of the association between hypertension and potential risk factors. Comparison of the means of hypertensive and normotensive groups were compared using independent sample t-tests.

The independent variables that had a p-value of less than 0.20 in univariate analysis were then incorporated into multivariate logistic regression to determine independent predictors of hypertension. Odds ratios (AORs) were adjusted and had 95 percent confidence intervals. The p-value that passed as statistic was below 0.05.

The study started with the ethical approval of the Institutional Review Board of the medical institution involved in Pakistan. All the participants gave informed consent in writing. Data were collected and made modestly to be used strictly on the basis of research and the confidentiality and anonymity of the participants were observed strictly. Study flow is shown in Figure 1.

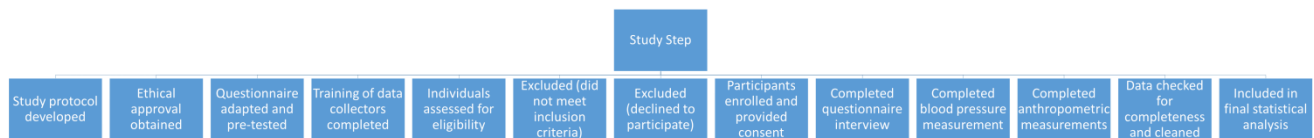


Figure 1: Graphical Representation of Study Flow

RESULTS

A total of 88 participants were included in the final analysis, with a mean age of 42.6 ± 13.8 years. The majority were aged 30–44 years (28/88, 31.8%), followed by 45–59 years (25/88, 28.4%). Males constituted 46/88 (52.3%) of the sample, while 50/88 (56.8%) participants resided in urban areas. Regarding education, 28/88 (31.8%) had completed secondary education, whereas 18/88 (20.5%) had no formal education. More than half of the participants (49/88, 55.7%) were employed.

Table 2: Characteristics of Study Participants (n = 88)

Variables		Frequency (n)	Percentage (%)
Age (years)	18–29	20	22.7
	30–44	28	31.8
	45–59	25	28.4
	≥60	15	17.0
Mean Age ± SD	—	42.6 ± 13.8	—
Gender	Male	46	52.3
	Female	42	47.7
Residence	Urban	50	56.8
	Rural	38	43.2
Education	Nil	18	20.5
	Primary	22	25.0
	Secondary	28	31.8
	Higher education	20	22.7
Occupation	Employed	49	55.7
	Unemployed/Household	39	44.3

The overall prevalence of hypertension was 30/88 (34.1%). Hypertension was significantly more common among participants aged ≥ 45 years (20/30, 66.7% vs. 10/30, 33.3%; $p = 0.003$) and those with BMI ≥ 25 kg/m² (21/30, 70.0% vs. 9/30, 30.0%; $p = 0.004$). Low physical activity was significantly associated with hypertension (19/30, 63.3%; $p = 0.018$), as was a positive family history of hypertension (17/30, 56.7%; $p = 0.022$). Smoking was observed in 14/30 (46.7%) hypertensive participants ($p = 0.041$), while gender was not significantly associated with hypertension (18/30 males, 60.0%; $p = 0.289$).

Table 3: Incidence of Hypertension and Correlation with Risk Factors (n = 88)

Variable	Category	Hypertensive n (%)	Normotensive n (%)	p-value*
Overall Hypertension Prevalence	—	30 (34.1%)	58 (65.9%)	—
Age Group	≥ 45 years	20 (66.7)	20 (34.5)	0.003
	<45 years	10 (33.3)	38 (65.5)	
Gender	Male	18 (60.0)	28 (48.3)	0.289
	Female	12 (40.0)	30 (51.7)	
BMI Category	≥ 25 kg/m ²	21 (70.0)	22 (37.9)	0.004
	<25 kg/m ²	9 (30.0)	36 (62.1)	
Smoking Status	Current smoker	14 (46.7)	15 (25.9)	0.041
	Non-smoker	16 (53.3)	43 (74.1)	
Physical Activity	Low	19 (63.3)	21 (36.2)	0.018
	Moderate/High	11 (36.7)	37 (63.8)	
Family History of HTN	Yes	17 (56.7)	18 (31.0)	0.022
	No	13 (43.3)	40 (69.0)	

*Chi-square test applied.

On multivariable analysis, age ≥ 45 years (AOR = 3.12, 95% CI: 1.28–7.60; $p = 0.012$), BMI ≥ 25 kg/m² (AOR = 2.85, 95% CI: 1.14–7.11; $p = 0.025$), and low physical activity (AOR = 2.67, 95% CI: 1.08–6.58; $p = 0.034$) remained independent predictors of hypertension. Smoking and family history lost statistical significance after adjustment. The overall regression model was statistically significant ($p = 0.002$) and explained 34% of the variance in hypertension status (Nagelkerke R² = 0.34).

Table 4: Multivariable Logistic Regression Analysis of Factors Associated with Hypertension (n = 88)

Variable	Adjusted Odds Ratio (AOR)	95% CI	p-value
Age ≥ 45 years	3.12	1.28 – 7.60	0.012
BMI ≥ 25 kg/m ²	2.85	1.14 – 7.11	0.025
Current smoker	2.41	0.95 – 6.10	0.064
Low physical activity	2.67	1.08 – 6.58	0.034
Family history of HTN	2.21	0.92 – 5.30	0.076
Male gender	1.39	0.57 – 3.42	0.468

DISCUSSION

The incidence of hypertension in this paper (34.1% or 30/88) is comparable to a range of recent community based studies done in Pakistan but estimates of hypertension differences in populations and methodology vary. To give an example, high prevalence of over 40% was reported in 400 adults in a large study in a low income community with obesity and physical inactivity being the major risk factors highlighting the continuing enormous burden of hypertension in various Pakistani

environments (7). Equally, one community study in Jamshoro showed that thirty-five point six percent of the respondents were hypertensive, which strongly supports the idea that a third of the adults in most communities are hypertensive. These local investigations concur with our results, implying that hypertension is still a major societal health menace in Pakistan, along socioeconomic lines.

The second National Diabetes Survey (NDSP 2016/2017) provided such large epidemiological data that estimated an even larger age adjusted prevalence of hypertension in the country (46.2), and found strong relationships with age, obesity, family history, and low physical activity (8). Though our smaller sample of the community showed a lower overall prevalence rate, which was lower than the NDSP, the same increasing age and high BMI prevalence rate is congruent with the national surveys. It can also be compared to hospital based evidence that indicated a considerable relationship between hypertension and obesity and smoking amongst clinical populations (9).

The risk factor analysis in the study showed that age ≥ 45 years, high physical activity and BMI had an independent relationship with hypertension (10). The current literature is supportive of these associations. The identification of 2,000 adults by a multifactorial case-control study revealed an outcome that older age, smoking, lower educational status, kidney disease, diabetes, and family history had a strong association with hypertension, which confirmed the multifaceted nature of risk in Pakistani adults (11). Moreover, a study in the urban Islamabad demonstrated that physical inactivity was highly related to the higher risks of developing hypertension (OR 1.89) and other factors that contribute to cardiovascular risks, as in this area, the influence of sedentary lifestyles on the development of these conditions is eminent (12).

Although, in our adjusted model, gender had no independent association with hypertension, other studies have determined mixed gender effects. Indicatively, some regional studies identified that unadjusted prevalence of hypertension was higher in males or varied by marital status and education level, which pointed to the potential that socio demographic variables would have context specific effects (13). However, there is a recurring trend in the series of research studies; modifiable lifestyle choices including BMI, physical activity, smoking, and dietary practices have significant roles in hypertension risk and are significant intervention targets.

The results of the study refer to the earlier studies (14,15) that have confirmed a high rate of prevalence of hypertension and a significant correlation with the commonly known risk factors such as age, overweight/ obesity, and lack of exercise in the Pakistani adults. These trends indicate that there are still current problems in the area of the population health and the necessity of effective prevention and control methods in the context of a wide range of communities.

CONCLUSION

The study confirms a high prevalence of hypertension among adults in Pakistan, with older age, elevated BMI, and low physical activity as significant independent predictors. These results emphasize the urgent need for practical public health interventions—including community screening programs, lifestyle modification initiatives focusing on weight management and increased physical activity, and targeted awareness campaigns—to reduce the burden of hypertension and related complications. From a future perspective, larger nationally representative longitudinal studies are required to delineate causal pathways and to evaluate the effectiveness of tailored prevention strategies that address region-specific risk profiles and healthcare challenges in Pakistan.

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