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Exploring Hypertension Knowledge and Identifying Determinants of Inadequate Knowledge Among Non-Hypertensive Adult Pakistanis

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ABSTRACT

Hypertension was a serious global health issue, with over half of the adults in underdeveloped nations remained undiagnosed. Given its prevalence and associated repercussions, non-hypertensive people continue to have low awareness of hypertension. **Objective:** To assess Knowledge of hypertension and identify determinants of inadequate Knowledge among non-hypertensive adult Pakistanis. **Methods:** A cross-sectional survey was conducted from January to May 2024. A sample of 500 non-hypertensive adults was recruited using the snowball sampling technique. The information was gathered using an online survey based on the Hypertension Knowledge-Level Scale (HK-LS). Data analysis was performed using SPSS version 26.0, and chi-square tests were applied to identify determinants of inadequate Knowledge. **Results:** The research project comprised 265 males (53%) and 235 females (47%), averaging 35.2 years. According to the total knowledge score, only 33.64% of participants had the necessary hypertension information, while 66.36% did not comprehend it. Knowledge about medication compliance, medical care, and hypertension problems was shown to have significant gaps. Age, educational attainment, and a family history of hypertension were among the demographic characteristics that significantly influenced Knowledge ($P<0.05$). Higher education levels and a family history of hypertension were associated with better knowledge levels among participants. **Conclusions:** In Pakistan, the non-hypertensive population is largely unaware about hypertension. In order to reduce hypertension and increase awareness, targeted outreach initiatives were necessary. Enhancing health literacy through media, healthcare providers, and family health communication can bridge the knowledge gap.

INTRODUCTION

Global sociodemographic shifts toward aging, fast urbanization, and the expansion of sedentary lifestyles promote tobacco use, excessive salt intake, weight gain, and inactivity, which raises the risk of noncommunicable diseases, particularly hypertension [1, 2]. According to numerous studies, hypertension is the leading cause of premature mortality and is a serious medical condition that primarily affects the kidneys and brain and increases the risk of cardiovascular disease [1, 3]. The prevalence of hypertension is the same in high-income and middle-income nations. On the other hand, hypertension is a serious health risk in low- and middle-income nations [4, 5]. Southeast Asia contributes to 80% of all cardiovascular disease deaths in those with poorly managed blood pressure [6]. Researchers have found that various factors influence understanding of hypertension, including socioeconomic level, lifestyle decisions such as high salt intake, medication adherence concerns, and gaps in

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clinical practice adherence to guidelines [7, 8]. Studies were out in poor nations found a correlation between high blood pressure and a lack of Knowledge about hypertension. The research highlights the need for all-encompassing health education initiatives that prioritize lifestyle modifications [9-11]. Similarly, a mixed-methods study conducted in Tanzania revealed a high prevalence of hypertensive disease (28%); remarkably, almost half of the participants (48%) acknowledged having hypertension but found it difficult to control because of various obstacles, including inadequate access and care from unqualified medical personnel [8]. The latter situation reflects issues within health service delivery systems that hinder effective care [12]. Another study conducted in Saudi Arabia investigated hypertension patients' Knowledge of their blood pressure measurements; despite higher educational levels only 74.4% were aware of their target blood pressure readings [13]. Later studies pinpoint a wide range of factors that lead to non-hypertensive individuals' low Knowledge of hypertension. It is widely accepted that early adulthood is the best time to start primary prevention, early detection, and blood pressure control. By highlighting gaps and increasing awareness, Knowledge of HTN in hypertension patients is crucial to controlling modifiable risk factors and reducing burden. Studies in Africa Asia revealed that good awareness of HTN is connected with higher rates of blood pressure control, medication adherence, and reduced morbidity and death [1, 7, 14, 15]. Furthermore, Nadeem MK *et al.*, examined hypertension-related Knowledge among Pakistanis, demonstrating a gap between Knowledge and appropriate management. Although the people had relevant information about hypertension (79%), only 64.8% could maintain their blood pressure [11]. To the best of the researcher's Knowledge, no study has used the standard Hypertension Knowledge-Level Scale (HK-LS) to assess Knowledge status and identify causes of low awareness among non-hypertensive adult Pakistanis [14]. Our study's objectives were to evaluate adult Pakistanis without hypertension's understanding of the condition and identify the factors contributing to this ignorance.

METHODS

A cross-sectional survey was carried out in 2024 between January and May. Open Epi software version 3.0 was used to calculate the sample size using the statistical approach n= [DEFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1)+p*(1-p)] [16]. Based on the 40.7% prevalence of hypertension among participants from the prior study, the sample size was calculated, with a 5% margin of error and a 95% confidence interval, yielding a sample size 525. Nevertheless, we manage to assemble a 500-person sample size with a 95.2% response rate [3]. The snowball technique (Figure 1) was used to select participants who fulfilled the following requirements: they had to be Pakistani citizens who had been in the country for more than five years, not have a history of hypertension, be at least eighteen years old (regardless of gender), able to understand and write in English, have given written consent to participate, and be able to use electronic devices with a basic understanding of computers in order to complete the survey. The RLKU Medical College, Lahore Institutional Review Board (IRB) granted ethical permission before the research investigation could begin (Reference Number: RLKU.IRB-003/12/23). People gave their informed consent in writing before enrollment. Thirty volunteers helped validate the questionnaire. More than 0.7 is regarded as an appropriate value for a Cronbach's alpha coefficient in a survey used to gather data. Three knowledgeable researchers assessed the validity of the complete form. For every question, the item-objective congruence index was more significant than 0.5, which was considered satisfactory. The Hypertension Understanding Level Scale (HK-LS), an instrument designed by Erkoc SB *et al.*, to measure Turkish adults' comprehension of hypertension, comprises 22 items in Section 2 [14]. Six subdomains were created from the twenty-two components, including definition of illness, medical treatment, medication adherence, lifestyle, food, and repercussions. The number of questions that the research volunteers answered correctly indicated whether or not their level of knowledge was appropriate. The participant was asked to indicate whether the supplied assertion was true, false, or unknown for each item, which consisted of a whole sentence." For every accurate response, one point was given; 'do not know' or erroneous responses yielded zero points. At least 75% of the right answers were required for a satisfactory level of knowledge (17 or more of 22). Should the percentage of correct answers stay below 75% (17 out of 22), the participant considered their knowledge to be insufficient. An online, self-administered, closed-ended survey made with the Google Forms platform was used to collect the research data. The SPSS version 26.0 was used to analyze the data. Frequencies and percentages were used to represent different types of variables. The mean and standard deviation were used to express the overall and subdimensional results of the HK-LS.

RESULTS

The Shapiro-Wilk test was utilized to confirm the normality of the data. Using Chi-Square, the factors that lead to inadequate knowledge were discovered. Every test was deemed significant when the P-value was less than 0.05. Arc GIS software displayed the participants' geographic locations (Figure 1).

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Figure 1: Geographical Distribution of Study Participants

The dataset provides an insightful glimpse into various demographic and socio-economic characteristics of non-hypertensive adults in Pakistan (Table 1), focusing on their awareness and Knowledge of hypertension. The sample consists of 500 individuals, with a slight male majority (265 males, or 53%, and 235 females, or 47%). The mean age of participants is 35.2 years, with a standard deviation of 5.1 years. Age distribution reveals that 31.25% were between 18 and 30 years old, 33% were between 31 and 40 years, 14.43% fall within the 41 to 50 years range, 11.57% were aged between 51 and 60 years, and 9.75% were over 60 years old. Participants come from various provinces in Pakistan, with Punjab being the most represented (42.50%), followed by Sindh (23.25%). Education levels vary, with most having completed bachelor's degrees (38.50%) or master's degrees (36%). Secondary education was reported by 20.25%, and 5.25% have a PhD. According to socioeconomic level, 42.75% of people have balanced financial conditions, 34.50% occasionally face financial difficulties, 12% frequently experience financial difficulties, and 10.75% have financial difficulties all year round. The nearly equal distribution of genders guarantees that both the views of men and women were taken into account. The need of focusing awareness campaigns on younger individuals was underscored by the prevalence of younger age groups, particularly those between the ages of 31 and 40. The necessity for region-specific tactics was seen in the strong presence of Punjab. Given the high proportion of married people, family-based therapies may be successful. The noteworthy percentage of individuals possessing advanced education suggests the possibility of utilizing academic accomplishments in health awareness initiatives. The socioeconomic data emphasize the financial difficulties experienced by many participants, and the varying job status emphasizes the necessity for customized methods based on various employment conditions.

Table 1: Socio-Demographics Characteristics of the Participants (n=500)

Variables	Category	Frequency (%)
Gender	Male	265 (53)
	Female	235 (47)
Age (Years)	18–30	155 (31.25)
	31–40	165 (33)
	41–50	72 (14.43)
	51–60	58 (11.57)
	>60	49 (9.75)
Age (Mean ± S.D)	-	35.2 ± 5.1
Province	Sindh	115 (23.25)
	Punjab	213 (42.50)
	Gilgit Baltistan	36 (7.25)
	KPK	78 (15.5)
	Balochistan	58 (11.50)
Marital Status	Single	146 (29.25)
	Married	308 (61.50)
	Separated / Divorced	46 (9.25)
Education Level	Secondary	101 (20.25)
	Bachelors	193 (38.50)
	Masters	180 (36.00)
	PhD	26 (5.25)
Employment Status	Employed	204 (40.75.5)
	Self-Employed	84 (16.75)
	Looking for a Job	74 (14.75)
	Housewife	36 (7.25)
	Student	82 (16.50)
	Retired	20 (4)
Socio-Economic Status	Insufficient Funds for the Whole Year	54 (10.75)
	Insufficient Funds for Some Time	172 (34.50)
	Balance	214 (42.75)
	Sufficient Funds for Most of the Times	60 (12)
	Yes	88 (17.50)
	No	230 (46)
	Don't Know	182 (36.5)
Source of Information about HTN	Media	157 (31.5)
	Healthcare Workers	96 (19.25)
	Friends and Family Members	202 (40.25)
	Others	45 (9)

The assessment of participants' Knowledge regarding hypertension (Table 2), evaluated through the Hypertension Knowledge Level Scale (HK-LS), reveals varying levels of understanding across different sub-dimensions of Knowledge. Participants' responses indicate significant gaps in Knowledge about hypertension, its treatment, and its complications. Regarding the definition of hypertension, 51.04% correctly identified that increased diastolic blood pressure indicates increased blood pressure, while 50.37% correctly noted that high diastolic or systolic blood pressure indicates increased blood pressure.

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Table 2: Assessment of Participant's Knowledge through the Hypertension Knowledge Level Scale

Sub-Dimensions of Knowledge	Variables	Correct Responses Frequency (%)
Definition	Higher diastolic blood pressure suggests high blood pressure	255 (51.037)
	Elevated diastolic or systolic blood pressure demonstrates a higher blood pressure	250 (50.37)
Drug Compliance	There is no need to change your lifestyle if your blood pressure medication can control it	153 (30.63)
	Aging causes high blood pressure; thus, treatment is unnecessary	198 (39.62)
	Individuals with elevated blood pressure can avoid therapy by changing their lifestyle	160 (32.15)
	People with high blood pressure can eat salty meals as long as they take their medications regularly	130 (26.07)
Medical Treatment	Medications for High Blood Pressure need to be Used Daily	154 (30.88)
	Individuals with elevated blood pressure Should only take their medicine when they are feeling not well	207 (41.39)
	Those with high blood pressure must take their medicine throughout their lives	230 (46.96)
	People with elevated blood pressure levels Should take their medicine in a way that makes them feel well	183 (36.63)
Complications	If not addressed, high blood pressure may result in premature death	196 (39.25)
	Untreated high blood pressure can lead to cardiac disease, including heart attacks	160 (31.96)
	If not treated, high blood pressure can lead to strokes	96 (19.24)
	Untreated high blood pressure might lead to renal failure	175 (35.06)
	Untreated high blood pressure might cause vision problems	164 (32.78)
Diet	White meat is ideal for those with high levels of blood pressure	168 (33.67)
	People with high blood pressure benefit most from red meat	124 (24.81)
Lifestyle	People with high blood pressure may drink alcoholic beverages	108 (21.77)
	People with high blood pressure should avoid cigarettes	157 (31.13)
	Individuals with high blood pressure should consume fruits and vegetables frequently	165 (32.91)
	For people with high blood pressure, frying is their preferred cooking method	182 (36.45)
	The optimum cooking techniques for people with high blood pressure are boiling or grilling	94 (18.73)
Total Knowledge Score	Adequate Knowledge	168 (33.64)
	Inadequate Knowledge	332 (66.36)

Among adult Pakistanis who were not hypertensive, sociodemographic factors related to several subdomains of hypertension knowledge exhibit some noteworthy relationships (Table 3). The Hypertension Knowledge Level Scale (HK-LS), which has subdomains for Disease Definition, Medical Treatment, Drug Compliance, Lifestyle, Diet, and Complications, was used to convey the data. According to residency areas, although the difference was not statistically significant, urban inhabitants have slightly better knowledge of disease definition (2.98 ± 1.64) than rural residents (1.97 ± 1.35). There were no appreciable disparities between residents of urban and rural areas in other subdomains. Another factor was family history of hypertension; individuals with a positive history demonstrated slightly more Knowledge of Medical Treatment (3.44 ± 0.88) and Complications (4.65 ± 1.87) than those with a negative history. Complications has a p-value of 0.004, which suggests a significant difference. Overall, the total knowledge score indicates significant gaps in hypertension knowledge among the participants, with education and family history being strong determinants. These findings suggest that targeted educational interventions focusing on these sociodemographic factors could help improve hypertension awareness and management among non-hypertensive adults in Pakistan.

Table 3. Association of Sociodemographic Determinants with the Subdomains of Hypertension Knowledge Level Scale (HK-LS)

Variables	HK-LS Subdomens (Mean ± SD)					
	Disease Definition	Medical Treatment	Drug Compliance	Lifestyle	Diet	Complications
	Min–Max	Min–Max	Min–Max	Min–Max	Min–Max	Min–Max
	0–3	0–4	0–4	0–5	0–2	0–4
Sex						
Male	1.62 ± 1.21	2.14 ± 1.24	3.44 ± 1.55	5.36 ± 2.27	1.21 ± 042	2.31 ± 1.52
Female	1.66 ± 1.31	2.51 ± 1.15	3.31 ± 1.24	5.25 ± 2.21	1.11 ± 0.70	2.60 ± 1.46
p-Value[a]	0.876	0.003	0.324	0.075	0.631	0.301
Age Group						
18–30	1.50 ± 1.38	1.78 ± 1.33	2.26 ± 1.54	5.10 ± 2.00	0.78 ± 0.63	2.59 ± 1.59
31–40	1.58 ± 1.36	1.13 ± 1.25	2.35 ± 1.53	5.24 ± 1.73	1.04 ± 0.68	2.51 ± 1.55
41–50	1.48 ± 1.26	2.42 ± 1.41	2.54 ± 1.26	5.42 ± 1.28	1.38 ± 0.72	3.56 ± 1.71

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51–60	1.87 ± 1.34	2.38 ± 1.46	2.77 ± 1.22	5.42 ± 1.33	1.22 ± 1.35	2.63 ± 1.292
>60	1.75 ± 1.44	1.85 ± 0.83	2.62 ± 1.37	4.51 ± 1.42	1.44 ± 1.85	3.87 ± 1.23
p-Value[b]	0.650	0.034	0.094	0.185	0.229	0.732
Educational Level						
No Formal Education	1.41 ± 0.45	1.65 ± 1.24	1.81 ± 1.49	4.83 ± 1.46	0.79 ± 1.34	1.84 ± 1.76
Primary	2.17 ± 1.28	1.47 ± 1.35	2.67 ± 1.26	5.27 ± 2.56	1.56 ± 0.95	2.76 ± 1.45
Intermediate	1.34 ± 1.25	2.47 ± 0.89	1.37 ± 1.87	5.41 ± 2.55	1.29 ± 0.69	2.63 ± 1.97
Secondary	1.78 ± 1.38	1.41 ± 1.45	2.49 ± 1.49	5.44 ±1.78	0.75 ± 0.92	2.67 ± 1.93
Higher Education	1.30 ± 1.26	2.78 ± 1.39	2.76 ± 1.56	5.78 ± 1.78	1.37 ± 1.93	1.78 ± 1.07
p-Value[b]	<0.002	0.004	<0.002	0.001	0.204	0.090
Residency Area						
Urban	2.98 ± 1.64	1.23 ± 1.28	2.42 ± 1.36	5.47 ± 1.81	2.34 ± 1.10	3.68 ± 2.87
Rural	1.97 ± 1.35	2.57 ± 1.07	2.87 ± 1.33	5.87 ± 1.22	2.45 ± 1.21	3.56 ± 2.23
p-Value[a]	0.751	0.304	0.325	0.786	0.5633	0.344
Family History of HTN						
Negative	1.76 ± 1.55	3.56 ± 1.24	3.65 ± 1.33	5.41 ± 1.67	1.61 ± 0.94	4.54 ± 1.567
Positive	1.66 ± 0.87	3.44 ± 0.88	3.67 ± 2.34	5.67 ± 1.89	1.22 ± 0.89	4.65 ± 1.87
p-Value[a]	0.359	0.046	0.531	0.235	0.543	0.004
Source of Information about HTN						
Media	2.56 ± 1.34	2.78 ± 1.65	3.45 ± 1.63	5.34 ± 1.82	2.13 ± 0.53	2.65 ± 1.87
Healthcare Workers	2.56 ± 1.36	1.78 ± 1.97	2.72 ± 1.72	5.56 ± 1.97	1.87 ± 0.76	2.53 ± 1.65
Friends and Family Members	1.89 ±1.461.3	2.76 ± 1.34	3.87 ± 1.72	5.67 ± 1.76	1.86 ± 0.32	2.63 ± 1.47
Others	2 ± 1.67	2.67 ± 1.32	1.24 ± 1.62	5.53 ± 1.85	1.42 ± 1.53	3.13 ± 1.67
p-Value[b]	0.635	0.045	0.256	0.374	0.546	0.087
Total	1.68 ± 1.45	1.89 ± 1.73	2.987 ± 1.53	6.01 ± 1.23	1.12 ± 1.40	3.86 ± 1.95

DISCUSSION

This study aimed to explore the Knowledge of hypertension and identify determinants of inadequate awareness among non-hypertensive adult Pakistanis. The findings reveal significant gaps in hypertension knowledge, with various sociodemographic factors influencing the levels of understanding across different subdomains of hypertension knowledge. Our analys was shows that overall hypertension knowledge was inadequate among most participants. Only 33.64% demonstrated adequate Knowledge, while 66.36% had inadequate Knowledge. These findings align with previous studies conducted in similar contexts, which have also reported low levels of hypertension awareness in developing countries [1, 16, 17]. The study showed that there are slight differences in men's and women's knowledge levels. In the subdomains of Disease Definition, Lifestyle, Diet, Drug Compliance, and Complications, there were no statistically significant variations between the performance of males and females. Women outperformed men significantly in the Medical Treatment subdomain (mean score: 2.51 ± 1.15 versus 2.14 ± 1.24, p-value = 0.003). This suggests that women could know more about the medical aspects of managing hypertension. Gender differences in hypertension knowledge have also been observed in previous research conducted in low-income countries; these studies typically attribute women's greater awareness to their more frequent interactions with the healthcare delivery system [7, 11, 15]. The study discovered that participants who were younger (18-30 years) had poorer knowledge scores in Medical Treatment (mean score: 1.78 ± 1.33) and Drug Compliance (mean score: 2.26 ± 1.54). Participants aged 41-50 demonstrated the highest Knowledge in the Complications subdomain (mean score: 3.56 ± 1.71). Age substantially impacts Knowledge in the Medical Treatment subdomain, as indicated by the p-value of 0.034. The results suggest that older persons may be more knowledgeable or interested in understanding the effects of hypertension and available treatment options. Similar findings were made by K Mohanty S *et al.*, in 2021 and Cissé K *et al.*, in 2021: older adults in low- and middle-income nations are more knowledgeable about hypertension because of their higher risk and more frequent encounters with the illness. [18, 19]. Level of schooling was a significant predictor of hypertension knowledge. Respondents without formal education scored the lowest in Drug Compliance (mean score: 1.81 ± 1.49) and Complications (mean score: 1.84 ± 1.76). The results presented highlight the importance of education in promoting health literacy. Similarly, India (2020) and Sri Lanka (2020) revealed a favorable association between educational achievement and hypertension knowledge in Asian populations [20, 21]. The studies discovered no substantial differences in hypertension knowledge between urban and rural populations across all subdomains. This contrasts with

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prior studies, indicating that metropolitan inhabitants generally have better access to health information and services, resulting in greater Knowledge [22, 23]. This study's lack of significant variations could be attributed to a balanced mix of urban and rural participants and similar exposure to hypertension information across Pakistan's varied resident areas. Due to direct or indirect encounters with family members, individuals with a history of hypertension were more likely to be aware of the disease's treatment and complications. This result was in line with studies conducted in Uganda and India [10, 19], which showed how family history affects hypertension awareness and treatment. With a mean score of 3.87 ± 1.72, the participants who depended on friends and family exhibited greater knowledge of the Drug Compliance subdomain. These variations show the value of reliable sources in disseminating health information, even though none were statistically significant. Prior research has highlighted the contribution of social media and the media to raising public health awareness, especially in areas where access to healthcare was scarce [24, 25]. Limitation of the study was it was started with a cross-sectional design, which may offer a basic knowledge of hypertension and its origins. It was advised to do longitudinal research to gain a deeper understanding of the influence of each factor and how it interacts with different situations.

CONCLUSIONS

The study focuses on the variables affecting adult Pakistanis who were not hypertensive in their hypertension awareness. The Hypertension Knowledge Level Scale provides different degrees of understanding for different information sub-dimensions. The replies from the participants reveal significant ignorance of the causes, symptoms, and treatment of hypertension. Better health outcomes for Pakistan will result from addressing these variables through targeted educational initiatives that increase understanding of hypertension and its management.

Authors Contribution

Conceptualization: SH, SAB

Methodology: SH, SAB, SMW, JA, PP, DP

Formal analysis: SH, SAB, JA

Writing, review and editing: SH, SAB, SMW, JA, PP, DP

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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