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PREVALENCE OF PREHYPERTENSION AND HYPERTENSION AND THEIR ASSOCIATION WITH BODY MASS INDEX IN YOUNG FEMALE ADULTS OF HYDERABAD, PAKISTAN.

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ABSTRACT

BACKGROUND: Prevalence of prehypertension and hypertension has been reported as the cause of concern among young females. Higher blood pressure can have adverse outcomes among females. The increase in the prevalence of overweight and obesity has been the major factor for the increase in systolic and diastolic blood pressure. BMI has been used to measure overweight and obesity. This study is focused on the prevalence of prehypertension and hypertension among young female adults who are residing in Hyderabad, Pakistan. This study was conducted in female adults in the selected areas of Hyderabad Pakistan. The data was obtained by interview-based questionnaire. The data was collected only during the morning timing from 8.30 am to 10.30 am to have consistency in the data, the weight and height were measured as the standard protocols using the weight in kilograms and height in centimeters. BMI was calculated for the subjects using the standard formula. The Blood pressure was measured using the sphygmomanometer. The data was analyzed using the statistical software SPSS 22. All the ethical measures were kept into consideration before the collection of the data. Prevalence of hypertensions was higher 36% followed by hypertension 7.8% among the studied female subjects. The prevalence of hypertension was 17.6%and the prevalence of prehypertension was 27.2%. The prevalence of prehypertension and hypertension was significantly higher χ=1.78, $P < 0.05$ among the overweight and obese female adults. Similarly the BMI showed a positive significant correlation with both SBP r=0.401, P < 0.001 and DBP r= 0.443, P < 0.001. This study concludes the higher prevalence of prehypertension and hypertension among young female adults. The BMI showed a positive correlation with SBP and DBP. This is alarming and further study is needed to find out the intervention strategies. This study will help in making public health policies

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INTRODUCTION

The prevalence of prehypertension and hypertension among young female adults has been reported as a major public health concern, this is mainly due to the role of prehypertension and hypertension in maternal and child health [1, 2]. Several studies have documented the link of prehypertension and hypertension to lifestyle changes such as dietary habits, lack of physical activity, which often results to the obesity [3]. Obesity has been documented previously as the major risk factor for the prehypertension and hypertension [3].

Body Mass Index BMI is a crucial anthropometric indicator for the assessment of underweight, normal weight, overweight and obesity. Both overweight and obesity have been reported as the major factors for an increased risk of prehypertension and hypertension [4]. The study reported that even the modest gain in the weight has been linked to the increase in blood pressure [5], other studies have corroborated these findings, highlighting the dose-response relationship between BMI and hypertension risk [5, 6.]

Several studies from Pakistan highlighted the increasing burden of hypertension among young adults in Pakistan, with urban populations showing higher prevalence rates compared to rural areas [7-9]. The higher prevalence in urban areas was attributed to the change in lifestyles, increased stress levels and limited physical activity, which is often linked to the increased prevalence of obesity [9]. A study by Jafar et al. 2010 demonstrated a strong correlation between elevated BMI and hypertension in young Pakistani women, highlighting that even minor weight increases significantly impact blood pressure levels [10]. Similarly, research by Ahmed et al. 2015 explored the role of BMI in prehypertension, noting that overweight individuals were at a higher risk of transitioning to hypertension if weight control measures were not implemented [11, 12].

METHODLOGY

This cross-sectional study, which involved randomly selecting healthy female individuals from various parts of Hyderabad city, was conducted from January 2024 to December 2024. A pre-tested questionnaire based on interviews was used to gather the data. There were several sections on the questionnaire, each of which was separated into several elements. Although 400 adult females were chosen in total, 14 individuals were dropped because they were unwilling to provide blood samples or answer. Participants in the study had to be between the ages of 18 and 35; those who were under 18 or over 35 were not allowed to participate. Participants with any comorbidities were also not allowed to participate in the trial. The study did not include any females who were pregnant or nursing.

measurements related to anthropometry

Participants were measured for height in cm while standing barefoot and for weight in kilos while wearing light clothing. Weight in kilograms divided by height in square meters was used to compute the body mass index, or BMI.

MEASUREMENT OF BLOOD PRESSURE

The systolic & diastolic blood pressures were achieved via apparatus sphygmomanometer, beforehand quantities

of blood pressure, the contributors were inquired to be sat on relaxed seat.

STATISTICAL ANALYSIS

For statistical analysis, SPSS Statistical Package for Social Sciences version 22.0 was utilized. Prior to statistical analysis, the data was edited for any extreme values or errors after being imported to the SPSS spreadsheet. The association between the variables was determined using the bivariate correlation approach. Statistical significance was defined as P <0.05 and P <0.01, while high significance was defined as P <0.001.

RESULTS

Total 400 apparently healthy female participants were approached for the study, out of 400, 386 agreed to participate in the study giving the response rate of 96.5%. The mean age of the participants was 24.34±5.71 years with age range of 18-35 years. According to the table 1, the mean values of Height 156.81±7.45 cms, weight 61.58±13.86 kgs, BMI 24.98±5.16 kg/m^2, SBP 115.94±14.10 mmHg and DBP were 77.69±10.25 mmHg.

Table 1. General characteristics of the participants

Parameters	Mean±SD
Age years	24.34±5.71
Height cm	156.81±7.45
Weight kg	61.58±13.86
BMI kg/m^2	24.98±5.16
SBP mmHg	115.94±14.10
DBP mmHg	77.69±10.25

Abbreviations: BMI, body mass index; WC; SBP, systolic blood pressure; DSB, diastolic blood pressure

Table 2 shows the prevalence of Prehypertension and Hypertension, which were 36% and 7.8% respectively. The female participants with normal blood pressure were 56.2%. According to the table 2 the prevalence of underweight was 9.6% and the normal weight was 45.6%, the prevalence of the overweight and obesity was 27.2% and 17.6% respectively.

Measure	Frequency	Percentage
Body Mass Index Category		
Underweight < 18.5 kg/m^2	37	9.6
Normal weight 18.5-24.99 kg/m^2	176	45.6
Overweight 25-29.99 kg/m^2	105	27.2
Obese ≥30 kg/m^2	68	17.6
Blood Pressure Category		
Normal blood Pressure <120/80mmHg	217	56.2
Pre-hypertension 120-139/80-89 mmHg	139	36
Hypertension ≥140/90 mmHg	30	7.8

Table 3 shows the BMI category and its association with normal blood pressure, prehypertension and hypertension. Hypertension was reported higher in obese participants, followed by overweight participants. Prehypertension was higher in overweight followed by obese, normal weight and underweight. These findings were statistically significant $\chi 2$= 1.78, *P*-value < 0.05.

BMI Category	Normal		Prehypertension		Hypertension		$\chi 2$	*P*-Value
	n	%	n	%	n	%		
Underweight	33	89.2	4	10.8	0	0	1.78	< 0.05
Normal Weight	147	83.5	29	16.5	0	0		
Overweight	25	23.8	69	65.7	11	10.5		
Obese	12	17.6	37	54.4	19	27.9		

According to the table 4 age was positively correlated with SBP r=0.401, P < 0.001 nad DBP r= 0.443, P < 0.001. Height showed no significant correlation with SBP and DBP P >0.05. Both weight and BMI showed a strong positive correlation, these results were statistically significant P < 0.001.

Variables	SBP		DBP	
	r-value	*P*-value	r-value	*P*-value
Age years	0.401	< 0.001	0.443	< 0.001
Height cm	0.-.014	> 0.05	0.013	> 0.05
Weight kg	0.482	< 0.001	0.581	< 0.001
BMI kg/m^2	0.535	< 0.001	0.635	< 0.001

DISCUSSION

Pakistani female population has a predisposition towards overweight and obesity due to a lack of physical activity and availability of grounds for walking, jogging, and exercise. This along with bad dietary habits and hormonal influences may contribute to the increase in BMI, even a slight increase in BMI is linked with an increased risk of prehypertension and hypertension. An increase in prehypertension and hypertension are the precursors for cardiovascular diseases in the future. In addition, prehypertension and hypertension in females of reproductive age has consequences for the pregnancy and outcome of pregnancy.

The prevalence of prehypertension in this study was 36%, this finding is consistent with the prevalence of prehypertension in the Indian female population 36.7%, and this is alarming since the age range in our study is lower 18-35 13. The prevalence of prehypertension in our study was reported higher than Bangladesh and Nepal 13. Similarly, the prevalence of hypertension in our study was 7.8% which is lower than Bangladesh 21%, India 12.6% and Nepal 10.9%, the lower prevalence of hypertension in our study might be because female participants in our were aged between 18-35 years 13.

The prevalence of overweight in this study was higher 27.2% than in previously published studies in Pakistan 14.7%, however, the prevalence of obesity was lower in our study 17.6 than in previously published study 48.7% 14. The lower prevalence in this study is due to the lower mean age of participants 14. Regarding prevalence of obesity, quite similar findings were observed in the previously published study, however, the prevalence of overweight in our study was higher 15. According to the BMI categories, the prevalence of prehypertension in this study was higher in over weight category, comparing with Bangladesh, India and Nepal, however, the prevalence of hypertension was lower in this study compared with other south Asian countries 1. The prevalence of prehypertension and hypertension in obese category in our study was higher than other south Asian countries.

The correlation values between Body Mass Index BMI and systolic blood pressure SBP 0.535 and diastolic blood pressure DBP 0.635 in our study highlight a moderately strong positive relationship. This indicates that as BMI increases among the female subjects studied, both SBP and DBP tend to rise 16, 17. These findings are consistent with the global literature and underscore the role of adiposity in the development of hypertension 17. The correlations found in our study align with similar research conducted globally, which often reports moderate to strong positive correlations between BMI and blood pressure 17. For instance: A study in the United States found correlations of 0.40-0.60 between BMI and BP across diverse populations. Research from other South Asian countries, such as India and Bangladesh, has shown similar patterns, with women being disproportionately affected due to

higher rates of obesity and metabolic syndrome.

CONCLUSION

This study provides an insight into the understanding of obesity and prehypertension and hypertension. The findings in this study suggest an increase in prehypertension and hypertension, which is alarming and needs to be addressed for preventing the future cardiovascular diseases. In addition there is an urgent need to devise public health strategies that include early identification of prehypertension and hypertension, community awareness programs, and targeted interventions to reduce BMI and consequently reduce the risk of prehypertension and hypertension.

ETHICS APPROVAL: Before collection of data the study was approved by the Institutional Review Board of the Department of Physiology, Faculty of Natural Sciences, University of Sindh, Jamshoro. Informed verbal consent was obtained from the participants before the collection of data. Objectives of the study were explained to the participants of the study and all those who agreed to participate in the study were included in the study

CONSENT TO PARTICIPATE: Written and verbal consent was obtained from all subjects.

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CONFLICT OF INTEREST: The authors declare no competing interests.

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