

CORRELATION OF BODY MEASUREMENTS AND EXERCISE WITH BLOOD PRESSURE AMONG MEDICAL STUDENTS IN LAHORE

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ABSTRACT

Objective: To find out correlation of body measurements and exercise with blood pressure among medical students in Lahore, Pakistan.

Study Design: Correlational study.

Place and Duration of Study: Akhtar Saeed Medical and Dental College, Lahore, from May to Jul 2018.

Methodology: A sample of 332 students was recruited through simple random sampling technique. Resting blood pressure in sitting position along with body mass index of respondents were taken after informed consent.

Results: Mean age of respondents was 21.06 ± 1.53 years. Mean sitting systolic blood pressure was 117.5 ± 8.24 mm Hg, Mean sitting diastolic blood pressure was 77.9 ± 7.05 mm Hg. Significant association was found between weight and both Systolic ($r=1, p \leq 0.00$) and Diastolic ($r=0.01, p=0.05$) blood pressure. Height was negatively correlated with systolic blood pressure ($r=-0.004$) and diastolic blood pressure ($r=-0.07$). Body mass index was also significantly associated with systolic blood pressure ($r=1, p \leq 0.00$) and diastolic blood pressures ($r=0.14, p=0.00$). Significant association is found between systolic blood pressure and exercise with number of days ($r=-0.15, p=0.05$) and diastolic blood pressure ($r=-0.11, p=0.00$) and duration of exercise with systolic blood pressure ($r=-0.13, p=0.01$) and diastolic blood pressure ($r=-0.16, p=0.04$).

Conclusion: Weight and Body mass index are positively correlated with systolic and diastolic blood pressure.

Keywords: Blood pressure, Body mass index, Exercise, Weight.

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INTRODUCTION

Hypertension is one of the known diseases of public health importance, associated with high mortality and disability worldwide.¹ Recent statistics of WHO show that global prevalence of this non-communicable disease exceeds 1.3 billion.² It is expected that in coming five years, prevalence of this disease to be expected to increase by 9% in men and 13% in women due to change in population dynamics.³ Existence of hypertension in youth is associated with severe consequences resulting from cardio vascular accidents. Pre-hypertension leading to hypertension, has greatest global share of deaths from cardiovascular, cerebral (stroke), and renal disease.⁴ The prevalence of hypertension was 17.9% in Bangladesh; 23.9% in Bhutan; 31.4% in India; 31.5% in Maldives; 33.8% in Nepal; 25% in Pakistan; and 20.9% in Sri Lanka.⁵

Hypertension is not only the dilemma of developed countries but it trickles down to the countries with lower socioeconomic status too. A study was conducted in Nigerian schools which showed that 4.7% of the

school children were diagnosed with stage I hypertension.⁶ Multiple predictors of hypertension include old age, weight, height, BMI, salt intake, smoking, exercise routine, family history and stress.⁷ A study was conducted in Ethiopia on 2200 participants revealed that association of hypertension with old age, diabetes, alcohol consumption and high BMI.⁸

A study conducted in Faisalabad, Pakistan in 2017 among medical students showed high BMI and stress has strong association with pre-hypertension.⁹ It is important to identify hypertension in younger population and to track them in future to avoid associated comorbidities.¹⁰ There is dearth of knowledge about prevalence of hypertension in college and university students in Pakistan. This study aims to find out prevalence of hypertension among students of a medical university and correlate its presence with multiple risk factors associated with it.

METHODOLOGY

Written informed consent was taken from study participants along with the Ethical approval from Institutional Review Board (Ref no. M-19/048/CM). This cross-sectional study was conducted among students of Akhtar Saeed Medical and Dental College

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(AMDC) from May to July 2018. Rao soft sample size calculator was used for sample size estimation. A sampling frame was constructed including all the students of AMDC (1500). A sample size of 306 was calculated keeping confidence level of 95%, margin of error 5% and prevalence taken was 32% from the study conducted in year 2017 in Ghana.¹¹ A sample of 332 students was recruited by using simple random sampling technique through computer-generated numbers. In order to overcome deficient information or errors in recording information, 32 students were added to make a sample size of 340. On data cleaning, 332 questionnaires were found fit for analysis.

Inclusion Criteria: All the students studying in AMDC constituent colleges were included in the study.

Exclusion Criteria: Those students, who are already hypertensive, were excluded from the study.

A questionnaire designed for this study was pre-tested and after necessary changes modified for final data collection. All the students were briefed about administration of the questionnaire. Resting blood pressure in sitting position and body mass index of the respondents was measured, calculated, and recorded in the questionnaire in addition to other information collected.

The data collected was reviewed for quality assurance and subsequently after coding of the questionnaire, entered into Statistical Package for Social Sciences (SPSS) for analysis of results. verbal consent was taken from all respondents and only those respondents were interviewed and their blood pressure checked who agreed to participate in this study. Furthermore, all matters related to ethical conduction of the study with confidentiality of the respondents was observed. After data entry, Pearson’s correlation model was applied between factors affecting blood pressure. Correlation was agreed upon with values of r ranging between (-1, 0, +1) and p-values were considered at ≤0.05 for significant associations.

RESULTS

Among 332 students taken as sample 109 (33%) were males and 223 (67%) were females. Students were categorized according to age group and maximum response was obtained from group ranging from 21-24 years include 205 students (61%). Among 332 students 256 (77%) were MBBS students. Out of these 332 students, 167 (50.3%) students had a positive family history of hypertension (Table-I).

Mean age of respondents was 21.06 ± 1.53 years. Mean sitting systolic blood pressure was 117.5 ± 8.24 mm Hg, Mean sitting diastolic blood pressure was 77.9 ± 7.05mm Hg. Mean weight and height were respectively observed as 62.77 ± 12.60 in kg and 1.65 ± 0.11 in meters. Out of 332 participants, only 143 responded that they indulge do exercise. Mean duration of exercise per day in these 143 participants was 37.65 ± 22.98 min and mean number of days of exercise were 4.89 ± 1.69 (Table-II).

Table-I: Socio-demographic profile of the respondents (n=332).

Parameters	n (%)
Gender	
Male	109 (33)
Female	223 (67)
Age in Years	
17-20 years	127 (38)
21-24 years	205 (61)
>24 years	4 (1)
Specialty Distribution	
MBBS	256 (77)
BDS	30 (9)
D-Pharmacy	31 (9.3)
DPT	15 (5)
Family History of Hypertension	
Positive	167 (50.3)
Negative	165 (49.7)

Table-II: Mean and standard deviation of personal characteristics of respondents (n=332).

Parameters	Mean ± SD	Minimum	Maximum
Age of respondents in years	21.06 ± 1.53 years	17	27
Sitting systolic BP of respondents	117.5 ± 8.24mm Hg	100	150
Sitting diastolic BP of respondents	77.9 ± 7.05mm Hg	60	110
Weight of respondents in kg	62.77 ± 12.60kg	40	110
Height of respondents in meters	1.65 ± 0.11m	1.28	1.92
BMI of respondents	22.78 ± 3.96	14.5	38.68
Duration per day spent in exercise in minutes (n=143)	37.65 ± 22.98min	10	120
No. of days exercised in a week (n=143)	4.89 ± 1.69 days	1	7

Results showed that out of 332 students, 5 (1.5%) students had systolic BP above 140 mmHg and were labelled as hypertensive after three different readings in different occasions on follow up. While readings of diastolic BP revealed that 34 (10.2%) had sitting diastolic BP >90mm Hg.

Pearson correlation test was applied to assess the relationship of factors affecting systolic and diastolic BP of participants. Significant association was found between weight and both Systolic ($p < 0.001$) and Diastolic ($p = 0.054$) BP. BMI was also significantly associated with high blood pressures. Significant association is found between BP and exercise with number of days and duration of exercise (Table-III).

Table-III: Correlation of factors affecting systolic and diastolic blood pressure.

Correlations	Systolic Blood Pressure		Diastolic Blood Pressure	
	r	p-value	r	p-value
Correlation with weight	1	<0.001	0.106	0.054
Correlation with Height	-0.004	0.946	-0.078	0.154
Correlation with BMI	1	<0.001	0.145	0.008
Correlation with Duration of Exercise /day min	-0.138	0.010	-0.169	0.043
Correlation with number of days in week	-0.156	0.050	-0.115	0.002
Correlation with age in years	0.068	0.214	0.007	0.898

Scatter diagram shown predict the correlations of systolic and diastolic blood pressure with weight and BMI of the participants (Figure-1 & 2).

DISCUSSION

In recent years, hypertension has shown tremendous increase in prevalence in younger population worldwide.¹² In this study, results showed that prevalence of systolic hypertension was 1.4% and diastolic hypertension was 10.4% in medical students. In a recent study of Libya, pre-HTN was detected in 27.1% of the students and hypertension in 2.2% of the students.¹³ A similar study was conducted in university students of Malaysia, which showed that 8.2% of the students had hypertension. Study showed that mean systolic blood pressure was 119.1 mmHg with standard deviation of 14.36 and the mean diastolic blood pressure was 72.6 mmHg with Standard Deviation of 9.73.¹⁴ In a study conducted in medical students of Saudi Arabia, hypertension was detected in 1.5% of the male students but prehypertension was detected with much higher rates where 52.1% of females and 58.8% of males, in undergraduate medical school were prehypertensive.¹⁵

Multiple factors play a key role in the development of hypertension. Findings of this study showed results where high blood pressure is associated with weight. A study was conducted in medical students of Saudi Arabia to assess the co-morbidities associated with obesity. Almost 11% of the obese medical students were identified to have hypertension.¹⁶

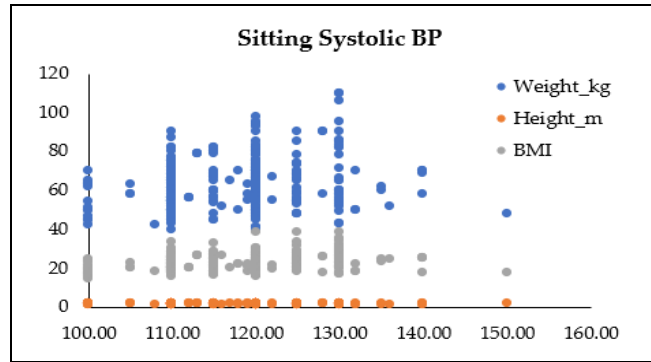


Figure-1: Correlation of sitting systolic blood pressure with weight and body mass index (n=332).

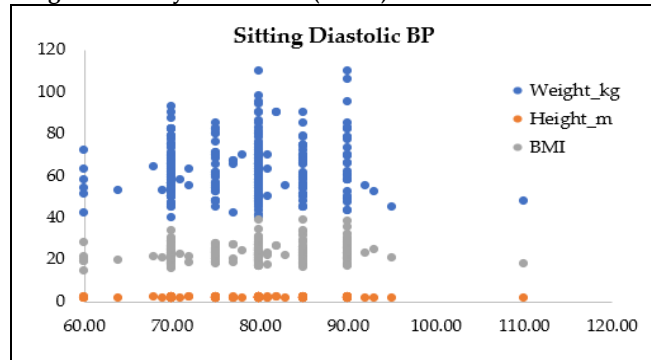


Figure-II: Correlation of sitting diastolic blood pressure with weight and body mass index (n=332).

Results of this study showed no association with height of students with their systolic and diastolic blood pressure. Literature reveals that A 10cm increase in height was related to a 7%-point reduction in hypertension in growing population. Stronger relationship was revealed in adult population.¹⁷

Another strong predictor of high blood pressure is BMI. Results of this study revealed positive correlation between the two. Similar findings were obtained from different studies which depicted stronger positive correlation of BMI with development of hypertension.^{18,19} Another factor which affects the prevalence of hypertension is life style. It is now a documented fact that regular exercise prevents hypertension by disrupting the correlation between sympathetic activity and age-related increasing blood pressure.²⁰ A strong negative correlation was observed with number of days of

exercise and duration of exercise with raised blood pressure in this study. Results of meta-analysis showed similar findings.²¹ With incorporation of healthy life style, in terms of regular exercise hypertension can be prevented as well as it can reduce blood pressure in hypertensive patients.

CONCLUSION

Strong positive correlation was observed between obesity and BMI with hypertension. Regular exercise and longer duration of exercise are negatively correlated with blood pressure.

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Conflict of Interest: None.

Authors' Contribution

IM: Conception, data analysis, writing, AM: Methodology, IM: Data collection, literature review.

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