

A STUDY TO ANALYZE THE SIGNIFICANCE OF BOTH RIGHT AND LEFT SIDE BLOOD PRESSURE AND ITS CORRELATION WITH ANTROPOMETRIC MEASUREMENTS.

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ABSTRACT:

BACKGROUND STUDY: Epidemiological studies find a progressive increase in the prevalence of elevated blood pressure. In the recent decades, several cross-sectional studies have shown that anthropometric measurements are closely related with right and left blood pressure components but it still remains unclear to what extent which variable is exactly and strongly correlated.

MATERIALS AND METHODS: A cross sectional experimental study was carried out by using convenient sampling technique (75subjects) within the age group of 18 to 25 years. Both right and left side blood pressure along with height, weight and BMI were monitored and assessed. The obtained data was analyzed using descriptive statistics method.

RESULTS: Using Pearson's correlation coefficient, the obtained mean value is 19.66 ± 1.58 which shows a positive correlation between blood pressure and anthropometric measurements.

CONCLUSION: The study concludes that there is significant correlation between right and left blood pressure components and anthropometric measurements.

INTRODUCTION:

Epidemiological studies have found that the prevalence of blood pressure has been steadily and progressively increasing worldwide, and comprises a major health issue as it is highly associated with mortality, morbidity, and risk of various cardiovascular diseases²³. Atherosclerotic changes of the arterial wall begin at a young age, even in so called evidently healthy children and teenagers. Levels of blood pressure and other cardiovascular risk factors in childhood continue over time and combined effect of both childhood and adulthood, influence subsequently various clinical cardiovascular disease¹⁸. This suggests that early acquired risks tracks into adulthood, but the origins of such risks still remain uncertain.

Over 28% of Indian adults are hypertensive, says ICMR survey. For both women and men, the southern states have a higher prevalence of hypertension than the national average.³⁰ The National NCD Monitoring Survey (NNMS), which studied those who are aged between 18 and 69 years, has found that 28.5% of adults in India are hypertensive. They surveyed using a multi-stage cluster sampling which involved individuals in the age range of 15-69 years. The estimated sample size for the survey was 12,000 adults (18-69 years) and 1,700 adolescents (15-17 years). The survey report said that the mean systolic and diastolic blood pressure (including people taking medication for hypertension) among adult respondents was 124.1 mmHg and 80.9 mmHg, respectively.³⁰

National NCD Monitoring Survey (NNMS) Among the 10,592 adult respondents aged 18-69 years, 28.5% had high blood pressure, of which 27.9% were aware of their high blood pressure status. Of those who were aware, 52.1% were on medication and of those who were on treatment, 44.4% had their blood pressure in control.

Hypertension, with all its varieties, affects the entire spectrum of the population, including men, women, and even the children. Hypertension is estimated to contribute to 9.4 million deaths each year worldwide⁹. Compared with the year 2000, the number of adults with hypertension is highly predicted to increase by 60% to a total of 1.56 billion by the year 2025.²¹

The cardiac cycle is a series of pressure changes that take place within the heart during every heart beat, which constitute as BLOOD PRESSURE. These pressure changes result in the circulation of blood through four chambers of the heart and the body as a whole. Cardiac cycle has two events taking place one is systole and the other one will be diastole. Systole and diastole occur in both the right and left heart, though with different pressures. Systole begins when the mitral valve (or tricuspid) closes and concludes with the closure of the aortic valve (or pulmonary). This stage of the cardiac cycle represents ventricular contraction that is forcing blood into the arteries. When a ventricle contracts, the pressure within the ventricles will become greater than adjacent blood vessels, and the valves will allow the blood to eject out. Diastole represents ventricular filling, and systole represents ventricular contraction/ejection. Diastole begins with the closing of the aortic valve (or pulmonary) and ends with the closing of the mitral valve (or tricuspid). This period comprises the ventricular relaxation and filling. Diastole represents when the blood vessels return blood to the heart for the preparation of the next ventricular contraction.^{31.32}

In the recent years, under the United States National Institutes of Health (NIH)'s guidelines many prospective and cross sectional studies have been done which stress the importance of anthropometric measurements that seems to be highly related with blood pressure, a central indicator for the development of cardiovascular diseases.¹⁹

Although previous reports have shown an association between high BMI and hypertension, fewer studies have surveyed the relationship between hypertension and other anthropometric indices that are representative of body fat distribution.²⁰ Nevertheless there are still some debates on an obesity-based index which predicts the risk of cardiovascular diseases.¹⁷ Since it is essential to determine among all the anthropometric indices which are more associated with hypertension, the present study was carried out to evaluate these relationships.

Despite the significance of anthropometric measurements is vital in the maintenance of blood pressure no studies have investigated on how far it is strongly correlated with blood pressure components.

Therefore, the objective of this study is to identify the association between anthropometric variables and blood pressure levels among people with age group between 18 to 25 years. In addition, we seek to evaluate which, among the variables studied, are with the strongest and significant correlation with blood pressure levels. Thus, by means of its results, this study will contribute to the investigation of a more effective screening and an adequate planning of preventive measures.

In this study we aimed to investigate the anthropometric variables – height, weight, body mass index (BMI), with left Systolic Blood Pressure and Diastolic Blood Pressure and right Systolic Blood Pressure and Diastolic Blood Pressure.

METHODOLOGY:

RESEARCH DESIGN : Cross sectional (experimental design) study

STUDY SETTING :MeenakshiFaculty of physiotherapy Outpatient department
MAHER, virugambakkam,Chennai-

SAMPLING TECHNIQUE: convenient sampling

SAMPLE SIZE: 75 (statistically calculated)

INCLUSION CRITERIA:

- Age group between 18 to25
- Both male and female individuals
- Healthy volunteers

EXCLUSION CRITERIA:

- People suffering from migraine
- Bedridden patients
- Subjects who were on long term medications for juvenile hypertension
- Neurological disorders
- Non cooperative patients
- Clinically psychiatric patients

MATERIALS USED:

- ❖ Digital sphygmomanometer
- ❖ Agaro electronic weight scale
- ❖ Stadiometer scale



DIGITAL SPHYGMANOMETER



STADIOMETER SCALE ELECTRONIC WEIGHT SCALE

PROCEDURE:

A total of 75 subjects were selected who have fulfilled the inclusion criteria, simplicity of the procedure was explained to them clearly and they were provided with informed consent prior to the study.

Each subject's blood pressure was checked using a standardized protocol. The subjects were rested in optimal room conditions for at least 10 minutes in relaxed sitting position with their arms being supported at the level of the heart. Subjects were instructed to be with light clothing (no tight clothing constricting the arm). Blood pressure measurements were taken individually from both right and left arms in mild flexion with digital sphygmomanometer. SBP was accepted as the first korotkoff sound phase (appearance of first heart sound). DBP was accepted as fifth phase (disappearance of heart sound).



MEASURING BP LEFT SIDE



MEASURING BP RIGHT SIDE

FIGURE 6 MEASURING BP BOTH RIGHT AND LEFT SIDES

Every person's weight was checked with an electronic weight scale using kilograms. Individuals were instructed to stand still without shoes and have their feet centered on the scale platform and with light clothing.

Height was checked with a stadiometer scale using centimeters. Subjects were asked to have their heels, buttocks and heels touching the scale or as close to it as possible and look straight forward.



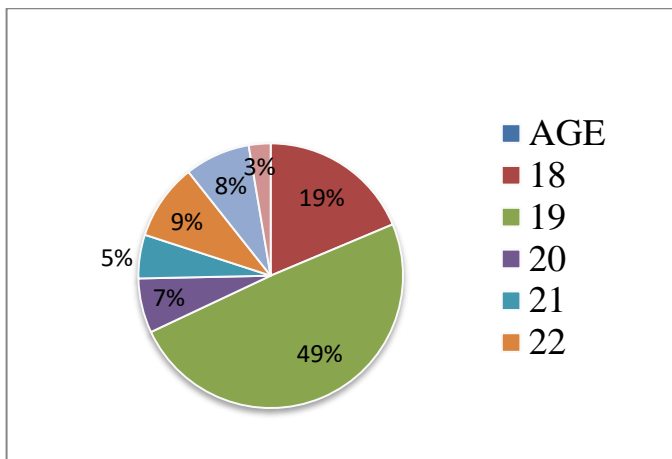
MEASURING HEIGHT

Body mass index (BMI) was calculated using the standard formula $BMI = \text{weight in (kg)} / \text{height in (m}^2\text{)}$. Individuals were classified under BMI guidelines of world health organization (WHO).

STATISTICAL ANALYSIS:

The values obtained were recorded and analyzed using descriptive statistics. The average mean age was 19.66 ± 1.58 .

AGE RANGE (Years)	NO OF SUBJECTS (N)
18-20	56
21-24	19



Using PEARSON correlation coefficient, the collected data was calculated statistically and the obtained results were tabulated.

	HEIGHT	WEIGHT	BMI	R (SYSTOLE)	R (DIASTOLE)	L (SYSTOLE)	L (DIASTOLE)
HEIGHT	1	0.55	0.08	0.37	0.27	0.53	0.39
WEIGHT	*	1	0.87	0.33	0.44	0.39	0.50
BMI	*	*	1	0.19	0.35	0.16	0.36
R (SYSTOLE)	*	*	*	1	0.40	0.57	0.31
R (DIASTOLE)	*	*	*	*	1	0.26	0.59
L (SYSTOLE)	*	*	*	*	*	1	0.49
L (DIASTOLE)	*	*	*	*	*		1

RESULTS

Anthropometric measurements and right and left blood pressure were recorded for a total of 75 adults (60 female and 15 male) between the age group 18 to 25 years. The values were recorded and analyzed. The average mean age of the study was 19.66 ± 1.58 . The following results were obtained,

- Weight has a strong and positive correlation with and BMI.
- Height is positively correlated with weight.
- The correlation between height and Left systole is significant.
- Also, the correlation between weight and Left diastole is significant.
- Left systole and right systole has a positive correlation.
- Also, left diastole and right diastole has a positive correlation.
- The correlation between left systole and left diastole is less significant or nearly significant.

DISCUSSION:

The results obtained in the current study shows statistically significant positive correlation between right and left SBP (systolic blood pressure) and DBP (diastolic blood pressure) components and anthropometric variables.

The significant association of BMI with weight is also evident among males and females of the present study. These findings are in agreement with other studies,^{8,4,20} which support a strong relationship between BMI, weight and blood pressure. Strong relationship of fat percentage with both SBP and DBP among both males and females was also observed in the present study. Having more fat tissue can cause complex changes in the body that combine to create or worsen hypertension. Those changes include: sympathetic nervous system over activation, stimulation of the renin-angiotensin-aldosterone (RAAS) system, changes in adipose-derived cytokines (hormones), insulin resistance, changes to the kidneys and their function.²⁴

Body weight which is correlated with left diastole, In fact, there is ample evidence that the accumulation of adipose tissue may determine cardiovascular alterations in several metabolic and neuro hormonal pathways, causing abnormalities in sodium handling, neuro endocrine activation, the renin-angiotensin-aldosterone system, and increasing myocardial oxidative stress. Changes in myocardial metabolism have been demonstrated in obese patients, with a shift toward free fatty acid utilization and subsequent cardiac lipotoxicity, resulting in cardiomyocyte apoptosis and reduced cardiac efficiency. In particular, myocardial fatty infiltration in obese patients may affect the cardiac structure and function, leading to the development of severe diastolic dysfunction.^{24,7,14,17}

In a study Berktenberklap concluded that obese subjects had greater left ventricular mass index and ejection fraction shortening than normals. Isovolumic relaxation time was prolonged in the obese group. The ratio of peak early and atrial filling velocities was significantly lower and atrial contribution was higher in obese subjects than in normal's. Shortened deceleration time was measured in obese subjects. In conclusion, obesity causes relaxation and early filling abnormalities and diastolic filling is compensated by augmented atrial contribution. Diastolic dysfunction is an early indicator of cardiac involvement in obesity.^{7,9}

CONCLUSION:

This study proves evidently that there is significant correlation between right and left blood pressure components and anthropometric measurements. Hence we conclude that practice of measuring blood pressure in both left and right side should become mandatory in the upcoming future time.

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