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ASSOCIATION BETWEEN BLOOD PRESSURE WITH ANTHROPOMETRIC MEASURES AND CONICITY INDEX IN YOUNG ADULTS

Ashwani Buddhisagar Mishra[1], Kanika Brahme[2], Harshita Tripathi[3], Ashish Kumar Sharma[4*] Ekta Dwivedi[5], Chandra Bhushan Pandey[6]

[1]Tutor, Department of Physiology, Autonomous State Medical College, Kushinagar, Uttar Pradesh, India

[2]Assistant professor, Department of General Medicine, Madhav Prasad Tripathi Medical College, Siddharthnagar, Uttar Pradesh, India

[3]Tutor, Department of Anatomy, Autonomous State Medical College, Kushinagar, Uttar Pradesh, India

[4]Assistant professor, Department of Biochemistry, Madhav Prasad Tripathi Medical College, Siddharthnagar, Uttar Pradesh, India

[5]Assistant Professor, Department of Pathology, Madhav Prasad Tripathi Medical College, Siddharthnagar, Uttar Pradesh, India

[6]Assistant Professor, Department of General Surgery, Madhav Prasad Tripathi Medical College, Siddharthnagar, Uttar Pradesh, India

***Corresponding Author:Ashish Kumar Sharma**

Assistant Professor,Department of Biochemistry,Madhav Prasad Tripathi Medical College, Siddharthnagar, U.P.Email: ashishgrmcg@gmail.com

Abstract:

Background: Anthropometric measurements and indicators of body fat distribution are key factors in the development of hypertension, a condition that is becoming more and more of a health concern among young adults. This study examines the relationship between young adults blood pressure (BP), body mass index (BMI), waist-to-hip ratio (WHR), and Conicity Index. **Methods:** A cohort of young adults participated in a cross-sectional study. The Conicity Index, WHR, and BMI were among the anthropometric measurements that were noted. A standard procedure was used to measure the diastolic and systolic blood pressures. To evaluate the connections between the variables, correlation analysis was done.

Results: There was a marginally significant positive correlation between BMI and systolic blood pressure (r = 0.143, P-value = 0.156). BMI and diastolic blood pressure did, however, show a moderately positive correlation (r = 0.252, P-value = 0.011), which was statistically significant at

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the 0.05 level. At the 0.01 level, WHR showed a moderately positive correlation with both diastolic blood pressure (r = 0.279, P = 0.005) and systolic blood pressure (r = 0.257, P-value = 0.01). Systolic blood pressure (r = 0.329, P-value = 0.001) and diastolic blood pressure (r = 0.334, P-value = 0.001) showed a strong positive correlation with the Conicity Index; these results were also significant at the 0.01 level.

Conclusion: The findings highlight the importance of WHR and the Conicity Index as better indicators of BP variations compared to BMI in young adults. This implies that indicators of central obesity might have more significant effects on the early detection and treatment of hypertension risk in this population.

Keywords: Blood pressure, Conicity index, BMI, Waist hip ratio, hypertension**.**

Introduction: Hypertension, commonly known as high blood pressure, is a significant global health issue that affects millions of individuals worldwide. It is a major risk factor for cardiovascular diseases (CVD), including heart disease and stroke, and contributes significantly to morbidity and mortality rates [1]. As per World Health Organization (WHO) reports, the global prevalence of hypertension has been rising steadily over the past few decades in low- and middle-income countries [2]. The escalating prevalence of hypertension is primarily driven by factors such as aging populations, unhealthy diets, physical inactivity, and increasing rates of obesity [3].

Maintaining normal blood pressure is vital for overall health. Elevated blood pressure can cause damage to the heart, arteries, kidneys, and other organs, leading to conditions such as myocardial infarction, heart failure, chronic kidney disease, and stroke [4]. The importance of

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early detection and intervention cannot be overstated, as managing hypertension can significantly reduce the risk of developing these severe health issues.

While hypertension is often associated with older adults, it can develop at a young age, making early identification and management crucial. The prevalence of hypertension in young adults has been rising, driven by increasing rates of obesity and sedentary lifestyles. Factors such as poor diet, lack of physical activity, excessive alcohol consumption, and smoking contribute to the development of hypertension in young adults age group [5].

Anthropometric measures like Body Mass Index (BMI), waist hip ratio and the conicity index are non-invasive, simple, and cost-effective methods used to assess and monitor body composition. These measures are commonly used in clinical and public health settings to evaluate the nutritional status, physical development, and health risk factors of individuals [6, 7].

Young adulthood is a critical period for establishing lifelong health behaviors. During this stage, individuals often experience significant lifestyle changes, such as increased independence, changes in dietary habits, physical activity levels, and stress, which can influence cardiovascular health. Early identification and management of hypertension in young adults are crucial for preventing chronic health issues later in life [8]. Therefore, This study aims to investigate the association between blood pressure and various anthropometric measures, including the conicity index, in young adults.

Material and Methods

Study Design and Setting: This cross-sectional study was conducted at Department of Physiology, Integral Institute of Medicals Sciences & Research, Lucknow. The Institutional

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Ethics Committee granted ethical clearance, and each participant provided written informed consent.

Study Population: For the study, young adults between the ages of 18 and 25 were recruited. People without a history of diabetes, cardiovascular disease, or other chronic illnesses were eligible to apply. Participants taking antihypertensive drugs, pregnant women, and those with insufficient information were all excluded.

Sample Size: 100 participants were included in this study.

Data Collection: Participants were assessed for:

Blood Pressure (BP): Blood pressure was measured using a validated automated sphygmomanometer (Omron HEM-907XL). Three readings were taken after the participant had rested for at least 5 minutes in a seated position. The average of the three readings was recorded as the BP.

Anthropometric Measurements:

Body Mass Index (BMI): Height and weight were measured using a stadiometer (SECA 213) and a digital weighing scale, respectively. BMI was calculated using the formula: BMI = weight (kg) / height (m^2).

Waist hip ratio (WHR): Waist Circumference was measured at the midpoint between the lowest rib and the iliac crest using a non-stretchable measuring tape (SECA 201). Hip

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Circumference was measured at the widest part of the hips to the nearest 0.1 cm using the same measuring tape.

Conicity Index (CI): The conicity index was calculated using the formula:

$$CI = \frac{\text{Waist Circumference (cm)}}{0.109\sqrt{\frac{\text{Weight (kg)}}{\text{Height (m)}}}}$$

Data Analysis: Variables were expressed as mean ± standard deviation (SD). Data were analyzed using SPSS (Statistical Package for the Social Sciences) version 26.0. The association between Variables was assessed using Pearson correlation coefficient (for normally distributed data). A p-value of <0.05 was considered statistically significant.

Observation and Results: Mean and standard deviations (SD) of variables in young adults were shown in table 1. The correlation of BMI, WHR and Conicity Index with systolic BP and diastolic BP in young adults were shown in table 2. There was a marginally significant positive correlation between BMI and systolic blood pressure (r = 0.143, P = 0.156). BMI and diastolic blood pressure did, however, show a moderately positive correlation (r = 0.252, P = 0.011), which was statistically significant at the 0.05 level. At the 0.01 level, WHR showed a moderately positive correlation with both diastolic blood pressure (r = 0.279, P = 0.005) and systolic blood pressure (r = 0.257, P = 0.01). Both systolic blood pressure (r = 0.329, P = 0.001) and diastolic blood pressure (r = 0.334, P = 0.001) showed a significant positive correlation with the Conicity Index; these results were also significant at the 0.01 level.

Table 1: Showing the Mean and standard deviations (SD) of variables in young adults

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Parameters	Mean	SD
Age	20.48	1.46
Weight (kg)	68.88	15.61
Height (m)	1.70	0.10
Body Mass Index (BMI)	23.72	4.37
Waist Circumference (cm)	83.09	10.12
Hip Circumference (cm)	93.05	10.92
Waist-Hip Ratio	0.89	0.07
Waist-Height Ratio	0.49	0.05
Systolic BP	117.20	10.61
Diastolic BP	80.14	6.96
Mean Arterial Pressure	92.42	7.60
BMI	23.43	4.25
Conicity Index	1.42	0.38

Table 2: Showing the correlation of BMI, WHR and Conicity Index with systolic BP and diastolic BP in hypertensive subjects.

Variables		Systolic BP	Diastolic BP
BMI	r-value	0.143	0.252
	P-value	0.156	0.011*
WHR	r- value	0.257	0.279
	P-value	0.01**	0.005**

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Conicity Index	r- value	0.329	0.334
	P-value	0.001**	0.001**
*. Correlation is significant at the 0.05 level (2-tailed).			
**. Correlation is significant at the 0.01 level (2-tailed).			

Discussion: This study investigated the relationship between blood pressure and several anthropometric measures in young adults, such as the Conicity Index, Waist-Hip Ratio (WHR), and BMI. Their potential role in understanding cardiovascular risk factors in this population is highlighted by the findings, which show clear patterns of correlation between these parameters and systolic and diastolic blood pressure.

There was a weak but statistically insignificant positive correlation between body mass index (BMI) and systolic blood pressure ($r = 0.143$, $P = 0.156$). Because of the relatively uniform distribution of height and weight in this age group, it is possible that BMI alone is not a reliable indicator of systolic blood pressure in young adults. Nonetheless, a more significant relationship was indicated by the moderately positive correlation between BMI and diastolic blood pressure ($r = 0.252$, $P = 0.011$). This supports the body of research showing that elevated BMI, a measure of adiposity, raises diastolic blood pressure via mechanisms like elevated peripheral resistance and sympathetic nervous system activation [9].

Both systolic blood pressure ($r = 0.257$, $P = 0.01$) and diastolic blood pressure ($r = 0.279$, $P = 0.005$) were moderately positively correlated with waist-hip ratio (WHR), and both results were statistically significant at the 0.01 level. This highlights how crucial central obesity is as a blood pressure predictor. WHR is a crucial indicator of the distribution of abdominal fat, which

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is known to affect blood pressure by influencing insulin resistance, hormone imbalance, and inflammation. These findings imply that in this population, WHR might be a more accurate measure of variations in blood pressure than BMI. [10].

At the 0.01 level of significance, the Conicity Index showed a significant positive correlation with both diastolic blood pressure ($r = -0.334$, $P = 0.001$) and systolic blood pressure ($r = -0.329$, $P = 0.001$). The Conicity Index may represent a different aspect of young adults' body composition that directly correlates with conventional indicators of obesity-related cardiovascular risk, even though it is commonly linked to central obesity. [11].

All things considered, these results demonstrate the intricate relationship between young adults' blood pressure and anthropometric measures. Conicity Index, WHR, and BMI all have positive correlations with blood pressure, highlighting the need for a more sophisticated method of determining cardiovascular risk in this population. To better understand the role of anthropometric measures in blood pressure regulation, future research should concentrate on examining the mechanisms underlying these associations and take into account additional confounding factors, such as diet, physical activity, and genetic predispositions. Conclusion: In young adults, this study shows a significant correlation between blood pressure and a number of anthropometric measures, such as the conicity index. The findings imply that elevated blood pressure levels are linked to higher BMI, waist circumference, and abdominal obesity. In order to improve cardiovascular health in young adults, these findings emphasize the necessity of interventions and preventive measures aimed at lowering obesity and improving body composition. It is advised that more research be done to examine these relationships in various demographics and environments as well as the long-term impacts of changes in body composition on blood pressure and cardiovascular health.

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