



A STUDY TO DETERMINE THE CORRELATION BETWEEN WAIST CIRCUMFERENCE AND BLOOD PRESSURE

Physiology

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ABSTRACT

Introduction: According to various studies, body weight has been found to have a positive correlation with blood pressure. Body weight is commonly assessed using Body Mass Index (BMI). However, it has been found to have limitations. Rather, waist circumference (WC) is a better indicator of high blood pressure according to various studies. **Methods:** The design of the study was cross-sectional and conducted among students and employees of Gauhati Medical College and Hospital, Guwahati. Simple random sampling was used to select the subjects, who were of the age-group 18-34 years and not taking any anti-hypertensive medications. Waist circumference was measured using a non-flexible measuring tape at the level of the iliac crest or the midpoint between the last rib and iliac crest. Blood pressure was measured using an aneroid sphygmomanometer. **Results:** The collected data were analysed using the software SPSS. As distribution of WC and blood pressures was normal, Pearson's coefficient analysis was applied. The r value for correlation between WC and systolic blood pressure was 0.65, while that for diastolic blood pressure, 0.36, for mean blood pressure, 0.55 and for pulse pressure, 0.46. **Conclusion:** WC shows a strong positive correlation with systolic blood pressure, while moderate positive correlation with pulse pressure and diastolic blood pressure. Hence, waist circumference may be a good indicator of hypertension, although further confirmatory longitudinal studies need to be carried out.

KEYWORDS

waist circumference, blood pressure, indicator

INTRODUCTION

Once thought of as a problem in high income countries, obesity is now increasing in low income and middle income countries as well, especially in the urban areas. In India, the number of people affected by obesity is 135 million. This prevalence varies with factors such as age, gender, geographical environment, socio-economic status, etc.¹ BMI is usually used as the index for assessing body weight. For Indians, a BMI between 23.0 to 24.9 kg/m² is overweight, while a BMI more than 25.0 kg/m² is obesity.² However, BMI has several limitations, such as being an inadequate marker of abdominal obesity and not being able to differentiate muscle from fat. Also, people with normal BMI can have high mortality from type 1 diabetes, and it does not take into account the differences between men and women concerning their body fat.³ Compared to BMI, waist circumference (WC) seems to be more effective. Various studies have shown a significant positive correlation between waist circumference and systolic and diastolic blood pressures. In fact, an increase in waist circumference alone can elevate blood pressure independent of BMI. Also, besides hypertension, high waist circumference is associated with type 2 diabetes mellitus, hypercholesterolemia, joint and low back pain, hyperuricemia and obstructive sleep apnoea.^{4,5} According to the World Health Organization (WHO), the healthy limit of waist circumference for Asian countries is 90 cm for men and 80 cm for women.⁶

AIMS AND OBJECTIVES

To determine the correlation between waist circumference and blood pressure.

MATERIALS AND METHODS

The design of the study conducted was cross-sectional. Sample size for the study was 384. To select the subjects, simple random sampling was carried out. The study was conducted among students and employees of Gauhati Medical College and Hospital, Guwahati, who were of the age-group 18-34 years and not taking any anti-hypertensive medications. Waist circumference was measured at the level of the iliac crest or the midpoint between the last rib and iliac crest, using a non-flexible tape in centimetres. Blood pressures were measured using an aneroid sphygmomanometer. Finally, the data collected were analysed with the software SPSS.

RESULTS AND OBSERVATIONS

Out of the 384 subjects on whom the study was conducted, 224 were males (58.3 percent), and 160 were females (41.7 percent).

Table 1: Table Showing The Mean And Standard Deviation Of The Various Parameters

Parameter	Mean	Standard Deviation
Waist circumference	79.3 cm	8.04 cm

Systolic blood pressure	111.06 mm Hg	11.34 mm Hg
Diastolic blood pressure	76.22 mm Hg	7.82 mm Hg
Mean blood pressure	87.71 mm Hg	7.84 mm Hg
Pulse blood pressure	34.84 mm Hg	9.96 mm Hg

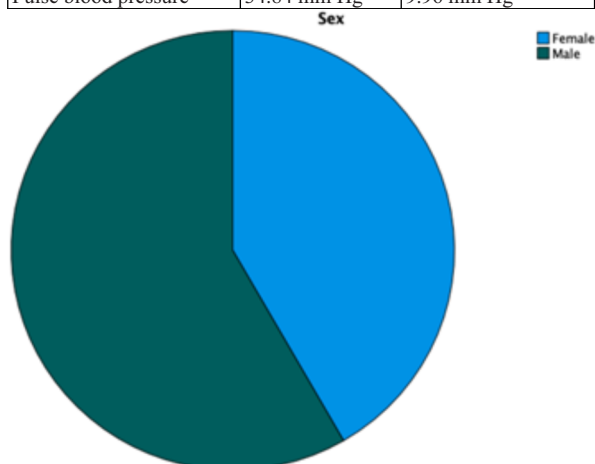


Figure 1: Pie Chart Showing The Gender Distribution Of The Subjects

The mean and standard deviations of the various parameters assessed are as shown in Table 1.

The Pearson's coefficient (r value) between waist circumference and the various modalities of blood pressure are shown in Table 2.

Table 2: Table Showing The Degree Of Correlation Between WC And Blood Pressure

Parameters considered for correlation	Pearson's coefficient (r value)	P-value	Lower confidence interval	Upper confidence interval
WC and systolic blood pressure	0.65	<0.001	0.59	0.71
WC and diastolic blood pressure	0.36	<0.001	0.27	0.45
WC and mean blood pressure	0.55	<0.001	0.48	0.62
WC and pulse blood pressure	0.46	<0.001	0.37	0.53

DISCUSSION

Table 2 shows that there is a positive correlation between WC and systolic, mean and pulse pressures. These findings are in accordance

with the study conducted by Kapil, Bhadoria, Sareen et al, who found a positive correlation between high WC and increased systolic blood pressure levels.⁷ Heba M. Tawfik also concluded that WC along with WHtR was a strong risk factor for hypertension and occurrence of cardiovascular events in Egyptian female patients.⁸

CONCLUSION

Waist circumference shows a strong positive correlation with systolic blood pressure and a moderate positive correlation with pulse and diastolic blood pressure. Hence, waist circumference may be a good indicator of hypertension. That said, further confirmatory longitudinal studies need to be carried out.

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