# The Relationship Of Obesity To Hypertension Among Paramedical Students Of West Tripura

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## Abstract

*Introduction:* Due to a consistent rise in frequency over the past few decades, particularly in metropolitan areas with significant regional variation, hypertension is becoming a growing public health concern in India.

*Methodology:* Cross-sectional research was done with around 115 paramedical students of Bhavan's Tripura College of Science and Technology. As per the WHO, each student's body mass index was categorized separately. The blood pressure was taken for the purposes of preventing, detecting, evaluating, and treating hypertension using a conventional mercury sphygmomanometer. The data were input into statistical software SPSS version 15.0 for analysis.

*Observation:* In the case of males, our study found that around 41.38% had a normal BMI, 10.34% were underweight, 36.21% were overweight, and 12.07% were obese. Additionally, 68.97% had a normal waist circumference and 31.03% had an abnormal waist circumference. In males, the normal blood pressure was 58.62%, prehypertension was 34.48%, stage 1 hypertension was 5.17%, and high blood pressure, or stage 2 hypertension, was 1.72%. For women, the percentages were as follows: approximately 61.4% had a normal BMI, 7.02% underweight, 24,56% overweight, and 7.02% obese. The abnormal/central waist circumference is 57.89%, while the normal waist circumference was 38.60%. Of the female population, 84.21% had normal blood pressure, 14.04% had pre-hypertension, and 1.75% had stage 1 hypertension.

*Results:* The difference of hypertension among the students in boys and girls 41.3% and 15.78% respectively, and the difference were statistically significant. The prevalence of obesity in paramedical college

*students was 9.56% and 4.34% was high blood pressure. Non-communicable illnesses in the contemporary era's epidemic have been described.*

***Conclusion:*** *A concerning trend in disease prevalence is the observed age shift backward in time for conditions including obesity, hypertension, and diabetes mellitus. The young adults are more likely to have these diseases as a result of engaging in unhealthy lifestyle choices. It is crucial that paramedical students recognize their personal risk factors and take preventative action before advising and motivating their parents to lead healthy lifestyles.*

## INTRODUCTION:

Noncommunicable illnesses will be responsible for 60.0% of all diseases worldwide and 73.0% of fatalities by 2020 [1]. Some have referred to non-communicable illnesses as the 20th century's contemporary pandemic. India is currently going through a shift in epidemiology, with a dual burden of noncommunicable and communicable illnesses [2]. The rise in noncommunicable disease incidence over the past few decades has been attributed to changes in lifestyle and social factors. The growth in obesity worldwide has been associated with environmental and behavioural changes brought about by modernization, urbanisation, and financial development [3]. More precisely, the primary causes of the rising incidence of obesity and hypertension are modifications in food intake, a decline in physical activity, and an increase in stress levels incurred in daily life. Globally, obesity is becoming a major issue affecting not just adults but also kids, adolescences, and young adults [4]. This age group is the ideal one to target when it comes to stressing the value of physical activity and a balanced diet when obesity and hypertension are detected early [2].

Worldwide, the prevalence of hypertension is rising daily, not only in first-class but also in third-class nations [5, 6]. Every year, 7.5 million people die from hypertension worldwide. According to estimates, 1.56 billion people would die from hypertension by the year 2025 [7, 8]. Pakistan's hypertension situation is comparable to that of any other nation in the globe. National Health Survey found that 33 individuals over the age of 40 and 18% of adults overall suffer from hypertension. Additionally, data showed that barely half of all hypertensives received treatment for their high blood pressure, and only around 50% of hypertensives received a diagnosis.

Known as the silent killer, hypertension causes a significant amount of illness and mortality on a global scale. Nevertheless, research on the occurrence of high BP and associated variables between university students in areas with limited resources is sparse [9]. Early measurement and adequate dissemination of knowledge about modifiable risk variables constitute a critical component of preventive education. Therefore, strategies aimed at achieving even a little reduction in young people' obesity and blood pressure (BP) are crucial to averting future outbreaks of these non-communicable illnesses [10].

According to published research, the prevalence of obesity and overweight among college students ranges from 10.0% to 20.0 percent [2, 11, 12],

whereas ranges of prevalence of hypertension varies from 4.0% to 15.0% [13. 14]. The younger age groups are more vulnerable to these diseases due to factors such as poor eating habits, stress related to school or college, excessive use of electronics, and inactivity. Paramedical studies are stressful throughout training, due to the quantity of work that must be done, social isolation, peer and test pressure, and expectations that don't match reality. These factors can all lead to psychological stress [4]. Research has indicated that obesity and hypertension are starting to manifest at earlier ages [15, 16]. As little data was available for this particular age group on these risk factors for noncommunicable illnesses, this research was undertaken to evaluate the prevalence of high blood pressure and obesity among paramedical students.

## METHODS:

This cross-sectional research was held in September 2024 at Bhavan's Tripura College of Science and Technology on odd-semester undergraduate paramedical students (i.e., first, third, and fifth semesters). Before the study began, authorization was requested from the institution's head and institutional ethics approval was secured.

After informing the students about the reason of this study, written informed permission was acquired from them. The students provided basic demographic information using a pre-made, pretested questionnaire. Every student who gave consent had their blood pressure (BP) and anthropometric measures taken. Height, weight, waist circumference, and hip circumference were the anthropometric measurements that were gathered; these were measured using established procedures by trained students [17].

Without shoes, weight was recorded on a conventional weighing scale in kilograms to the closest 0.5 kg, with the scale resting on a stable, level platform. Using a stadiometer, the height was measured and recorded in centimeters, to the closest 0.1 centimeter. Using a non-stretchable measuring tape, the circumference of the waist was measured at the midway between the iliac crest and the costal border, to the closest 0.1 cm. Using a measuring tape, the hip circumference was determined at the level of the greater trochanter, which is the widest point of hip, to the closest 0.1 centimeter. The anthropometric information was gathered by trained students in the college. All research participants had their blood pressure taken while they were seated and at ease using a standardized mercury sphygmomanometer in the left arm. The participants' blood pressure was measured by students who had previously received training in the palpatory and auscultatory methods of blood pressure monitoring. Body mass index (BMI), which was determined by dividing weight in kg by height in meters squared, was used to categorize obesity. Furthermore, waist circumference, waist-hip ratio, and waist-stature ratio were used to characterize obesity.

## Identifying criteria of obesity by using Body Mass Index:

According to the classification of WHO, underweight is defined as a BMI of less than 18 $kg/m^2$, normal weight is defined as a BMI of 18.00–24.99 $kg/m^2$, overweight is defined as a BMI of 25–29.99 $kg/m^2$, and obesity is defined as a BMI of 30 $kg/m^2$ or above [18].

Southeast Asian classification: obesity is defined as a BMI of 25 $kg/m^2$ or higher [19].

**Waist circumference:** Central/abdominal obesity is indicated by a waist circumference of more than 90 cm in men and more than 80 cm in women [19].

**Waist-hip ratio:** Truncal obesity is indicated by a ratio of 0.90 or higher in men and 0.85 or larger in women [20].

**Waist-stature ratio:** In both boys and girls, a ratio higher than 0.5 indicates obesity [21].

## Criteria by which high blood pressure is defined:

The Joint National Committee's (JNC VII) seventh report on the prevention, detection, assessment, and management of high BP was followed in grading blood pressure [22]. Normal blood pressure was defined as systolic (SBP) <120 mm Hg and diastolic (DBP) < 80 mm Hg. Prehypertension was defined as SBP between 120 mm and 139 mm Hg and/or DBP between 80 mm and 89 mm Hg. High blood pressure was defined as SBP of between 140 –159 mm Hg and/or DBP of between 90–99 mm Hg (stage 1 hypertension) and SBP of 160 mm Hg or higher and/or DBP of 100 mm Hg or higher (stage 2 hypertension).

## Data analysis

The data were tabulated and examined using software SPSS version 15.0. Percentages and frequencies were used to summarize the data. For binary variables, the unadjusted odds ratio with the 95.0 percent confidence interval was calculated. To examine the relationship between anthropometric, demographic, and blood pressure variables chi-square test was applied. p less than 0.05 was regarded as significant statistically.

## RESULTS:

The study comprised one hundred and fifteen students, with fifty-eight (50.43 %) boys and fifty-seven (49.57 %) girls. 35 of them (30.43 %) were in the first semester, 42 (36.52%) were in the third, and 38 (33.14%) were in the fifth. The research sample consisted primarily of non-tribal Bengali individuals (102 (88.70 %). Of the students, almost 98 (or 85.23 %) were from nuclear families. The study population's average BMI was 24.05 kg/m$^2$. Ten students (8.70 %) were under-weight, whereas 59 students (51.30 %) had normal BMI. Thirty-five students (30.43 %) were overweight and eleven (9.57%) were obese based on BMI. Of the 35 students who were overweight (30.43 %), 21 (60.00 %) were boys and 14 (40.00 %) were girls. Of the 11 students (9.57 %) who were obese, 7 (63.64 %) were males and 4 (36.36 %) were females.

Table 1 shows that there was no statistically significant difference was found in BMI between boys and girls ($\chi2$ = 3.34, two degrees of freedom, P = 0.068). However, on the basis of anthropometric characteristics such waist circumference, waist-hip ratio, and waist-stature ratio, females were more likely than males to be obese, and this difference was found statistically significant, as shown in Table 1.

**Table 1. Anthropometric and blood pressure measurements of the study participants according to gender (n=115)**

| Different Anthropometric variables | Boys (n=58) | Girls (n=57) | Crude odd ratio | r$^2$ | P value |
|---|---|---|---|---|---|
| Body mass index (kg/m$^2$) | | | | | |
| <25 | 30(51.72%) | 39(68.42%) | 0.49 | | |
| >25 | 28(48.27%) | 18(31.58%) | (0.23-1.06) | 3.34 | 0.068 |

| Waist circumference (cm) | | | | | |
|---|---|---|---|---|---|
| Normal | 40(68.97%) | 24(42.10%) | 3.06 (1.42-6.57) | 8.40 | 0.004* |
| Abnormal (males >90 cm; females >80cm) | 18(31.03%) | 33(57.89%) | | | |
| Waist-hip ratio | | | | | |
| Normal | 39(67.24%) | 23(40.35%) | 3.03 (1.42-6.50) | 8.37 | 0.004* |
| Abnormal (males ≥0.90; females ≥0.85) | 19(32.76%) | 34(59.65%) | | | |
| Waist-stature ratio | | | | | |
| Normal (≤0.5) | 36(62.07%) | 22(38.60%) | 2.60 (1.22-5.52) | 6.34 | 0.012* |
| Abnormal (>0.5) | 22(37.93%) | 35(61.40%) | | | |
| Blood pressure (mm Hg) | | | | | |
| Pre-hypertension (>120/80) | 20(34.48%) | 8(14.04%) | 0.63 (0.06-6.49 | 0.16 | 0.692 |
| Hypertension (>140/90) | 4(6.90%) | 1(1.75%) | | | |

*Significant at p<0.05

The research population's mean DBP was 76.7 mm Hg, while their mean SBP was 115.6 mm Hg. Eighty-two students, or 71.30%, had blood pressure within the normal range. Of the paramedical students, 28 (24.35 %) had prehypertension. Only one student had blood pressure readings in the range of stage 2 hypertension, and only 4 (3.48 %) of the students had stage 1 hypertension. When age-wise comparisons between students with BP < 140/90 mm Hg and students with BP of 140/90 mm Hg or more were made, no significant difference ($\chi 2$ =0.16, two degrees of freedom, p=0.692) was observed.

**Table 2. Univariate analysis of demographic and anthropometric variables with blood pressure among para-medical students (n=115)**

| Variables | Normal BP (n=82) | Prehyperten-sion (n=28) | Hyperten-sion (n=5) | $\chi 2$ | P value |
|---|---|---|---|---|---|
| Sex | | | | | |
| Male | 34 (41.46%) | 20 (71.42%) | 4 (80%) | 9.33 | 0.009* |
| Female | 48 (58.54%) | 8 (28.57%) | 1 (20%) | | |
| Semester | | | | | |
| First | 24 (29.27%) | 9 (32.14%) | 2 (40%) | 3.24 | 0.519 |
| Second | 27 (32.93%) | 13 (46.43%) | 2 (40%) | | |
| Third | 31 (37.80%) | 6 (21.42%) | 1 (20%) | | |
| Obesity-SEA classification (BMI ≥25 kg/m2 ) | 28 (34.15%) | 15 (53.57%) | 4 (80%) | 1.97 | 0.922 |
| Obesity – WHO classification (BMI ≥30 kg/m2 ) | 2 (2.44%) | 6 (21.43%) | 2 (40%) | 0.29 | 0.865 |
| Obesity – WC classification (males >90 cm; females >80 cm) | 36 (43.90%) | 14 (50%) | 4 (80%) | 0.75 | 0.946 |
| Obesity – WHR classification (males ≥0.90; females ≥0.85) | 38 (46.34%) | 12 (42.86%) | 3 (60%) | 0.09 | 0.955 |
| Obesity – WSR classification (>0.5) | 21 (25.61%) | 10 (35.71%) | 2 (40%) | 1.39 | 0.966 |

BMI: body mass index; BP: blood pressure; WC: waist circumference; WSR: waist-stature ratio; SEA: Southeast Asian; WHR: waist-hip ratio;

Four (3.47 %) of the students with blood pressure readings of 140/90 mm Hg or above were male, and one (0.87 %) was female. Table 2 displays the statistical significance of the relationship between blood pressure readings by gender. Eighty percent of the students with high blood pressure were classified as obese by the WHO BMI classification, and forty-nine percent also had a high waist-hip ratio. Three students (2.61%) with blood pressure readings above 140/90 mm Hg also mentioned a family history of hypertension. None of the students mentioned having a history of hypertension screening or diagnosis. Students were told about their blood pressure and obesity status, and those who were at risk were advised to make appropriate lifestyle changes. Furthermore, they received guidance on assessment and ongoing care at the college's tertiary care hospital.

## DISCUSSION:

This research offers descriptive information about 115 paramedical college students. Of the 115 students, 11 (9.57%) were classified as obese by the WHO, while 35 (30.43%) were classified as overweight. The prevalence of overweight and obesity was observed 19.6% in the study done by Dantu and Ujwala [11] on 263 undergraduate college students; however, the prevalence of overweight and obesity was reported to be 13.2% in another study from Pune, India [2], which showed the lower tendency of prevalence of overweight and obesity from our current study.

Dantu and Ujwala [11] also found that men were more lightly than women to be overweight or obese, and this sex difference was consistent with the findings of the current investigation. According to the Southeast Asian definition of obesity, the prevalence of obesity was 2.4 % in Lahore, Pakistan [13], compared to 30.43% percent in the current research. We found a higher frequency among our undergraduates compared to research from Malaysia and Kolkata, India [3, 23]. The variations in study locations, participant lives, and various evaluation techniques, in addition to the fact that the subjects were either day students or stay in hostel.

The current study found that 4.35 % of participants had both stage 1 and stage 2 hypertension together. In comparison to university students from the Philippines, the observed prevalence of prehypertension and high blood pressure was also higher [21], but the reported incidence of hypertension in the Indian state of West Bengal was 13.0 % [10, 24]. The study found a gender difference, with males having a higher prevalence of blood pressure more than 140/90 mm Hg (6.90%) than females (1.75 %). These findings are consistent with research from Mangalore, a nearby area in the Indian state of Karnataka [25].

The majority of overweight pupils also had larger waists and waist-to-hip ratios. Similar to our findings, Flegal et al. [26] discovered a substantial association between BMI and waist circumference. It is concerning that younger people are more likely to be obese. There are a number of possible reasons for the increased rates of obesity and hypertension among undergraduate students, including dietary habits, changes in lifestyle, stress from school, cultural differences, living away from family, and dorm living.

Since the students gave their agreement willingly, there is a chance of a healthy volunteer effect, which would have led to an underestimating of the prevalence of obesity and hypertension in the re-

search group because the majority of the students would have been in good health. Due to time restrictions, only one BP recording was made since the students needed to get to their classrooms and clinical posts. For students with elevated blood pressure, an additional reading was obtained that day, and a follow-up assessment was conducted the same day.

Because of the health care service is present nearby the college, if BP was found to be persistently high, the students were directed to this Primary health center. Another flaw in the setup was that it was unable to measure other factors including stress levels, sleeping patterns, and food intake due to poor logistics. A comprehensive assessment that considers every risk factor is a labor-intensive process that is challenging to carry out due to the college rigorous schedule.

Despite these drawbacks, a baseline assessment of the risk variables was conducted among paramedical students as a first step toward chronic disease screening. Generalizability is an issue as the data collection was restricted to students from a particular college. Therefore, it is imperative that these characteristics be measured repeatedly over time at different paramedical college using a standard technique. Initiating such research is particularly desired as it addresses the issue of non-communicable illnesses among the younger generation of pathologist.

## CONCLUSIONS:

Among paramedical students, the prevalence of high blood pressure (4.36%) and obesity (9.56%) was greater and there was a significant association between the two conditions in the population under investigation. Additionally, a gender difference in hypertension and obesity was observed. While hypertension was more common in boys, obesity was more common in girls. Thus, we would be able to reduce blood pressure and its complications by implementing appropriate weight-loss interventions. To confirm the diagnosis, more measures and follow-up are needed. It would be great to monitor blood pressure and weight growth over a period of years in order to combat the rising epidemic of noncommunicable illnesses among the younger population.

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