

Prevalence of Hypertension and Its Association With Body Mass Index Among Teachers Attending A Screening Program At A Tertiary Care Hospital: A Cross-Sectional Study

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Abstract

Background: Hypertension is an important modifiable risk factor for cardiovascular and other non-communicable diseases. Teachers may be exposed to occupational stress, prolonged sitting, reduced physical activity, and workload-related factors that may contribute to excess body weight and elevated blood pressure.

Objective: To estimate the prevalence of hypertension among teachers attending a screening program at a tertiary care hospital and to assess the association between body mass index (BMI) and blood pressure.

Methods: A cross-sectional study was conducted among 253 teachers attending a screening program at a tertiary care hospital. Data were collected using a predesigned and pretested proforma. Blood pressure, height, and weight were recorded. BMI was calculated as weight in kilograms divided by height in metres squared. Descriptive statistics were expressed as frequency, percentage, mean, and standard deviation. Association between BMI category and blood-pressure category was assessed using the chi-square test. Pearson correlation, simple linear regression, and binary logistic regression were used to assess relationships between BMI and blood-pressure outcomes. A p-value <0.05 was considered statistically significant.

Results: Among 253 participants, 61.2% were female and 38.7% were aged 36–45 years. Overall, 40.7% were overweight and 23.3% were obese. Based on the study's stated blood-pressure classification, 33.6% had hypertension and 41.1% had prehypertension. BMI category was significantly associated with blood-pressure category ($\chi^2 = 69.78$, $df = 6$, $p < 0.001$). BMI showed positive correlations with systolic blood pressure ($r = 0.284$, $p < 0.001$) and diastolic blood pressure ($r = 0.197$, $p = 0.003$). In simple linear regression, BMI was significantly associated with systolic blood pressure ($\beta = 1.078$, $R^2 = 0.081$, $p < 0.001$) and diastolic blood pressure ($\beta = 0.559$, $R^2 = 0.039$, $p = 0.003$). Binary logistic regression showed that each 1 kg/m² increase in BMI was associated with higher odds of hypertension (OR = 1.121, 95% CI: 1.054–1.192, $p < 0.001$).

Conclusion: In this screened group of teachers, higher BMI was significantly associated with higher blood-pressure levels and hypertension. Regular screening and lifestyle-focused prevention may be useful. Because this was a cross-sectional screening study, the findings demonstrate association rather than causation.

Keywords: Hypertension; Body mass index; Teachers; Blood pressure; Obesity; Cross-sectional study; Screening.

Introduction

Hypertension is a major non-communicable disease and an important risk factor for cardiovascular disease, stroke, chronic kidney disease, and premature death.[1] It remains a significant public health problem because many affected individuals may remain asymptomatic for long periods and may be undiagnosed until complications arise.[1]

Teachers represent an important occupational group because they influence the health behaviour and learning environment of students. However, the teaching profession may involve stress, prolonged sitting, limited physical activity, irregular meals, and workload-related strain, which may contribute to overweight, obesity, and hypertension.[2–4] Studies among schoolteachers have reported a substantial burden of hypertension and an association between increasing BMI and hypertension.[2–4]

Evidence from different settings has reported considerable hypertension prevalence among teachers. For example, a study among schoolteachers in Calabar reported a hypertension prevalence of 32%, with higher odds among overweight or obese teachers than among teachers with normal weight.[2] Similarly, a study among teachers in Jeddah reported a hypertension prevalence of 25.2% and an association between BMI ≥ 25 kg/m² and hypertension.[3]

These findings support the value of regular screening and early preventive interventions. BMI is a simple and practical measure of body size and is useful for identifying individuals who may be at increased cardiometabolic risk.[4,5]

Therefore, the present study was conducted to assess the prevalence of hypertension among teachers attending a screening program at a tertiary care hospital and to examine its association with BMI.

Objectives

1. To estimate the prevalence of hypertension among teachers attending a screening program at a tertiary care hospital.
2. To assess the association between BMI category and blood-pressure category among the study participants.
3. To assess the correlation and regression relationship between BMI and systolic and diastolic blood pressure.

Methodology

Study design and setting

A cross-sectional study was conducted among teachers attending a screening program at a tertiary care hospital.

Study participants and sampling

Teachers who were present during the screening period and fulfilled the eligibility criteria were enrolled after obtaining written informed consent. The final analysis included 253 participants.

Study tool and data collection

Data were collected using a predesigned and pretested proforma. Information included sociodemographic characteristics, relevant medical history, blood-pressure measurements, height, weight, and calculated BMI.

Inclusion criteria

- Teachers attending the screening program at the tertiary care hospital.
- Teachers who gave written informed consent.
- Teachers willing to participate in the study.

Exclusion criteria

- Teachers who did not give consent.
- Pregnant teachers.
- Teachers with acute illness at the time of screening.
- Participants with incomplete data.

Blood-pressure measurement

Blood pressure was measured with the participant seated after at least 5 minutes of rest. An appropriately sized cuff was applied to the upper arm at heart level. Two readings were taken at an interval, and the average of the two readings was used for analysis.

Blood-pressure classification used in the study

blood pressure was categorized as follows:

Category	Definition
Normal	SBP <120 mmHg and DBP <80 mmHg
Prehypertension	SBP 120–139 mmHg and/or DBP 80–89 mmHg
Hypertension	SBP ≥140 mmHg and/or DBP ≥90 mmHg, or previous history of hypertension on treatment

Body mass index

BMI was calculated as weight in kilograms divided by height in metres squared (kg/m^2) and classified as:

BMI category	BMI (kg/m^2)
Underweight	<18.5
Normal	18.5–24.9
Overweight	25.0–29.9
Obesity	≥30.0

Statistical analysis

Data were entered into a spreadsheet and analysed using statistical software. Categorical variables were summarized using frequency and percentage, while continuous variables were summarized using mean and standard deviation

where appropriate. The association between BMI category and blood-pressure category was assessed using the Pearson chi-square test. Pearson correlation was used to assess the linear relationship between BMI and systolic and diastolic blood pressure. Simple linear regression was used to quantify the relationship between BMI and systolic/diastolic blood pressure. Binary logistic regression was used to assess the association between BMI and hypertension. A p-value <0.05 was considered statistically significant.

Results

A total of 253 teachers were included in the analysis.

Table 1. Frequency and percentage distribution of demographic variables among study participants (N = 253)

Variable	Category	Frequency (n)	Percentage (%)
Age	18–25 years	7	2.8
	26–35 years	46	18.2
	36–45 years	98	38.7
	46–55 years	71	28.1
	>55 years	31	12.3
Gender	Male	98	38.7
	Female	155	61.3

The largest proportion of participants were aged 36–45 years (38.7%). Females constituted 61.3% of the study population.

Table 2. Frequency and percentage distribution of clinical variables among study participants (N = 253)

Variable	Category	Frequency (n)	Percentage (%)
BMI	Underweight	5	2.0
	Normal	86	34.0
	Overweight	103	40.7
	Obesity	59	23.3
Blood pressure	Normal	64	25.3
	Prehypertension	104	41.1
	Hypertension	85	33.6

Overall, 40.7% of participants were overweight and 23.3% were obese. Based on the study classification, 33.6% had hypertension and 41.1% had prehypertension.

Table 3. Association between BMI category and blood-pressure category among study participants (N = 253)

BMI category	Normal BP n	Prehypertension n	Hypertension n	Total n
Underweight	5	0	0	5
Normal	43	32	11	86
Overweight	11	46	46	103
Obesity	5	26	28	59
Total	64	104	85	253

Pearson chi-square = 69.78, df = 6, p < 0.001.

There was a statistically significant association between BMI category and blood-pressure category.

Table 4. Correlation and regression analysis of BMI with blood-pressure outcomes

Analysis	Outcome	Estimate	p-value
Pearson correlation	BMI vs SBP	r = 0.284	<0.001
Pearson correlation	BMI vs DBP	r = 0.197	0.003
Simple linear regression	BMI → SBP	$\beta = 1.078$; $R^2 = 0.081$	<0.001
Simple linear regression	BMI → DBP	$\beta = 0.559$; $R^2 = 0.039$	0.003
Binary logistic regression	BMI → Hypertension	OR = 1.121 (95% CI: 1.054–1.192)	<0.001

BMI showed a positive correlation with both systolic and diastolic blood pressure. In the logistic regression model, each 1 kg/m² increase in BMI was associated with approximately 12.1% higher odds of hypertension (OR 1.121).

Discussion

In this cross-sectional screening study of 253 teachers, one-third of participants were classified as having hypertension and more than two-fifths were classified as overweight. The observed distribution indicates a substantial burden of elevated BMI and abnormal blood-pressure categories in the screened population.

The significant association between BMI category and blood-pressure category is consistent with the direction of findings reported in previous studies among teachers.[2–5] The positive correlations between BMI and both systolic and diastolic blood pressure further indicate that higher BMI was associated with higher blood-pressure measurements in this study.

The regression findings provide additional quantitative support for this relationship. BMI explained 8.1% of the variation in systolic blood pressure and 3.9% of the variation in diastolic blood pressure in the respective simple linear regression models. The logistic regression estimate also indicated higher odds of hypertension with increasing BMI.

The findings should be interpreted in the context of the study design. Because the study was cross-sectional and participants were recruited from a screening program, temporal relationships and causality cannot be established, and the results may not be generalizable to all teachers.

Conclusion

Among teachers attending the screening program, higher BMI was significantly associated with higher systolic and diastolic blood pressure and with hypertension. The findings support the importance of periodic screening and promotion of healthy body weight and lifestyle practices among teachers. Longitudinal studies with representative sampling and standardized repeated blood-pressure measurements are recommended to establish temporal relationships and improve generalizability.

References

1. The Prevalence of Hypertension and Associated Risk Factors among Adults in Ethiopia: A Systematic Review and Meta-analysis. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC8064782/>
2. Prevalence of Hypertension and Associated Factors among Schoolteachers in Calabar, Nigeria: A Cross-Sectional Study. Available from: <https://pubmed.ncbi.nlm.nih.gov/39082910/>
3. Prevalence and Determinants of Prehypertension and Hypertension among Preparatory and Secondary School Teachers in Jeddah. Available from: <https://pubmed.ncbi.nlm.nih.gov/19302774/>
4. Awareness of Weight and Situation of Body Mass Index and Hypertension in Nepalese Teachers. Available from: <https://www.nepjol.info/index.php/jhp/article/view/32965>
5. An Evaluation of Obesity and Hypertension among Primary School Teachers in an Urban Region of South-South Nigeria. Available from: <https://clinmedjournals.org/articles/jhm/journal-of-hypertension-and-management-jhm-6-050.php>