Short Communication

Anthropometric survey to identify association of waist circumference and body mass index with blood pressure in the adult patients visiting a homoeopathy hospital

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Abstract

Background: Studies have showed that obesity indices, e.g. waist circumference (WC) and body mass index (BMI) are amongst the most common predictors of hypertension. This study was aimed at identifying the influences of WC and BMI on blood pressure (BP) in the patients visiting the outpatients of The Calcutta Homoeopathic Medical College and Hospital, West Bengal.
Methods: This cross-sectional survey was carried out involving a sample size of 450. Data was collected on BP, weight, height, BMI, and WC. Forward stepwise multiple linear regressions were used to identify which factors were independently associated with BP.
Results: There were statistically significant influences of age and BMI on both systolic and diastolic BP (all $P < 0.01$).
Conclusion: This study identified increasing age and increased BMI as the significantly influencing factors for blood pressure.

Keywords: Blood pressure; body mass index; waist circumference

Introduction

Hypertension is considered as one of the major public health concerns due to its magnitude, risk, and difficulties faced to control. A considerable majority remains asymptomatic; hence not readily detectable. Unless treated early and adequately, it tends to generate lethal complications, especially cardiovascular events, thus resulting in high medical expenses and high socio-economic costs. The World Health Organization (WHO) rates hypertension as one of the most important causes of premature death worldwide [1]. Hypertension induced cardiovascular diseases (CVD) are responsible for 29% deaths [2] (57% of all stroke deaths and 24% of all coronary heart disease deaths) [3] and 11% of all Disability Adjusted Life Years (DALYs) in India [4] and it is estimated that by 2020, CVDs will be the largest cause of

mortality and morbidity in India [5]. Recent studies from India have shown the prevalence of hypertension to be 25% in urban and 10% in rural subjects in India [6]. The prevalence rate of hypertension in urban India is 29-45% in men and 25-38% in women [7], and these are projected to go up to 22.9 and 23.6% for Indian males and females, respectively, by 2025 [8]. Studies have showed that obesity indices, e.g. waist circumference (WC) and body mass index (BMI) are amongst the most common predictors of hypertension [9-11]. Few years back, in a cross-sectional survey involving 405 patients visiting a homoeopathy hospital, WC and BMI were elicited as having significant influences on SBP and DBP [12].

This study was aimed at identifying the influences of WC and BMI on BP in the patients visiting the outpatients of The Calcutta Homoeopathic Medical College and Hospital, West Bengal.

METHODS

Setting and design: This cross-sectional survey was carried out at The Calcutta Homoeopathic Medical College and Hospital.

Sample size: Allowing for a margin of error of 4.7%, confidence level of 95%, and response distribution estimated to be 50%, calculated sample size became 426. Making a provision for probable 5% missing values, 450 was the target sample size.

Participants: Patients aged 18 years and above visiting the outpatients of The Calcutta Homoeopathic Medical College and Hospital (CHMCH).

Data collection: At first, BP, weight, height, BMI, and WC were measured. BP was measured according to JNC-7 guidelines [13] (seated quietly for 5 min in chair; feet on floor and arm supported at heart level; no caffeine, exercise or smoking for 30 min; cuff bladder encircle at least 80% arm circumference; inflate 20-30 mm Hg above pulse extinction; deflate at rate of 2 mm Hg/sec; SBP = onset of 1st Karotkoff sound; DBP = disappearance of Karotkoff sounds). BP was measured by using mercury sphygmomanometer and stethoscope. Body weight of lightly-clothed subjects was recorded to the nearest 0.5 kg on a weighing scale. For height and weight, individuals were requested to remove their shoes before taking measurements. BMI was calculated by dividing the weight in kg by height in meter square. WC was taken at the level and around the umbilicus.

Statistical analysis plan: All data were extracted in a specially designed Microsoft Excel spreadsheet and subjected to statistical analysis using SPSS®IBM® Inc., version 20 for Windows. Descriptive statistics were presented in the form of absolute numbers, percentages, means and standard deviations. Forward stepwise multiple linear regressions were subsequently used to identify which factors were independently associated with BP. To adjust for multiple pair-wise comparisons, a 2-sided level of statistical significance was set at P less than 0.01 using a Bonferroni correction.

RESULTS

Descriptive statistics including age, sex, BMI, WC, SBP and DBP – all are presented in the following table:

Descriptive statistics

Features	Description
Age (yrs) ¶	44.4 (±14.4)
Sex (M:F)§	162 (36%) : 288 (64%)
BMI ¶	23.9 (±4.6)
Waist circumference (cm) ¶	90.9 (±11.9)
SBP (mm Hg) ¶	121.1 (±18.8)
DBP (mm Hg) ¶	78.0 (±10.5)

¶ Continuous data presented as mean (± sd); §Categorical data presented as absolute value (percentage)

Forward stepwise multiple linear regressions identified 2 significantly influencing factors for DBP – age (ß = 0.178, SE = 0.033, adjusted final model R^2 = 0.087, P < 0.001) and BMI (ß = 0.211, SE = 0.162,

adjusted final model R^2 = 0.130, P = 0.003). Similarly, for SBP, age (β = 0.409, SE = 0.056, adjusted final model R^2 = 0.165, P < 0.001) and BMI (β = 0.172, SE = 0.175, adjusted final model R^2 = 0.193, P < 0.001) were found to be the influencing factors.

DISCUSSION

The study findings revealed that there were statistically significant influence of age and BMI on both SBP and DBP. The study outcome was consistent with the conclusion of the previous studies [12, 14, 15]. The findings also supported the outcome of earlier studies conducted on participants across the world which describes the influence of BMI on BP [9, 10, 16, 17].

The results of this study should be interpreted carefully. As it was a cross-sectional study, no causal relationship could be established. The study sample was representative of only adults visiting the outpatients of CHMCH; so the findings may not be generalizable to West Bengal and other states of India. Despite this limitation, this study provides important data regarding the hypertension risk factors among adults in an urban Indian homoeopathy hospital setting. Multi-centric, longitudinal study on larger sample size and other obesity indicators (e.g. waist-hip ratio, waist-height ratio etc.) is needed to strengthen the study findings.

CONCLUSION

This cross-sectional survey involving 450 participants conducted at CHMCH identified increasing age and increased BMI as the significantly influencing factors for blood pressure. Waist circumference and sex were not elicited as influencing variables. Further multicenter studies are warranted with larger sample sizes and other obesity indicators.

Conflict of interest: The authors declare that they have no competing interests.

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Authors' contributions: S. Saha conceived and designed the study, ran the statistical analyses, interpreted the data and prepared the manuscript. J. Banerjee, P. Sarkar and K. Chakraborty collected data and prepared the master chart. All the authors reviewed and approved the final manuscript.

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