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The relationship of BMI and fat percentage with blood pressure of physical education students

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Abstract

Purpose: The main purpose of the study was to find a possible relationship between obesity Indicators and blood pressure of male Physical Education students.

Methodology: The study was conducted on 40 male Physical Education students, and age ranged from 20 to 25 years who were selected from the department of Physical Education of G.G.V Bilaspur. Selected variables for the study were body mass index (BMI), Fat percentage and systolic & diastolic blood pressure. The statistical technique, descriptive statistics and the Pearson's Product Moment Correlation were used, the data analyzed with the help of SPSS (16.0 version) software and the level of significance was set at 0.05 level of confidence.

Result: There exists a significant relationship between SBP and BMI ($r = .571, p < 0.05$), Fat % ($r = 0.412, p < 0.05$), other hand DBP have also significant relationship with BMI ($r = 0.484, p < 0.05$) and Fat % ($r = 0.436, p < 0.05$).

Keywords: Obesity Indicators, Body Mass Index, Fat %, Systolic Blood Pressure and Diastolic Blood Pressure.

1. Introduction

The prevalence of overweight and obesity is increasing worldwide: globally there were at least 1.7 billion overweight and obese people in 2004, (Wu Y., 2006, Haslam DW, James WP., 2005) [2] and the childhood obesity epidemic has now spread from developed to developing countries (Ke L, *et al.*, 2009). Worldwide, over 155 million school-age children (equivalent to 10% of 5 – 17-year olds) are overweight or obese (Lobstein T, Baur L, Uauy R., 2004) [11]. Longterm obesity is associated with the development of adult hypertension and carries with it a heightened risk of cardiovascular disease (CVD) (Ribeiro J, *et al.*, 2003; Weiss R, *et al.*, 2004) [13, 17]. Cross-sectional and longitudinal studies undertaken in different populations corroborate the relationship between obesity and the occurrence of hypertension and cardiovascular events (Kim KS, *et al.*, 2000; Kristjansson K, *et al.*, 2003; Kovacs VA, *et al.*, 2010) [6, 9, 7]. Obese children have significantly higher blood pressure (BP) readings than those who are normal weight or underweight (Lauer RM, *et al.*, 1991) [10]. Obesity related hypertension has also become one of the most serious public health problems, particularly in developing countries (Kearney PM, *et al.*, 2005) [5].

Obesity and in particular central obesity have been consistently associated with hypertension and increased cardiovascular risk. Based on population studies, risk estimates indicate that at least two-thirds of the prevalence of hypertension can be directly attributed to obesity (Krause RM., *et al.*, 1998) [8]. Apart from hypertension, abdominal adiposity has also been implicated in the pathogenesis of coronary artery disease, sleep apnoea, stroke and congestive heart failure (Haslam DW, James WP., 2009).

1.1 Objective of the Study

The main objective of the present study was to find a possible relationship between obesity Indicators and blood pressure of male Physical Education students.

2. Methodology

2.1 Selection of Subjects

A total of 40 male physical education students were randomly selected from departments of Guru Ghasidas Vishwavidyalaya, Bilaspur. Subjects were ranging between 20 to 25 years.

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2.2 Selection of Variables

Keeping the feasibility criterion in mind, the researcher selected the following variables for the present study. Body Mass Index (BMI) and fat % were selected as Obesity Indicator for present study. Blood pressure was measured with Systolic blood pressure (SBP) & Diastolic blood pressure (DBP).

2.3 Criterion Measures

- BMI was calculated from body mass and body height (kg/m²), and body fatness of participants was classified according to WHO standards.
- Fat Percentage was measured by OMRON body fat analyzer.
- Blood pressure was measured with digital Amron Blood Pressure Monitor in mmHg.

2.4 Statistical Analysis

For determining the relationships of Obesity indicator and Blood Pressure, descriptive statistics and the Pearson's Product Moment Correlation was used, the data analyzed with the help of SPSS (16.0 version) software and the level of significance was set at 0.05 level of confidence.

3. Result and Findings of the Study

Table 1: Descriptive statistics of obesity indicators and blood pressure of Physical Education Students

Variables	Mean	SD	N
Fat %	20.4975	6.63682	40
BMI	22.3882	3.80188	40
SBP	131.282	13.50401	40
DBP	81.8250	7.88015	40

Table-1 shows that the descriptive statistics i.e Mean and SD of selected variables. The Mean and SD of selected variables are i.e. Fat % (20.4975±6.636), BMI (22.388±3.801), Systolic Blood Pressure (131.282±13.504) and Diastolic Blood Pressure (81.825±7.880).

Table 2: Correlation coefficient of SBP and DBP with Fat % and BMI of Physical Education Students

Variables		Correlation coefficient (r)	Sig.
Fat %	SBP	.412*	.008
	DBP	.436*	.005
BMI	SBP	.571*	.000
	DBP	.484*	.002

*P<0.05, Statistically Significant.

From Table 2 we can say that there exists a significant relationship of Fat % with SBP (r=0.412) and DBP (r=0.436). On other hand BMI also have a significant relationship with SBP (r=0.571) and DBP (r=0.484) as the p-values were less than 0.05.

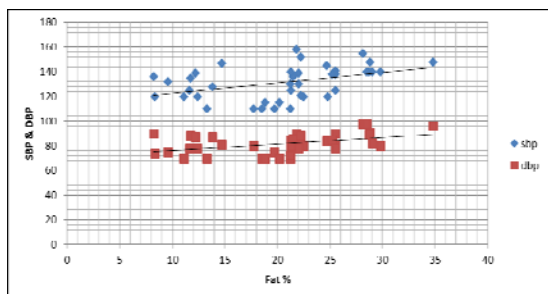


Fig 1: Graphical representation of relationship of SBP and DBP with Fat % Physical Education Students

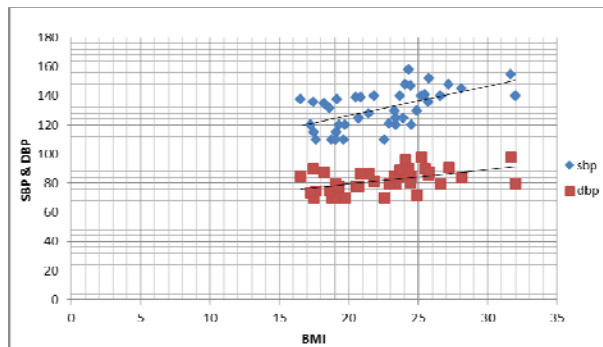


Fig 2: Graphical representation of relationship of SBP and DBP with BMI Physical Education Students

4. Discussion of the Findings

Obesity has been defined using varying indices that usually including BMI, WC, Fat % and WHR. In this cross-sectional study, only two obesity indices were compared with respect to their association with BP in adolescents. The present study revealed that there were positive associations between high SBP/DBP with BMI and Fat %. This demonstrated that these two indices were associated with BP levels. Results from the Pearson Product Moment Correlation (r) also indicated that when BMI and Fat % were combined, overweight and obese adolescents had a higher mean BP than those of normal weight. A high prevalence of hypertension was found in the overweight and obese group and these results were consistent with other studies (Wang NR, Wang JL, 2008; Ji CY, 2008) [16, 4]. Obesity could raise BP by altering cardiac output, cardiac systolic and diastolic function and renal-pressure natriuresis (Hall JE, Brands MW, Henegar JR, 1999) [1]. The result of Our study were similar to those of previous studies indicating that high blood pressure increased with increasing BMI and WC after adjusting for age and sex [Lu X, Shi P. *et al.*, 2013, Hu YH, Reilly KH., *et al.*, 2011, Thakur, JS, *et al.*, 2015]. Seidell *et al.* (1989) [14] have suggested from the multicenter study of women that BMI was the best overall predictor for both systolic and diastolic blood pressure. These findings suggest that obese children are at higher risk of having high blood pressure than normal children.

5. Conclusions

Within the limitation of the present study and on the basis of findings the following conclusions have been drawn –

- Significant relationship was observed between Fat % and SBP (r = 0.412, p<0.05).
- Significant relationship was observed between Fat % and DBP (r = 0.436, p<0.05).
- Significant relationship was observed between BMI and SBP (r = 0.511, p<0.05).
- Significant relationship was observed between BMI and DBP (r = 0.484, p<0.05).

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