



Correlation of BMI with obesity and physical activity among university male students

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Abstract

India is a developing nation and a young nation. It is important to have a healthy young population to prevent development of various lifestyle diseases in future. The present study aimed to see the correlation of BMI with obesity and physical activity patterns in 200 university male students (18-27 years) in Hisar city. The results showed that of the total population 16% and 9.5% of the students were overweight and obese. There was strong positive correlation between BMI and Waist circumference ($p < 0.01$) and BMI and hip circumference ($p < 0.01$). While, there was a negative correlation between BMI and physical activity, though non-significant. Hence, young boys should be advised to be more physically active to prevent rise in BMI and hence associated obesity in the long run.

Keywords: BMI, physical activity, obesity, young

1. Introduction

Physical activity (PA) needs to be clearly defined especially to its relevant association with health. As per CDC (center of disease control and prevention) physical activity is "any bodily movement produced by the contraction of skeleton muscles that increase energy expenditure above a basal level.

It can also be described as the optimal efficiency of various organs like heart, lungs, blood vessels and muscles to their best capability. A coordinated work involving the joint effort of strength, flexibility, cardio respiratory endurance and body composition too counts for a physical fitness. It also means to work without excessive fatigue and adequate energy to carry out and enjoy daily activities. A sense of alertness and ability to respond to unwanted situations with vigor and energy is also physical fitness^[1].

An Indian study conducted on 14227 people in 2014 reported that 54.4% of them were inactive while 31.9% were highly active. Subjects in urban areas were more inactive than those in rural areas.

It also showed that females were less active compared to males with reporting of 41.7% of males inactive, while, 61.3% of males were highly active. It also reported around 392 million people in India to be inactive when the results were generalized for whole country. These inactive people were generally of higher BMI, Increased waist circumference, and raised systolic and diastolic BP and having higher pulse rate when compared to active people^[2].

When talking about global mortality, physical inactivity is one of the 10 leading risk factors in 18 years and above age group. People who are involved in at least 150 minutes of moderate intensity physical activity in a week or near equivalent to it, have less chances of mortality when compared to inadequately active people who have 20% to 30% more chances of mortality.

A 2010 study showed global activity rates in adults over 18 years was found to be insufficient in 23% of people of which 20% were men and 27% women. With age inactivity status decreased. Of the whole lot the youngest population which were insufficiently active constituted 19% of the whole. While, this figure was 55% reported in the oldest age group.³ Income has been associated with level of insufficient physical activity prevalence as per WHO. In high income countries the insufficient physical activity has been reported more than in those with low income countries. About 41% men and 48% women are inactive in high income countries while the same for low income countries is 18% and 21% for men and women^[4].

3.2 million Deaths alone globally are due to physical inactivity, which is also the fourth leading risk factor for its associated mortality. Daily activities like walking, cycling and regular sports activities can improve health significantly. All these activities should be of moderate intensity. Today's job requirements and sedentary leisure activities have led to the drop in physical activity levels too. Similarly, shift to the easy, comfortable and passive transportation modes have contribute to it too.

In 2010, 81% of adolescents were below the physical activity levels all in the age group of 11-17 years. Here too, girls were less active to boys with 84% girls and 78% boys not meeting recommendations given by WHO for adequate physical activity^[3].

Recent rapid urbanization had also added to people becoming less active over a period of time. Various factors like crimes in outdoor places, excessive traffic, poor air quality, less open spaces, lack of pavements and few places for sports and fitness have added to this. The recent rise in non-communicable diseases (NCDs) such as stroke, diabetes, and cancer are also associated with low physical activity levels

too. It is not only a problem of few countries, but slowly and steadily more and more countries are getting affected by it [3]. A decrease in the physical activity level has been associated with various chronic diseases. Adolescents and youth are not active on a regular basis and are reported to have low physical activity. Studies reporting the pattern of PA and inactivity among Indian adults and adolescents are limited and there exists differences in the PA levels among various populations [4]. The aim of the present study was to assess the correlation of BMI with physical activity patterns among university male students in Hisar city.

2. Methodology

It is a cross sectional study done on a convenience sample of 200 university male students in the age range of 18-27 years in Hisar, Haryana. Uncooperative students and those with any diagnosed medical condition like diabetes, hypertension were excluded from study. A questionnaire was used to measure basic demographic variables of participants along with height, weight, waist circumference, hip circumference and physical activity measures. After getting the consent from the participants, data was collected for the above variables.

Weight: For measuring weight, digital weighing machine was used. Subject was asked to stand on weighing machine with light clothing and without shoes.

Height: Measuring tape was used for measuring height. Student was asked to stand with feet shoulder width apart and head straight, eyes looking forward and both shoulders were in level and keeping the spine straight measurement was taken using a scale placed horizontal on the vertex parallel to floor touching the wall. This mark was then measured using the measuring tape for height measurements.

BMI: It was calculated by dividing weight in kilograms by square of height in meters.

Waist Circumference (WC): Using the measuring tape, WC measurement was taken at the level of umbilicus.

Hip Circumference (HC): Using the measuring tape, measurement was taken at the level of widest part of the buttocks.

Physical activity (PA): It was measured by using the International physical activity questionnaire (Short version).

3. Statistical analysis

Data was analyzed using SPSS software version 21. Demographic data is presented in mean and standard deviation. Further data was classified according to BMI group and presented in mean and standard deviation along with percentages. Normality was checked for variables using Kolmogorov-Smirnov test for BMI, waist circumference, hip circumference and physical activity. Spearman correlation was used to find correlation between BMI and waist circumference, BMI and hip circumference, BMI and physical activity, waist circumference and hip circumference.

4. Results

The mean age, height, weight of the study subjects was 22.38 ± 1.54 years, 5.8 ± 0.44 feet, 63.83 ± 9.83 kg respectively while the mean waist circumference and mean hip circumference of the subjects was 77 ± 7.84 cm and 88.74 ± 6.42 cm. The mean BMI of the subject was 21.3 ± 3.03 kg/m²

and the mean physical activity was 4198.09 ± 2691.64 (MET).

Table 1: Demographic data of the study participants

Demographic data	Mean ± SD
Age (Year)	22.38 ± 1.54
Height (feet)	5.8 ± 0.44
Weight (kg)	63.83 ± 9.83
Waist Circumference (cm)	77 ± 7.84
Hips Circumference (cm)	88.74 ± 6.42
BMI (kg/m ²)	21.3 ± 3.03
Physical Activity (MET)	4198.09 ± 2691.64

Of the total students 18% were underweight, 56.5% normal, 16% overweight and 9.5% obese.

Table 2: Prevalence of underweight, normal, over weight and obese among the students according to BMI

BMI	No. of subject	
<18.5	36 (18%)	Under weight
18.5-22.9	113 (56.5%)	Normal
23-25	32 (16%)	Overweight
>25	19 (9.5%)	Obese

Table 3: Average of waist circumference, Hip circumference and physical activity according to BMI classification among university students

Variables	Underweight	Normal	Overweight	Obese
Waist circumference	67.91	76.27	81.90	90.26
Hip circumference	81.75	87.98	93.21	98.94
Physical activity				
Low (6)	0 (0%)	3 (2.65%)	2 (6.25%)	1 (5.26%)
Moderate (76)	12 (33.33%)	46 (40.70%)	10 (31.25%)	8 (42.10%)
High (118)	24 (66.66%)	64 (56.63%)	20 (62.5%)	10 (52.63%)

Waist and hip circumference increased gradually as the BMI increased. Out of 200 students 6 students were having low physically active, 76 were with moderate physically active and 118 were highly physically active.

Table 4: Correlation between study variables

Variable	r	Significance
BMI vs. WC	0.818	0.000*
BMI vs. HC	0.782	0.000*
BMI vs. PA	-0.088	0.214
WC vs. HC	0.863	0.000*

*Correlation is significant at the 0.01 level (2 tailed)

There was a strong positive correlation between BMI and WC, significant at p<0.01. Also, BMI and HC had a strong positive correlation, significant at p<0.01. Results also showed that there was a negative correlation between BMI and PA i.e. with increasing BMI, PA decreased and vice versa in young boys.

The aim of present study was to find out the correlation of BMI with physical activity among University male students of age group 18-27 in Hisar city. In this study 56.5% students were in normal BMI, 18% were underweight, 16% were overweight and 9.5% were obese. In this study the mean BMI was 21.3 Kg/m². Observation Studies has been done in

different populations to assess the correlation of BMI with physical activity and central obesity in different age group in developing country like India.

A study was conducted by Habiba Sulema *et al.* in 2006 among young females aged 14-17 years to examine relation of BMI to physical activity. There was inverse and significant association between BMI and total activity they did in a day [5]. The above study supports the present study because in present study negative correlation was found between physical activity level and body mass index.

A 2014 study done on patients with metabolic syndrome by Marcin Gierach *et al.* compared association of BMI to waist circumference. 839 patients in the age range 32-80 years diagnosed with metabolic syndrome were included. Of the total population 41.1% were men while 58.9% were women. The study showed a positive and significant correlation between BMI and waist circumference [6]. Hence this study too support the present study. As in present study correlation between BMI and waist circumference was positive and highly significant.

A study was conducted by Hemmingsson E *et al.* in 2017 to know whether the association between physical activity and body mass index is dependent on obesity. They concluded that the association between physical activity and body mass index was weekly significant and negatively correlated. Hence this study also supports the present study because present study also reported negative correlation between body mass index and physical activity though our results were statistically non-significant [7].

The factors supposed to be the cause of this increasing prevalence of obesity and decreasing level of physical activity are shifting more to fast foods, presence of latest technology instruments for work making life easier and comfortable, increase in TV watching hours by the students and consumption of high calorie food. Last but not the least, obesity can be due to genetic and endocrine disorders too.

Advice should be given to young students to increase their physical activity levels to enhance their health and life expectancy. Physical activity is also necessary for maintain good quality of life. So, adequate knowledge regarding physical activity and proper awareness should be developed among the society to decrease the complications of diabetes, sleep apnea and hypertension.

5. Conclusion

The result of the study shows the negative correlation between body mass index and physical activity level. Hence, it can be concluded from the study that the students who have poor physical activity are more prone to obesity as shown from higher reading of BMI. Additionally, the BMI is found positively correlated with waist circumference and hip circumference i.e. with increasing BMI there are chances of increased central obesity too. 25.5% of the boys are above the normal BMI range. i.e. 1/4 of young male population is either overweight or obese. Physical activity is adequate among all BMI groups but still 25.5% of boys are overweight and obese.

Conflict of interest: None

6. References

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