SHORT COMMUNICATION

Correlation between Fitness Index and BMI among 1st MBBS Students of a Tribal District Teaching Hospital of India

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Abstract

Aim: *Present study was conducted to investigate association between Body Mass Index (BMI) and physical fitness among 1st M.B.B.S. students of a tribal district teaching hospital of south India.* ***Method:*** *A total of 100 students including 39 males and 61 females of age group between 17-19 years were assessed for their cardiorespiratory fitness, measured using maximal oxygen uptake (VO_2 max) by the Mc Ardle Step Test. The subjects were instructed to perform test for a total duration of three minutes at the rate of 24 cycles per min. After completion radial pulse rate was recorded from the 6th to 20th sec of the recovery period in same position. I5 sec pulse rate was converted into heart rate/min & the VO_2 max was calculated from Wassermann's equation.* ***Result:*** *Observed mean BMI (kg/m2) was 22.83 ± 1.76 and 24.06 ± 2.13; and mean VO_2 max (ml/kg/min) 47.66 ± 7.81 and 35.59 ± 4.06 for male and female, respectively. Correlation coefficients between both BMI and VO_2 max were statistically significant (r = −0.32).* ***Conclusion:*** *This study illustrated a negative moderate relationship between body mass index and physical fitness among the students of this tribal district teaching hospital.*

Key words: *BMI, Fitness Index, VO_2.*

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Introduction

The human body is created to function well when it is in an active condition. Physical fitness prevents an individual from being infected or suffering from illness, and assists them in staying healthy both mentally and physically throughout their lives.[1] Cardio-respiratory fitness and body composition are associated with the risk of emergence of cardiovascular diseases. Accordingly, these factors are related to health and relationships existing between the two have been the focus of researchers in the field of sports sciences.[2]

The incidence of cardiovascular disease is statistically and physiologically related to obesity. It is considered that VO_2 max or maximal aerobic capacity is one of the best to measure functional capacity of the oxygen system, the cardio-respiratory system or the oxygen transport system.[3] In the recent decade, a decline in physical activity among college students has been observed.[4,5]

Physical fitness is an important thing in life. Physical fitness is not only needed by an athlete but also by non-athlete for better life. Medical students are going to be a doctor. A good doctor is a doctor who has a good physical fitness too. Increased Body Mass Index (BMI) and low cardiorespiratory fitness has been associated with significant risk of morbidity and mortality. The purpose of this study was to investigate the association between BMI and physical fitness in the population of the 1st MBBS students of 2013 batch at tribal region medical college, RIMS Adilabad.

Materials and Methods

This cross-sectional study of 30 healthy males, of mean (SD) age 18.15± 0.81 years and 70 healthy females of mean (SD) age 18.13±1.02 of 1st MBBS students of 2013 batch was done at

tribal region teaching hospital, RIMS Adilabad. After a brief explanation about the study and signing an informed consent form, each participant was measured for body weight and height. Weight was measured using calibrated weighing machine and height was measured on a meter scale. BMI was calculated using quetlet's index [6] as weight in Kgs and height in meters. The recommended values of BMI, categorized as "normal weight" are in the range BMI 18.5–25. [7]

Cardiorespiratory fitness was measured using maximal oxygen uptake (or VO2max) by the Mc Ardle Step Test.[8, 9] The test was performed using a stool with a height of 16.25 inches (41.30 cm). The test was done for a total duration of three minutes at the rate of 24 cycles per min. After completion, subjects were asked to remain standing comfortably and radial pulse rate was recorded from the 6th to 20th sec of the recovery period. This I5 sec pulse rate was converted into heart rate per min and the wasserman's equation [10] was used to predict VO_2 max [For men VO2 max (ml/kg/min) = 113.33 - (0.42 X Pulse rate/min) and for women VO_2 max (ml/kg/min) = 65.81 – (0.1847 × pulse rate/min)]. All experiments were performed at room temperature. This was an analytic study with a cross-sectional study design. Data analysis was performed using MS Excel 2010 with Pearson correlation test and student T-test.

Results

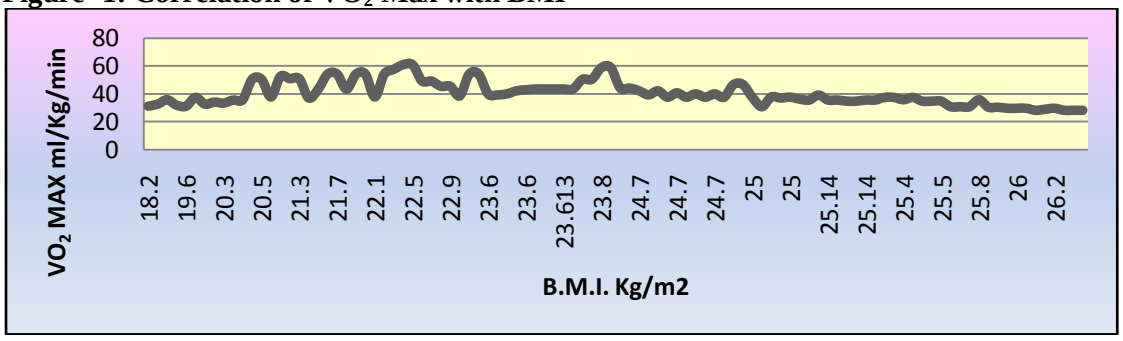
In the present study, observed mean age was 18.13±1.02 years in male while it was 18.15±0.81 years in females with no statistical significance. Mean height was 156.91±3.76 cms in male while it was 168.10±4.78 cms in females with statistical significant p value. Mean weight was 156.91±3.76 Kgs in male while it was 168.10±4.78 Kgs in females with statistical significant p value. Statistical significant differences were observed between BMI values of female and males as BMI in females was 24.06±2.13 Kg/M_2 while it was 22.83±1.76 Kg/M_2. VO_2 Max in females was 35.59±4.06 Ml/Kg/Min while it was 47.66±7.81 Ml/Kg/Min, the difference was statistically significant. Basal heart rate and recovery heart rate were also significantly different in both the genders as mean basal heart rate was 83.72 beats per minute in females while in males it was 88.05 beats per minute. Mean recovery heart rate was 163.81 in females while it was 152.56 in females (Table- 1).

Table- 1: Characteristics of study population

Variable	Females	Males	P-Value
Age (Years)	18.13±1.02	18.15±0.81	0.91#
B.M.I. (kg/M_2)	24.06±2.13	22.83±1.76	0.002*
VO_2 Max (ml/kg/min)	35.59±4.06	47.66±7.81	$0.1X10^{-13}$*
Height (cms)	156.91±3.76	168.10±4.78	$0.20X10^{-22}$*
Weight (kgs)	59±7.21	64.41±5.35	$0.5x10^{-4}$*
Basal Heart Rate (beats/min.)	83.72±8.11	88.05±8.15	0.005*
Recovery Heart Rate (beats/min.)	163.81±27.21	152.56±18.89	0.013*

#: non-significant, *: significant

Figure- 1: Correlation of VO_2 Max with BMI



Discussion

This study was done among the 1st MBBS students of RIMS Adilabad and we found that VO_2 max (ml/kg/min) achieved by males was 47.18±7.83 which was more in comparison to females (35.62±5.05) with p-value of $0.1X10^{-13}$. Similar results were also observed by Bandyopadhyay A et al in their study.[11] The difference is largely attributable to a difference in body composition.

The findings of the present study shows moderate negative correlation (r = -0.32) between B.M.I. and VO_2 max in all student. Fairly good VO_2 max is achieved with B.M.I. of range 21-24 Kg/m^2 after which there was a decline in both male and female students. Therefore this study shows that a normal BMI is required for good cardio-respiratory fitness which is consistent with the study done by Padmapriya K et al[12]. Studies done by Chatterjee S et al [13] and Sulayma AL Barwani et al [14] have proved the inverse relationship between BMI and VO_2 max and have found that excess body fat impairs cardio-respiratory functions and reduces mechanical efficiency for a given work load which is also proved in our study.

Conclusion

In this cross- sectional study among medical graduates shows negative associations between obesity index (B.M.I) and cardio-respiratory fitness index, as measured by calculated VO_2 max. The observed trends are unfortunate because it has been demonstrated that physical activity and good nutrition can have a positive effect on the overall performance of students. Physical activity can reduce stress levels and improve work-related time management, hence strategies should be implemented to counter the present trend and help young people improve their physical fitness.

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