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# Correlation Between Body Mass Index and Cardiorespiratory Fitness in Young Healthy Males

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**Abstract**

**Background:** Increased body fatness as predicted by body mass index is an additional factor for developing cardiovascular diseases.

**Objective:** The objective of this study was to determine the cardiorespiratory fitness in terms of VO2 max in young healthy males and to study the relation between body mass index and cardiorespiratory fitness.

**Methodology:** 50 young healthy male subjects in the age group of 18 to 22 years were included in this study group. Body mass index was measured as weight (in kilograms) divided by height (in meters) squared. Cardio respiratory fitness in terms of VO2 max was assessed by following the protocol of Queen's College Step Test (QCT).

**Results:** There was a significant negative correlation between body mass index (BMI) and VO2max (ml/kg/min) (r = -0.890).

**Key words:** Body mass index, cardio respiratory fitness, vo2 max.

## Introduction

Physical fitness is measure of proper functioning of cardiovascular, respiratory, neuro endocrine, muscular and haemato circulatory system.Physical fitness, daily routine physical activity and task oriented physical exercises are outcome of integrated functioning of all bodily system. Hence, when physical fitness is checked, the functional status of all system is actually being assessed. Due to this reason physical fitness is considered as very useful health markers.[5]

Cardio respiratory fitness is a powerful predictor of cardiovascular and all-cause mortality. Low aerobic fitness is one of the modifiable cardiovascular risk factor. Effect of body fatness and leanness with aerobic fitness has remained unexplored. Body composition parameters affect cardiovascular fitness.[12]

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Cardiovascular fitness is different in individual with different body mass. Lean individual with high body fat is very common trend in India. In lean individual, high mortality is seen in association with smoking and other diseases. Cardio respiratory fitness should be assessed to check association between body composition and mortality. Overweight and obesity have increased very fast in India in last few decades.[11]

Cardiovascular mortality is very common in overweight and obese. Unwanted premature cardiovascular deaths are also common in lean individual. Body mass index is commonly used tool to check all cause morbidity and mortality2,3,4. In obese individuals, more body weight is seen for particular height but fat mass and fat free mass are ignored. Increased body mass index reflects high body fat and fat free mass and they have different association with cardiovascular fitness. [15]

Cardio respiratory fitness can be measured in terms of VO2 max (ml/kg/min). It measures the capacity of the body to utilize oxygen. Assessing VO2 max in children and adolescents is very important to determine the cardiovascular, metabolic and musculoskeletal risk factors in adult life. Clinical trials have shown that atherosclerosis which is a major cardiovascular complication begins in childhood and leads to adulthood mortality. High VO2 max shows that the child is free of cardio metabolic complications in later life and a low VO2max in childhood suggests that the child is prone for high cardiovascular risk profile.[16]

There is evidence that cardio respiratory fitness and physical activity significantly reduce cardiovascular risks in adults. A better understanding of the association between cardio respiratory fitness, physical activity, and childhood obesity is vital in assessing. The benefits of interventions to prevent obesity.[9]

The body composition was done with light weight of clothing. The body weight was recorded in kilograms on an empty bladder on a standard weighing machine. The body weight was recorded bare footed to the nearest 0.1 kg. The height was measured using meter scale without footwear to the nearest 0.1 cm. BMI was calculated as the weight (kg) divided by the square of height (m2). Total body fat percentage (TBF %) and visceral fat were assessed by bioelectrical impedance technique using Omron HBF-302, a body fat monitor. Fat mass was calculated on the basis of total body fat percentage into body weight. Fat free mass was calculated by subtracting fat mass from total body weight. FMI was calculated as the FM (kg) divided by the square of height ($m^2$). FFM was calculated by deducting FM from the body weight, and FFMI was calculated as the FFM (kg) divided by the square of height ($m^2$).

The body mass index corresponding to weight in kg , height in $m^2$ and is a good marker of malnutrition present in the majority of existing nutritional screen for calculating the BMI one not only have to measure the height and weight of individuals but also have to do mathematical calculation.

Measure in the height and weight in the field visits in rural areas cumbersome job. BMI measurement require a trained work staff carrying instruments such as weighting scale and stadiometer in the field survey are also not smooth in terms of logistics.

The relationship between body mass index, cardio respiratory and musculoskeletal fitness has not been well explored, particularly in males.

## Aim of the Study

The aim is to find out the correlation relation between body mass index and cardiorespiratory fitness in young healthy males.

## Need for Study

Low cardio respiratory fitness in young adults has emerged as an important factor for developing cardiovascular co morbidities later in middle age, so we are in the need to do further research in this study.

## Objectives of the Study

To find the relation between the body mass index and cardiorespiratory fitness in young healthy males.

## Materials and Methodology

**Study Design:** Correlation Study

**Study Setting:** Cherraan's college of physiotherapy

**Study Samples:** 50 subjects including male college students

**Materials and Tools**

- Body mass index
- Cardio -respiratory fitness

## Materials

- Pen / pencil, to note down the measurement
- Paper with measurement table
- Inch tape
- Stadiometer
- Class 3 electronic weight measuring machine
- Calculator
- Finger type pulse-oximeter

**Criteria for Selection of Subjects**

The study group comprised of 100 young healthy males in the age group of 18 to 22 yrs.

**Inclusion Criteria:**

- Males
- Age between 18-22 yrs.
- Otherwise healthy

**Exclusion Criteria:**

- Male subjects below 18 and above 22 yrs
- History of cardiac disease
- History of lung disease
- Smoking
- Not on regular medications affecting cardiovascular and respiratory system
- Not undergoing any physical conditioning programmes

**Procedure**

50 subjects were selected from the young healthy males between the age group of 18-22. After explaining the procedure, consent was obtained. Before, to start theprocedure, heart rate was measured by using queen's college step test,after that procedure, again heart rate was measured. Pre and post heart rate were compared. Statistical analysis were done by using correlation method.

**Data Presentation and Analaysis**

Statistical analysis **w**ere done by using correlation method

**Table 1:**

| S No | Parameter | Means |
|---|---|---|
| 1 | Body mass index | 23.0168 |
| 2 | Cardio respiratory fitness | 72.84 |

Correlation between body masss index and cardiorespiratory fitness in young healthy males. (Age group 18-22)

**Table 2:**

| S.No | BMI (X) | Heart rate (Y) |
|---|---|---|
| 1 | 22.24 | 83 |
| 2 | 26.2 | 70 |
| 3 | 17.3 | 70 |
| 4 | 20.3 | 71 |
| 5 | 18.6 | 70 |
| 6 | 26.3 | 70 |
| 7 | 18.9 | 70 |
| 8 | 24.9 | 71 |
| 9 | 22.7 | 73 |
| 10 | 23.2 | 78 |
| 11 | 22.1 | 70 |
| 12 | 21.9 | 70 |
| 13 | 28.8 | 70 |
| 14 | 21.9 | 70 |
| 15 | 24.4 | 70 |
| 16 | 21.6 | 70 |
| 17 | 24.3 | 70 |
| 18 | 23.9 | 70 |
| 19 | 28 | 70 |
| 20 | 21 | 70 |
| 21 | 24.2 | 78 |
| 22 | 23.6 | 70 |
| 23 | 21.7 | 70 |
| 24 | 24.4 | 70 |

| S.No | BMI (X) | Heart rate (Y) |
|---|---|---|
| 25 | 19.5 | 70 |
| 26 | 20.8 | 73 |
| 27 | 33.2 | 72 |
| 28 | 24.9 | 71 |
| 29 | 23.2 | 72 |
| 30 | 21.1 | 73 |
| 31 | 18.8 | 73 |
| 32 | 24.4 | 70 |
| 33 | 21.2 | 71 |
| 34 | 25.5 | 71 |
| 35 | 23 | 73 |
| 36 | 21.1 | 70 |
| 37 | 18.2 | 71 |
| 38 | 18.9 | 73 |
| 39 | 24.6 | 70 |
| 40 | 23.2 | 73 |
| 41 | 22.1 | 71 |
| 42 | 21.9 | 70 |
| 43 | 28.8 | 70 |
| 44 | 21.4 | 72 |
| 45 | 23.6 | 70 |
| 46 | 24.4 | 73 |
| 47 | 21 | 73 |
| 48 | 24.4 | 70 |
| 49 | 25.5 | 73 |
| 50 | 23.5 | 70 |
| Total | 1150.84 | 3642 |

Correlation between Body mass index and cardio respiratory fitness in healthy males CORELLATION COEFICIENT = - 0.890

This implies that there is a NEGATIVE CORRELATION between body mass index and cardio respiratory fitness. Null hypothesis is accepted.

## Result

There was significant negative correlation between body mass index and vo2 max- r = -0.890

## Discussion

**LAKMI CC, UDAYAIB, VINUTHA SHANKAR S** In this studythere was a significant One hundred young healthy male subjects in the age group of 18 to 22 years were included in this study group. Body mass index was measured as weight (in kilograms) divided by height (in meters) squared. Cardio respiratory fitness in terms of $VO_2$ max was assessed by following the protocol of Queen's College Step Test (QCT)**.** There was a significant negative correlation between body mass index (BMI) and $VO_2$max (ml/kg/min) ($r = -0.48$, $p<0.01$).The results suggest the striking effect of body fat on cardiorespiratory functions. Excessive amount of body fat exerts an unfavourable burden on cardiac function and oxygen uptake by working muscles. Low cardio respiratory fitness in young adults with increased body fat could be a factor for developing cardiovascular co morbidities later in middle age

**SANTU DHARA AND KALLOL CHATTERJEE** Within the limitation of the present study the following Conclusions were drawn on the basis of obtaining results. In this study there were very low positive co-relation was exist on VO2 max (ml/kg/min) with Body Mass Index (BMI) of Physical Education students, but the value was not so correlated that a significance difference can be possess. The scholar is greatly satisfied to mention that the findings have accomplished the purpose for which the study was initially conceptualized. The study done by 'Sports Medicine Program Faculty of Medicine Universities Indonesia', In the year of 2012 it was held in Gelora Bung Karno (GBK) Jakarta, Fitness Challenge is a serial fitness tests held annually including BMI and cardio respiratory endurance examination mass index (BMI) and VO2 max (ml/kg/min) ($r = -0.48$, pIn this study there was a significant Negative correlation between body mass index and vo2max( ml/kg/min) ($r= -0.48$ , $p<0.01$)

**APARNA KONDAPALLI ,DR GANPAT DEVPURA, DR MANOHAR ,SARAVANTH** PERAKAM In this study : This is a cross sectional study involving 60 girls with an age group of 14 -16 years and were categorized into 3 groups (n=20) based on their BMI and WHR. All three groups

were assessed for Cardio respiratory fitness using 20m shuttle run test. Results: The data was analyzed using ANOVA and (P< 0.05) in all the 3 groups. This suggests the significant difference of VO2max in all the 3 groups. There is negative correlation between body mass index and vo2 max

In this study there was a significant negative correlation between body mass index and vo2 max CORELLATION COEFICIENT = (- 0.890). This implies that there is a NEGATIVE CORRELATION between body mass index and cardio respiratory fitness. Null hypothesis is accepted.

## Conclusion

From the data presentation and analysis it is evident that the body mass index and cardio respiratory fitness is negatively correlated.

**Ethical clearance>** Taken from... CHERAN COLLEGE OF PHYSIOTHERAPY ETHICAL... committee

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**Conflict of Interest**: NIL.

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