

**IJCRR**

Vol 05 issue 23

Section: Healthcare

Category: Research

Received on: 01/10/13

Revised on: 28/10/13

Accepted on: 11/11/13

CORRELATION BETWEEN PHYSICAL FITNESS AND BODY MASS INDEX

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ABSTRACT

Background: Physical inactivity is a major cause of morbidity and mortality. The aim of the present study was therefore, to co-relate the incidence and relationship between the measures of efficiency physical fitness and the body mass index.

Method: A cross-sectional study was done to determine the correlation between the measures of efficiency fitness Index and body mass index. Subjects' physical fitness & body mass index was assessed using standardized protocols.

Result: Twenty-two young subjects (age group 18-25 years) participated in the study. The study revealed high prevalence of low fitness among obese subjects and significant correlation between the selected indices of physical fitness (efficiency fitness index) and body mass index.

Conclusion: The results showed that the efficiency fitness index of the subjects differed significantly from one another in the various BMI categories, with the subjects of normal weight possessing a higher fitness than the overweight or obese subjects. Fitness capacity therefore decreased progressively as the BMI increased.

Keywords: Physical Fitness, Body Mass Index

INTRODUCTION

There has been a great deal of concern in recent years about the levels of physical fitness of many young people. Young adult obesity rates have almost quadrupled in the last 25 years. The number of obese children has tripled in 20 years. 10% of six year olds are obese, rising to 17% of 15 year olds. There are various causes of obesity such as environmental pollution, stress, and lack of exercise, overeating combined with lack of exercise is considered to be the main cause according to most scientists (Na et al. 2001). Simple obesity caused by overeating and lack of exercise makes up 95% of the people suffering from obesity, without cause from hereditary illness, endocrine disorders, or neurotic disabilities (Kim 1990). Science of disease prevention and health improvement are crucial matters in our

society and obesity is becoming a big issue for example, heart related diseases recently came up as a major cause of death. Research has shown that obesity can lead to health problems, including arthritis, heart disease and diabetes. One way to help to ensure that these problems do not arise is to improve people's physical fitness levels by taking regular exercise and awareness of physical fitness in the general population.

A key concept in testing physical fitness is that of a person's pulse rate and, in particular, how quickly this returns to normal after excessive exercise. It is important that the pulse rate returns to normal after strenuous exercise, otherwise the heart is put under continuous stress. The purpose of this study was to examine the relationship between body mass index (BMI) and physical fitness. The negative impact of obesity on physical

fitness has been documented; however, this issue has not been explored in youth.

AIM AND OBJECTIVE

This study was to examine the relationship between body mass index (BMI) and physical fitness. Correlation between efficiency fitness Index and body mass index assessed.

REVIEW OF LITERATURE

The literature carried out in this area showed that there was a negative significant correlation between BMI and aerobic fitness ($r=-0.55$) (Chen et al., 2002). There was a negative significant correlation between BMI and results of physical fitness (Chen et al., 2002). A negative significant correlation was observed between percent of body fat and aerobic fitness (Nikbakht, 1991; Hoseini, 1998). The correlation between percent of body fat and abdominal muscle endurance was negative and significant (Afarinesh, 1991). There was a negative significant correlation between percent of body fat and flexibility (Karimi, 1999). The relationship between waist circumference and physical fitness was negative (Delaux et al., 1999). There was a negative significant correlation between weight and aerobic fitness (Nikbakht, 1991; Hosseini, 1998). There was a correlation between weight and sit and reach (Afarinesh, 1991). Increased prevalence of obesity was associated with decrease of PA level (Lioet S., 2007 ; Riddoch CJ, et al, 2004).

MATERIALS AND METHODS

This cross-sectional study was carried out on twenty-two students, age group 18-25 years. The subjects were divided into 3 groups based on BMI (Group I: BMI < 25, Group II: BMI \geq 25 to < 30, Group III: BMI \geq 30) and the correlation between BMI and physical fitness was assessed.

Inclusion criteria: Only apparently healthy subjects, who volunteered to participate in the study, were included.

Exclusion criteria: Subjects with medical and surgical conditions such as diabetics, hypertension and other cardiac, renal, respiratory disease and chronic disease were excluded from the study.

The following anthropometric and physiological measurements were measured: Height, body weight, measure of overall obesity (body mass index [BMI]). Statistical analyses included descriptive statistics (mean, standard deviation. The study protocol was approved by ethical committee. Written consent from the subjects was taken before they were considered for inclusion in the study.

1) Measuring height and weight

Wearing light clothing, the subject stands comfortably barefooted with eyes leveled on a Height and Weight Measuring Instrument.

2) Measuring efficiency fitness index (EI) by Gallagher and Brouha Test

They were asked to exercise for 5 minutes on bicycle ergo meter in the department of Physiology of Santosh Medical College. The pulse rate will be recorded before the start of exercise, during exercise, 1 minute after the exercise (a), 2 minute after the exercise (b), and 4 minute after the exercise (c).

The efficiency fitness index will be calculated as,

$$EI = \frac{(\text{Duration of Exercise in seconds}) \times 100}{2(a + b + c)}$$

The fitness of the subject will be graded on basis of Heart rate recovery as,

>90% - Superb

80 - 90 - Excellent

70 - 80 - Good

55 - 70 - Average

Below 55 – Poor Physical condition

RESULTS

Table 1: Represents the mean values of efficiency fitness index of the subjects in the various BMI groups and various BMI parameters along with correlation between BMI and Efficiency fitness index (EI)

	N	Wt (kg)	Ht (m)	BMI	EI	r*	p Value
Overall	22	86.14	1.77	27.36 (± 4.53)	55.28 (± 4.16)	-0.91629	HS
Group I	7	68.57	1.73	22.81 (± 2.26)	58.9 (± 1.76)	-0.91258	HS
Group II	9	85.33	1.78	26.8 (± 1.25)	55.99 (± 3.19)	-0.65916	HS
Group III	6	107.83	1.79	33.56 (± 1.44)	50 (± 0.53)	-0.44449	HS

* Correlation

** p Value < .005

Table 1, which represents the mean values of efficiency fitness index of the subjects in the various BMI groups, confirmed a decrease in the mean values of efficiency fitness index as the BMI of the subjects increases and shows negative correlations in the efficiency fitness index with BMI. These negative correlations in the efficiency fitness index with BMI in all groups were significant.

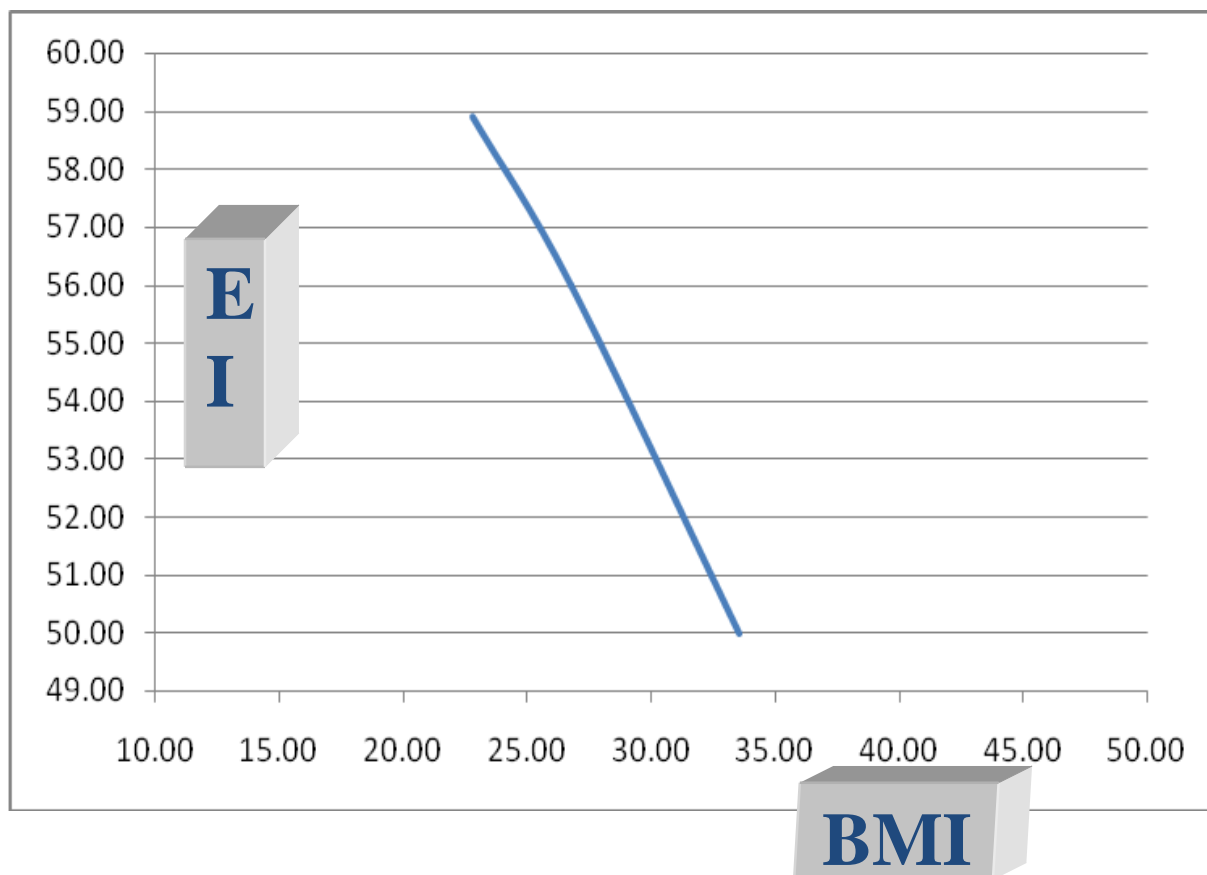


Figure 1: Represents correlation between the mean values of BMI and Efficiency fitness index (EI)

DISCUSSION

The results from table no.1 showed that the efficiency fitness index of the subjects differed significantly from one another in the various BMI categories, with the subjects of normal weight possessing a higher fitness than the overweight or obese subjects. Fitness capacity therefore decreased progressively as the BMI increased. These results correlate with other studies that researched the same variables (Graf C, et al. 2004, Chen LJ, et al. 2006, Tokmakidis SP, et al. 2006). The overweight and obesity are associated with lowered muscle strength (Wearing et al and Tokmakidis et al). Study of anthropometric measures focusing on health indices and female students' physical fitness, concluded that there was a negative significant between most of health-related anthropometric measures and physical fitness factors (Leila Jaafari, 2012).

CONCLUSION

Physical fitness is negatively affected to a great degree in Young adults who are overweight and obese. Although the negative health effects of poor health-related physical fitness are not necessarily present at this age as a sickness or a disease, it is apparent that obesity is the precursor of various chronic diseases, which includes hypertension, type II diabetes mellitus, coronary heart disease and hyperlipidaemia. Statistics worldwide also indicate that the obesity rates seen among these young adult will most probably not improve in the future. The information obtained from this study can therefore be used in the compilation of health related fitness programmes and awareness of use of yoga and physical training. The study, however, had a shortcoming that must be taken into account when interpreting the results. The subject size was relatively small, which made generalization of the results difficult.

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