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Original Research Article

An Observational Study Assessing the Relationship between Body Mass Index and Physical Fitness in Adult Males

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Abstract

Aim: The aim of the present study was to assess the relationship between body mass index and Physical fitness

Material & Methods: A prospective study was conducted in Department of Physiology, Nalanda Medical college, Patna, Bihar, India which includes participants adult male basketball players in the age group of 18-22 years. Sample size was 100 in number.

Results: BMI was inversely correlated with measures of anaerobic power and muscle strength. The heart rate recovery was 96.4±18.2 and 98.2±20.2 in normal and overweight group respectively. Correlation (Pearson co-efficient r) between BMI and physical fitness showed significant differences.

Conclusion: There is negative effect of elevated BMI on selected parameters of physical fitness and sport performance Therefore achievement of optimal body mass should be considered by fitness trainers as means of physical fitness amelioration.

Keywords: BMI, Physical fitness, Heart Rate, Hand grip dynamometer.

Introduction

Optimal weight is the important concern in day-to-day life. The research on the physical determinants of basketball performance from a physiological perspective has focused on profiling of physical fitness characteristics of elite players. [1,2] who have high stature and increased anaerobic power. [3,4] Moreover, the achievement of an optimal body mass (BM) is a main concern in daily basketball practice. Body mass index (BMI) is an easily-administered and inexpensive tool to monitor BM status. Body mass Index is easy to calculate and helps to monitor the weight status. [5] Although it is commonly used in a health-setting to classify humans as underweight, normal weight, overweight and obese. [6]

However, BMI is often overlooked in studies in sport populations and there are many studies in basketball players which present data on height and BM, but not on BMI. [2,7,8] Although basketball is a widely practiced sport worldwide, to the best of our knowledge no study has ever been conducted to investigate the effect of elevated BMI on running and jumping performances in young male basketball players. There is evidence from research

conducted chiefly on general populations that BMI is associated with reduced physical fitness and the same has been shown recently in soccer, volleyball and handball. [9] While such findings would be attributed to the association of BMI with fat mass, we would not expect the same magnitude of association between BMI and physical fitness in the case of sport populations, in which there is an increased fat free mass. Heart rate Recovery is heart's ability to return to normal level after physical activity. Fitness level and proper function of heart are measured by recovery phase.

There is evidence that raised BMI is associated with reduced physical fitness. [10] The comparison between groups with different BMI revealed that groups with lower BMI have better physical fitness. Normal BMI is 18.5-24.9 kg/ m2 and that of overweight subjects is 25-29.9 kg/ m2. Therefore, the main objective of this study was to examine the relationship of BMI with physical fitness such as running and jumping performances of male basketball players, with an emphasis on the characteristics which are linked with sport excellence (e.g., sprint and vertical jump) [4]

Material & Methods

A prospective study was conducted in Department of Physiology, Nalanda Medical college, Patna, Bihar, India. The subjects recruited were adult male basketball players in the age group of 18-22 years. Sample size was 100 in number.

Inclusion Criteria

- Young healthy adults male in the age group of 18-21yrs
- Non obese BMI 18.5– 24.9 kg/ m2 as control
- Overweight subjects is 25-29.9 kg/ m2 as test.
- Normotensive < 130/80mm Hg.
- Non smoker
- Non alcoholic
- Euglycemic

Exclusion criteria

- Use of any medication
- Smokers
- Alcoholic
- Any systemic illness

Materials:

Hand grip dynamometer, electronic weight scale Parameters

- Weight in kilogram. &height in meters were measured. BMI=Weight in kg/height in meter2 was calculated to group them as normal weight.
- Waist to hip ratio was measured.
- Maximum voluntary contractions (MVC) were assessed and subjects were asked to carry out endurance isometric exercise at 40% of their MVC

Study method

Prior to the procedure written and informed consent was obtained from all the subjects. All participants visited our laboratory and underwent a series of anthropometric and physiological measures. The exercise was performed in a well-ventilated room. Participants were instructed not to consume beverages nor a heavy meal in previous 4 hours or participate in any vigorous activities 24 hour before test.

At the reporting time subjects were asked to relax in supine position for 5min. Baseline HR was recorded. Isometric exercise was done using handgrip dynamometer. Subjects executed MVC contractions of 1second duration at 1 minute interval for 3times. Maximum of these is considered as their MVC. Then endurance contraction at 40% of their MVC is made. Isometric endurance contraction at 40% of the individuals MVC was executed with hand grip dynamometer.

Handgrip strength test:

The participants were asked to stand with their elbow bent approximately 90 degree

and instructed to squeeze the handle of handgrip dynamometer as hard as possible foe 5 second. HST was calculated as sum of the best efforts for each hand divided by body mass and expressed as kg.kg-1 of body mass.

Heart rate was recorded at the end of test and in the end of first minute of recovery after the test.

Statistical Analysis

All the statistical methods were carried out through the SPSS for Windows (version 17.0).

• Descriptives: Data was expressed as Mean and Standard Deviation (SD).

• Students Independent – 't' test was employed to test differences in physical fitness between normal and overweight participants for each group.

• Pearson correlation: Pearson's correlation coefficients were estimated to determine the

correlation between BMI and physical fitness p values < 0.05 are considered to be significant

Results

Table 1: Comparison of BMI &WHR between normal and overweight

	Normal Weight	Overweight
Weight (Kg)	62.8±8.6	74.6±6.4
Height (m)	1.72±0.08	1.75±0.05
BMI (Kg/m2)	22.48±1.46	25.75±1.72
WHR	0.75±0.02	0.82±0.03

BMI was inversely correlated with measures of anaerobic power and muscle strength.

Table 2: Comparison of Heart rate recovery between normal and overweight

	Normal Weight	Overweight
HR recovery	96.4±18.2	98.2±20.2
HST Kg Kg -1	1.32±0.25	1.10±0.25

The heart rate recovery was 96.4±18.2 and 98.2±20.2 in normal and overweight group respectively.

Table 3: Correlation of between BMI and physical fitness

	BMI	Physical fitness
HR recovery	0.05	0.32
HST	-0.50	-0.78

Correlation (Pearson co-efficient r) between BMI and physical fitness showed significant differences.

Discussion

Optimal weight is the important concern in day today life. Body mass Index is easy to calculate and helps to monitor the weight status.[5] Heart rate Recovery is heart's ability to return to normal level after physical activity. Fitness level and proper function of heart are measured by recovery phase. There is evidence that raised BMI is associated with reduced physical fitness. [10] Moreover, the achievement of an optimal body mass (BM) is a main concern in daily basketball practice. Body mass index (BMI) is an easily-administered and inexpensive tool to monitor BM status. Although it is commonly used in a health-setting to classify humans as underweight, normal weight, overweight and obese [11], its application in sport populations has been questioned, because it is associated with fat mass, as well as with fat-free mass. [12] Independently from this limitation, it still can evaluate athlete's BM for a given stature, and thus, contribute to BM control. Although basketball is a widely practiced sport

worldwide, to the best of our knowledge no study has ever been conducted to investigate the effect of elevated BMI on running and jumping performances in young male basketball players. There is evidence from research conducted chiefly on general populations that BMI is associated with reduced physical fitness [10,13-16] and the same has been shown recently in soccer, volleyball and handball. [17-19]

BMI was inversely correlated with measures of anaerobic power and muscle strength. The heart rate recovery was 96.4±18.2 and 98.2±20.2 in normal and overweight group respectively. Correlation (Pearson co-efficient r) between BMI and physical fitness showed significant differences. Excess of body mass has a more negative effect on physiological characteristics. [20] Our findings came partially to terms with previous studies on general [13,21,22] and sport population.23 Various studies have shown a negative effect of BMI on mean power and hence the performances of sportspersons like jumping and sprinting in different sports [18,19,24]. These performances represent a crucial part of performance in basketball and should be considered as an integral part of any training program in this sport. Moreover, since sprint ability is also related with agility performance [25], it is reasonable to assume that excess BM might also affect agility.

Conclusion

There is negative effect of elevated BMI on selected parameters of physical fitness and sport performance. Therefore, achievement of optimal body mass should be considered by fitness trainers as mean of physical fitness amelioration.

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