A Comparative Study on Body Mass Index and Basal Metabolic Rate Among Sports and Non-Sports School Going Boys

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Abstract

The purpose of the study was to compare body mass index and basal metabolic rate among sports and non-sports school going boys. For the purpose of the study 50 boys (N=50) boys were selected from Government Secondary School Mothiyapura Baser, Dhaulpur Rajasthan with age ranged from 12 to 16 year old. The selected subjects were divided into two groups one who have participated any sports at district/state/national level were labelled as sports group and the other who have not played sports at any level were labelled as non-sports group. For the current study height, weight, body mass index and basal metabolic rate were selected as variables. Height and weight were measured by weighing scale and stadiometer respectively. There was no significant difference in height, weight and body mass index (BMI) between sports and non-sports school boys while there was a significant difference in basal metabolic rate (BMR) between sports and non-sports school boys. Hence, we conclude that basal metabolic rate (BMR) is better is sports boys than non-sports boys.

Key words Body mass index, Basal metabolic rate.

Introduction

The World Health Organization recommends individuals to reduce fat, salt, and sugar food intake and increase physical activity in order to combat the obesity epidemic. In Sweden, body weight (BW), body mass index (BMI), and overweight in both children and adults has increased. Although no real cause can be determined, an excess caloric intake and decreased energy expenditure (EE) might possibly be what is causing the energy imbalance. The modern lifestyle that includes an increase in overeating as well as an increase in sedentary lifestyles intensifies the preponderance of obesity. Although there may be controversy as to which factor plays a bigger role, both factors must be considered **(Prentice & Jebb, 1995).** Relative weight and skin fold measurements have been used frequently among adults and children to estimate adiposity. Both classes of measures have limitations (**Ruiz et al., 1971; Berry 1974; Rauh & Schumsky, 1968**) but the research to date has suggested that skin fold measurements are the best of the non-laboratory methods currently in use (**Cronk & Roche, 1982**). Measures of relative weight cannot distinguish between adiposity, muscularity. Fat percentage obtained from skin folds measurements has had a wide acceptance among sports researchers. This is due to the fact that F% obtained from the anthropometrical technique is quite well associated and does not differ significantly from the F% obtained from the hydrostatic weighting (**Jackson et. al., 1980**),which is considered as validation criterion for other techniques.

Methodology

For the purpose of the study stratified purposive sampling technique was employed for drawing of sample for the current analysis. For the purpose of the study 50 boys (N=50) boys were selected from Government Secondary School Mothiyapura Baser, Dhaulpur Rajasthan with age ranged from 12 to 16 year old. The selected subjects were divided into two groups one who have participated any sports at district/state/national level were labelled as sports group and the other who have not played sports at any level were labelled as non-sports group. For the current study height, weight, body mass index and basal metabolic rate were selected as variables. Height and weight were measured by weighing scale and stadiometer respectively.

Body mass index was calculated using following formula:

$$\text{Body Mass Index} = \frac{\text{Weight in kg}}{(\text{Height in metres})^2}$$

Basal metabolic rate (BMR) was calculated using the Harris–Benedict equation. The equation used for calculating BMR was:

BMR = 88.362 + (13.397 x weight in kg) + (4.799 x height in cm) - (5.677 x age in years)

Result and findings of the study

The data collected from subjects was analysed by employing descriptive statistics and independent t test. For the purpose of the study and statistical analysis the level of significance chosen was 0.05. The calculation was performed using SPSS software and the findings pertaining to descriptive statistics and t-test has been presented below:

Table no. 4.1. Group Statistics and Independent Sample Test of Selected Variables between Sports and Non-Sports School Going Boys

Variable	**Group**	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**	**t**	**df**	**Sig. (2-tailed)**
Height	Sports	25	1.75	0.11	.02134	1.311	48	.196
	Non-Sports	25	1.71	0.13	.02075			
Weight	Sports	25	60.68	5.28	1.05628	0.334	48	.740
	Non-Sports	25	60.12	6.51	1.30041			
Body Mass Index	Sports	25	20.74	2.29	.45810	0.374	48	.710
	Non-Sports	25	20.97	2.05	.41088			
Basal Metabolic Rate	Sports	25	1595.27	91.28	18.25675	3.815	48	.001
	Non-Sports	25	1463.78	146.18	29.23753			

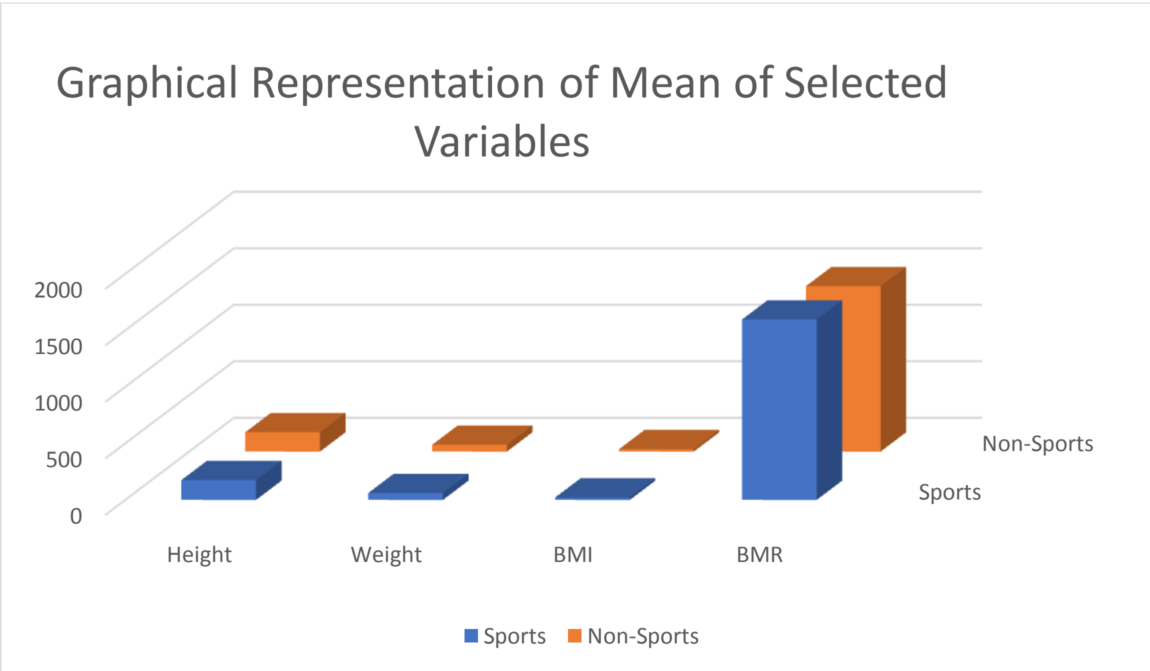
The results indicate that there was no significant difference in height between sports and non-sports school boys t (48) = 1.311, P = 0.196. That is the average score of sports (M=1.75, SD=0.11) was not statistically different from that of non-sports (M=1.71, SD=0.13). It is evident from table that in height, a t value of 1.311

was obtained and the probability in the significance was P=0.196, which is greater than 0.05. Thus, it could be concluded that there was no significant difference in height between sports and non-sports school boys.

The results indicate that there was no significant difference in weight between sports and non-sports school boys t (48) = 0.334, P = 0.740. That is the average score of sports (M=60.68, SD=5.28) was not statistically different from that of non-sports (M=60.12, SD=6.51). It is evident from table that in weight, a t value of 0.334 was obtained and the probability in the significance was P=0.740, which is greater than 0.05. Thus, it could be concluded that there was no significant difference in weight between sports and non-sports school boys.

The results indicate that there was no significant difference in body mass index (BMI) between sports and non-sports school boys t (48) = 0.374, P = 0.710. That is the average score of sports (M=20.74, SD=2.29) was not statistically different from that of non-sports (M=20.97, SD=2.05). It is evident from table that in body mass index (BMI), a t value of 0.374 was obtained and the probability in the significance was P=0.740, which is greater than 0.05. Thus, it could be concluded that there was no significant difference in body mass index (BMI) between sports and non-sports school boys.

The results indicate that there was significant difference in basal metabolic rate (BMR) between sports and non-sports school boys t (48) = 3.815, P = 0.001. That is the average score of sports (M=1595.27, SD=91.28) was statistically different from that of non-sports (M=1463.78, SD=146.18). It is evident from table that in basal metabolic rate (BMR) a t value of 3.815 was obtained and the probability in the significance was P=0.001, which is less than 0.05. Thus, it could be concluded that there was significant difference in basal metabolic rate (BMR) between sports and non-sports school boys.



Discussion

There was no significant difference in height, weight, body mass index (BMI) between sports and non-sports school going boys while in basal metabolic rate (BMR) there was significant difference between sports and non-sports school going boys.Physical activity is an important factor in weight loss. An increase in PA, without modifying diet, might be the best way to observe how body composition, weight and BMR are affected.

Koshimizu, et al., (2012) study the estimated energy requirement is important for adequate nutritional management in athletes. The energy requirement can be estimated from the basal metabolic rate (BMR). However, there is little data regarding the BMR of Japanese athletes. This study measured the BMR and body composition of 81 elite Japanese male athletes in different sports categories: endurance (E), strength, power and sprint (S) and ball game (B). The factors influencing the BMR were also investigated. The BMR and body composition were measured by indirect calorimetry and an air-displacement plentysmograph device (the BOD POD), respectively. The BMR per lean body mass (LBM) differed significantly among the three groups. The BMR was significantly correlated with the body weight (BW) and LBM in all groups. A multiple-regression analysis showed that the LBM was the most powerful predictor in the E and S groups, whereas the BW was the most powerful predictor in the B group. The BW appears to become an important predictor as the BW of athletes increases. Additionally, height was the second explanatory variable in the S and B groups, thus suggesting that height needs to be considered for the BMR in these groups. Therefore, the BMR in elite athletes needs to be estimated according to their body composition.

Juzwiak et al., (2016) study was to compare basal metabolic rate (BMR) predicted by different equations with measured BMR of the Brazilian paralympic track & field team aiming to verify which of these equations is best suited for use in this group. Method: 19 male and 11 female athletes grouped according to functional classification (vision impairment-VI, limb deficiency-LD, and cerebral palsy-CP) had their BMR measured by indirect calorimetry and compared with values predicted by different equations: Cunningham, Owen, Harris-Benedict, FAO/OMS, Dietary Reference Intakes, and Mifflin. Body composition data were obtained by skinfold measurements. Results were reported as mean and standard deviation and analyzed using the Wilcoxon test and Pearson´s Correlation Coefficient. The Root Mean Squared Prediction Error (RMSPE) was calculated to identify the similarity between the estimated and predicted BMR. Results: Mean measured BMR was 25 ± 4.2, 26 ± 2.4, and 26 ± 2.7 kcal/kg of fat free mass/day for VI, LD, and CP, respectively. Owen´s equation had the best predictive performance in comparison with measured BMR for LD and CP athletes, within 104 and 125 kcal/day, while Mifflin's equation predicted within 146 kcal/day for VI athletes. Conclusion: for this specific group of athletes the Owen and Mifflin equations provided the best predictions of BMR.

Conclusion

The following conclusions are drawn:

1. There was no significant difference in height between sports and non-sports school boys.
2. There was no significant difference in weight between sports and non-sports school boys.
3. There was no significant difference in body mass index (BMI) between sports and non-sports school boys.
4. There was a significant difference in basal metabolic rate (BMR) between sports and non-sports school boys. Hence, we conclude that basal metabolic rate (BMR) is better is sports boys than non-sports boys.

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