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Perception of weight and BMI among high school athletes

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Abstract

Athletes tend to have greater muscle mass than non-athletes and muscle mass is more dense than fat, hence there is a bias in BMI with athletes having a higher BMI compared to similarly sized non-athletes. A measurement called percentile of body mass index (BMI) is used to identify overweight and obesity in study subjects. NCHS/CDC -2000 growth charts for children and adolescents aged 2–20 years. 72.7% of study subjects perceived themselves as of normal weight for their age and height, 16.8% perceived as of underweight and 10.5% perceived as of overweight/obese.

Keywords: BMI, perception, athletes

1. Introduction

Body mass index (BMI) is a measure of weight adjusted for height, calculated as weight in kilograms divided by the square of height in meters (kg/m^2). Although BMI is often considered an indicator of body fatness, it is a surrogate measure of body fat because it measures excess weight rather than excess fat. Despite this fact, studies have shown that BMI is correlated to more direct measures of body fat, such as underwater weighing and dual energy x-ray absorptiometry.

Athletes tend to have greater muscle mass than non-athletes and muscle mass is more dense than fat, hence there is a bias in BMI with athletes having a higher BMI compared to similarly sized non-athletes [1]. This has led coaches and trainers to question the validity of BMI as a measure of health risk among athletes [2]. Nevill *et al.* (2010) [3] used skinfold thickness and BMI data from elite (Olympic) athletes in seven sports with age-matched controls to examine the adjustments required for elite athletes that would allow BMI for athletes to reflect the adiposity in nonathletic populations. They documented adjustments in the range of 21% to 39% that differed by sport with middle-distance runners requiring a greater adjustment in BMI than other sports studied (including lightweight- and heavyweight-rowers, long-distance runners and triathletes) (Nevill *et al.*, 2010). A substantial athletic bias exists in interpreting BMI for elite athletes. Few individuals are elite athletes. A similar, but less pronounced bias should exist for athletes of non-elite status but this has not been examined in the literature. More generally, BMI may overstate the adiposity status of physically fit individuals of all ages. The current analysis examines whether such a bias exists for young adolescent males and females. One recent review of the literature suggests that this may be behind the lack of association between physical activity and BMI in adolescent males [4]. Adolescence is noted as a time when youth typically become less physically active [5] and males and females develop at different rates as they enter puberty (Centers for Disease Control and Prevention, 2010). Males increase muscle mass and reduce body fat, while females increase body fat due to hormonal changes in puberty. These differences in maturation are considered when calculating BMI percentile among adolescents and thus it seems reasonable to hypothesize that differences may exist with regards to bias in BMI between adolescent males and females. The current study builds on the nascent literature regarding bias in BMI by providing a methodology for indirectly measuring the size of this bias.

2. Methodology

Weight was measured using a bath room weighing scale, every time before measurement it was ensured that it was calibrated to zero, this scale was checked frequently using known

weights. This scale was kept on a horizontal surface a subject was made to stand in the centre of the scale in erect position; foot wear was removed before weighing. Height was measured with a measuring tape, using a measuring tape; markings were done on a wall.

A subject was made to stand erect, without foot wear with feet together, and head touching the wall. The head was positioned so that the top of the external auditory meatus was in level with the inferior margin of the bony orbit and sufficient pressure was given to compress the hair with a help of a very

thin, stiff plastic sheet, and reading was taken.

A measurement called percentile of body mass index (BMI) is used to identify overweight and obesity in study subjects. NCHS/CDC -2000 growth charts for children and adolescents aged 2–20 years i.e. BMI for age and sex percentile growth curves are used to classify the subjects as overweight and obesity. Ethical clearance certificate was issued by the Medical college institution.

3. Results

Table 1: Distribution of study subjects based on – their body image perception

Body image perception	Underweight		Normal weight		Overweight/obese		Total*	
	N	%	N	%	N	%	N	%
Underweight	131	45.3	138	47.8	20	7.0	289	16.8
Normal weight	303	24.3	770	61.6	176	14.1	1249	72.7
Overweight/obese	5	2.8	57	31.7	118	65.5	180	10.5
Total	439	25.6	965	56.2	314	18.3	1718	100

*(%) – column percentage

chi-square – 363.65 df- 4 p value – 0.00

This table shows that 72.7% of study subjects perceived themselves as of normal weight for their age and height, 16.8% perceived as of underweight and 10.5% perceived as of overweight/obese.

Among the subjects who perceived themselves as of normal weight, 14.1% are overweight/obese and 24.3% are underweight.

Among the subjects who perceived themselves as of underweight, 7.0% are overweight/obese and 47.8% are of normal weight.

Among the subjects who perceived themselves as of overweight/ obese, 2.8% are underweight and 31.7% are of normal weight.

4. Discussion

In the present study the subjects who knew their body weight were asked to write their body weight and then their written body weight was compared with their actual body weight which was measured at the time of data collection. 82.8% subjects have false perception of their body weight i.e., 67.3% of subjects underestimated their body weight and 15.5% over estimated their body weight. The prevalence of overweight/obesity is high among those who underestimated their body weight (18.7%) compared to subjects who overestimated (6.7%) but the prevalence of underweight is high among the subjects who overestimated their body weight (60.8%) compared to subjects who underestimated (22%).

Prevalence of faulty body images was observed among the respondents. Around 72% of the study subjects perceived themselves as of having normal weight while only 60% of them are actually of normal weight. Among the subjects who perceived themselves as of underweight, 7.0% are overweight/obese and 47.8% are of normal weight. Earlier studies by Levy and Heaton⁶ and Story *et al.*^[7] have also reported the prevalence of faulty body images among college-girls.

5. Conclusion

Among the subjects who perceived themselves as of normal weight, 14.1% are overweight/obese and 24.3% are underweight.

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