

Using Body Mass Index of Adolescents as Predictor Variable in Research: A Word of Caution

Sir,

Body mass index (BMI) is commonly used parameter to measure obesity indirectly due to its convenience of measurement and sufficient correlation with direct measure of total body fat.^[1] Although this surrogate marker does not differentiate between fat mass and fat-free mass, its applicability is still supported by the World Health Organization (WHO). One of the major advantages of using BMI is that there is globally accepted normative value for BMI. There is also accepted BMI range for Asian population, which is slightly different than global range due to higher risk of cardiovascular disease in lower range of BMI in Asian population.^[2] In researches, BMI can be used to categorize the population in groups (e.g. normal, overweight, and obese). Then, investigators can use the categorical data to test the outcome variable statistically. However, researchers can use body fat to determine the relationship between body fat and another continuous variable among a single group of population. But facility of body fat measurement is not available in many settings. In addition, BMI can be determined with a simple weighing scale and a stadiometer.

With this background, in numerous biomedical research papers, BMI is being used for wide range of population. However, generous use of BMI in adolescents must be considered cautiously, especially where a convenient sample of students from schools and colleges are taken. Ample number of studies has been carried out with samples' age group of 17–25 years. If researchers use the BMI criteria to test the relationship between BMI and other continuous variables among a single group of people, it may not hamper the result. A study by Manjareeka *et al.* titled “Assessment of peak expiratory flow rate (PEFR) in preadolescent children of sub-tribal communities in Odisha” published in your journal (Int J Clin Exp Physiol 2014;1:120-4) had taken sample size from 8 to 11 years students. They had compared the BMI of boys and girls and studied correlation between BMI and PEFR. In their study, they did not categorize students with adult BMI cutoff criteria, so this study is considered appropriate. However, a comment or discussion on BMI percentile values of students would enrich the article.

If researchers categorize individuals in groups according to adult BMI cutoff criteria (e.g. normal, overweight, and underweight), the result may land in a valley of errors. The rejection of null hypothesis may not be justified. Hence, categorization of adolescent boys and girls according to adult BMI cutoff criteria may be critical for research work. Research by Das *et al.* studied the sympathetic cardiovascular parameters in overweight, normal, and underweight school children based on adult BMI cutoff criteria.^[3] Hence, their result may be questioned.

For better understanding of BMI under 19 years, we present here an example of two fictitious boys. The boy “A” of 17.5 years of age has a BMI (kg/m²) of 24.5 and another boy “B” of 17 years has the same BMI. If we erroneously use the WHO adult BMI cutoff criteria to categorize them, both of them will be in “normal range” of BMI. But factually, the scenario becomes different when we use the categorization according to WHO centile cutoffs.^[4] Boy A will fall in “normal” and boy B will be in “overweight” category when we plot the BMI values according to age. A visual presentation of this example is given in Figure 1. Hence, if we use the adult cutoff values for individuals less than 19 years of age, this may give error in interpreted result.

The centile-based category of WHO differs from the International Obesity Taskforce (IOTF) and Centre for Disease Control (CDC). The comparison of WHO centile and IOTF and CDC is found in the WHO website presented in graphs.^[4] The Indian Academy of Pediatrics revised the growth charts for height, weight, and BMI for 5–18-year-old Indian children in 2015 which is available from the Indian Academy of Pediatrics website.^[5] These references may be utilized for researches carried out with children and adolescents.

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Conflicts of interest

There are no conflicts of interest.

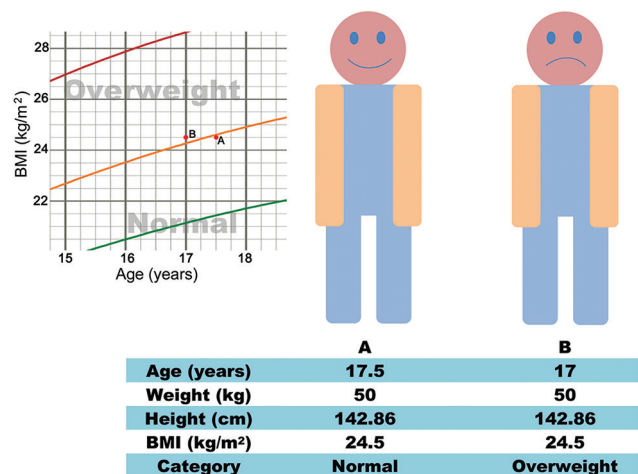


Figure 1: Age and anthropometric parameters of two fictitious boys (a and b) and their category according to the World Health Organization centile cutoff value of body mass index-for-age

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