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An anthropometric index to estimate the obesity

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Obesity is a disease that occurs when the percentage of body fat has a negative effect on a person's health. As for the World Health Organization's definition, obesity is defined as the condition of the body when the body fat is greater than 25% and 35% for men and women respectively. Obesity is a crucial point to discuss as it has been considered a major nutritional health problem in developed and developing countries. Therefore, many indices have been developed to estimate body fat using various measurements of the body. The objective of this study was to develop a simple anthropometric linear equation (index) that is more accurate than the Body Mass Index (BMI) and other indices which currently use to estimate whole-body fat percentage among individuals. Developing a new index to measure body fat is significant as the current indices fail to measure body fat accurately in some exceptional cases like professional athletes. As for an example, the BMI also does not capture information on the mass of fat in different body parts. Hence developing a new index to measure the body fat level is essential. This study used secondary data from the National Health and Nutrition Examination Survey (NHANES) in 2017-2018. Missing values were imputed by using the multiple imputation techniques. Initially a descriptive analysis was performed to analyze the composition of the sample. It was discovered that the mean fat percentage was 35.416 with a standard deviation of 7.109 and 24.461 with a standard deviation of 7.964 in girls and boys of age 15 to 19 years, respectively. Total fat percentage was considered as the response variable. Simple linear regression models were fitted to find the most correlated variables with the total body fat level. 15 anthropometric indices were generated using transformations on explanatory variables. The best-fitted equation was selected by considering the High Correlation with body fat, Minimum Akaike Information Criterion (AIC), and Highest R^2 value. The accuracy of the index was tested using the test dataset and compared with the accuracy of the current indices. It was revealed that this index measures body fat more accurately than the Body Mass Index (BMI) and Waist-Height Ratio (WHR) with an accuracy of 76.8%. Waist Circumference, Hip Circumference and height measurements used to develop new index. Then the selected variables were used with the age category and gender as explanatory variables to perform a multiple linear regression model to find the determinants of the body fat level. As a further study, the developed index can be improved by adjusting for gender-wise and age-wise to obtain more accurate results.

Keywords: BMI, Body fat, Obesity, WHR