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A New Obesity Index Derived from Waist Circumference and Hip Circumference Well-Matched with Other Indices in Children with Obesity

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Abstract : Anthropometric obesity indices such as waist circumference (WC), indices derived from anthropometric measurements such as waist-to-hip ratio (WHR), and indices created from body fat mass composition such as trunk-to-leg fat ratio (TLFR) are commonly used for the evaluation of mild or severe forms of obesity. Their clinical utilities are being compared using body mass index (BMI) percentiles to classify obesity groups. The best of them is still being investigated to make a clear-cut discrimination between healthy normal individuals (N-BMI) and overweight or obese (OB) or morbid obese patients. The aim of this study is to derive a new index, which best suits the purpose for the discrimination of children with N-BMI from OB children. A total of eighty-three children participated in the study. Two groups were constituted. The first group comprised 42 children with N-BMI, and the second group was composed of 41 OB children, whose age- and sex- adjusted BMI percentile values vary between 95 and 99. The corresponding values for the first group were between 15 and 85. This classification was based upon the tables created by World Health Organization. The institutional ethics committee approved the study protocol. Informed consent forms were filled by the parents of the participants. Anthropometric measurements were taken and recorded following a detailed physical examination. Within this context, weight, height (Ht), WC, hip C (HC), neck C (NC) values were taken. Body mass index, WHR, (WC+HC)/2, WC/Ht, (WC/HC)/Ht, WC*NC were calculated. Bioelectrical impedance analysis was performed to obtain body's fat compartments in terms of total fat, trunk fat, leg fat, arm fat masses. Trunk-to-leg fat ratio, trunk-to-appendicular fat ratio (TAFR), (trunk fat+leg fat)/2 ((TF+LF)/2) were calculated. Fat mass index (FMI) and diagnostic obesity notation model assessment-II (D2I) index values were calculated. Statistical analysis of the data was performed. Significantly increased values of (WC+HC)/2, (TF+LF)/2, D2I, and FMI were observed in OB group in comparison with those of N-BMI group. Significant correlations were calculated between BMI and WC, (WC+HC)/2, (TF+LF)/2, TLFR, TAFR, D2I as well as FMI both in N-BMI and OB groups. The same correlations were obtained for WC. (WC+HC)/2 was correlated with TLFR, TAFR, (TF+LF)/2, D2I, and FMI in N-BMI group. In OB group, the correlations were the same except those with TLFR and TAFR. These correlations were not present with WHR. Correlations were observed between TLFR and BMI, WC, (WC+HC)/2, (TF+LF)/2, D2I as well as FMI in N-BMI group. Same correlations were observed also with TAFR. In OB group, correlations between TLFR or TAFR and BMI, WC as well as (WC+HC)/2 were missing. None was noted with WHR. From these findings, it was concluded that (WC+HC)/2, but not WHR, was much more suitable as an anthropometric obesity index. The only correlation valid in both groups was that exists between (WC+HC)/2 and (TF+LF)/2. This index was suggested as a link between anthropometric and fat-based indices.

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