

The Link between Anthropometry and Fat-Based Obesity Indices in Pediatric Morbid Obesity

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Abstract : Anthropometric measurements are essential for obesity studies. Waist circumference (WC) is the most frequently used measure, and along with hip circumference (HC), it is used in most equations derived for the evaluation of obese individuals. Morbid obesity is the most severe clinical form of obesity, and such individuals may also exhibit some clinical findings leading to metabolic syndrome (MetS). Then, it becomes a requirement to discriminate morbid obese children with (MOMetS+) and without (MOMetS-) MetS. Almost all obesity indices can differentiate obese (OB) children from children with normal body mass index (N-BMI). However, not all of them are capable of making this distinction. A recently introduced anthropometric obesity index, waist circumference + hip circumference/2 ((WC+HC)/2), was confirmed to differ OB children from those with N-BMI, however it has not been tested whether it will find clinical usage for the differential diagnosis of MOMetS+ and MOMetS-. This study was designed to find out the availability of (WC+HC)/2 for the purpose and to compare the possible preponderance of it over some other anthropometric or fat-based obesity indices. Forty-five MOMetS+ and forty-five MOMetS- children were included in the study. Participants have submitted informed consent forms. The study protocol was approved by the Non-interventional Ethics Committee of Tekirdag Namik Kemal University. Anthropometric measurements were performed. Body mass index (BMI), waist-to-hip circumference (W/H), (WC+HC)/2, trunk-to-leg fat ratio (TLFR), trunk-to-appendicular fat ratio (TAFR), trunk fat+leg fat/2 ((trunk+leg fat)/2), diagnostic obesity notation model assessment index-2 (D2I) and fat mass index (FMI) were calculated for both groups. Study data was analyzed statistically, and 0.05 for p value was accepted as the statistical significance degree. Statistically higher BMI, WC, (WC+HC)/2, (trunk+leg fat)/2 values were found in MOMetS+ children than MOMetS- children. No statistically significant difference was detected for W/H, TLFR, TAFR, D2I, and FMI between two groups. The lack of difference between the groups in terms of FMI and D2I pointed out the fact that the recently developed fat-based index; (trunk+leg fat)/2 gives much more valuable information during the evaluation of MOMetS+ and MOMetS- children. Upon evaluation of the correlations, (WC+HC)/2 was strongly correlated with D2I and FMI in both MOMetS+ and MOMetS- groups. Neither D2I nor FMI was correlated with W/H. Strong correlations were calculated between (WC+HC)/2 and (trunk+leg fat)/2 in both MOMetS- ($r=0.961$; $p<0.001$) and MOMetS+ ($r=0.936$; $p<0.001$) groups. Partial correlations between (WC+HC)/2 and (trunk+leg fat)/2 after controlling the effect of basal metabolic rate were $r=0.726$; $p<0.001$ in MOMetS- group and $r=0.932$; $p<0.001$ in MOMetS+ group. The correlation in the latter group was higher than the first group. In conclusion, recently developed anthropometric obesity index (WC+HC)/2 and fat-based obesity index (trunk+leg fat)/2 were of preponderance over the previously introduced classical obesity indices such as W/H, D2I and FMI during the differential diagnosis of MOMetS+ and MOMetS- children.

Keywords : children, hip circumference, metabolic syndrome, morbid obesity, waist circumference

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