

Comparison of dual-energy X-ray absorptiometry, air displacement plethysmography and bioelectrical impedance analysis for the assessment of body composition in severely obese Caucasian children and adolescents.

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The objectives of the present study were to compare body composition assessed by dual-energy X-ray absorptiometry (DXA), air displacement plethysmography (ADP) and bioelectrical impedance analysis (BIA) in severely obese Caucasian children and adolescents and to develop and validate new equations for predicting body composition from BIA using DXA as the reference method. Body composition was assessed in fifty-eight obese children and adolescents (BMI 34.4 (SD 4.9) kg/m²) aged 10-17 years by DXA, ADP and BIA. ADP body fat content was estimated from body density using equations devised by Siri (ADP_{Siri}) and Lohman (ADP_{Lohman}). In the whole sample, the Bland-Altman test showed that ADP_{Siri} and ADP_{Lohman} underestimated percentage fat mass (%FM) by 2.1 (SD 3.4) and by 3.8 (SD 3.3) percent units ($P < 0.001$), respectively, compared to DXA. In addition, compared to DXA, BIA underestimated %FM by 5.8 (SD 4.6) percent units in the whole group ($P < 0.001$). A new prediction equation (FFM (kg) = 0.87 x (stature²/body impedance) + 3.1) was developed on the pooled sample and cross-validated on an external group of sixty-one obese children and adolescents. The difference between predicted and measured FFM in the external group was - 1.6 (SD 2.9) kg ($P < 0.001$) and FFM was predicted accurately (error < 5%) in 75% of subjects. In conclusion, DXA, ADP and the BIA are not interchangeable for the assessment of %FM in severely obese children and adolescents. The new prediction equation offers an alternative approach to DXA for the estimation of body composition in severely obese children and adolescents.

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