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The Use of Ultrasound as a Safe and Cost-Efficient Technique to Assess Visceral Fat in Children with Obesity

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Abstract : Background: Obesity is an increasingly common problem in childhood. Childhood obesity is considered the main risk factor for the development of metabolic syndrome (MetS) (diabetes type 2, dyslipidemia, and hypertension). Recent studies estimated that among children with obesity 30-60% will develop MetS. Visceral fat thickness is a valuable predictor of the development of MetS. Computed tomography and dual-energy X-ray absorptiometry are the main techniques to assess visceral fat. However, they carry the risk of radiation exposure and are expensive procedures. Consequently, they are seldom used in the assessment of visceral fat in children. Some studies explored the potential of ultrasound as a substitute to assess visceral fat in the elderly and found promising results. Given the vulnerability of children to radiation exposure, we sought to evaluate ultrasound as a safer and more cost-efficient alternative for measuring visceral fat in obese children. Additionally, we assessed the correlation between visceral fat and obesity indicators such as insulin resistance. Methods: A cross-sectional study was conducted on 46 children with obesity (aged 6–16 years). Their visceral fat was evaluated by ultrasound. Subcutaneous fat thickness (SFT), i.e., the measurement from the skin-fat interface to the linea alba, and visceral fat thickness (VFT), i.e., the thickness from the linea alba to the aorta, were measured and correlated with anthropometric measures, fasting lipid profile, homeostatic model assessment for insulin resistance (HOMA-IR) and liver enzymes (ALT). Results: VFT assessed via ultrasound was found to strongly correlate with the BMI, HOMA-IR with AUC for VFT as a predictor of insulin resistance of 0.858 and cut off point of >2.98. VFT also correlates positively with serum triglycerides and serum ALT. VFT correlates negatively with HDL. Conclusions: Ultrasound, a safe and cost-efficient technique, could be a useful tool for measuring the abdominal fat thickness in children with obesity. Ultrasound-measured VFT could be an appropriate prognostic factor for insulin resistance, hypertriglyceridemia, and elevated liver enzymes in obese children.

Keywords : metabolic syndrome, pediatric obesity, sonography, visceral fat
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