TACSM Abstract

Estimation of Visceral Fat via Ultrasound Sonography

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ABSTRACT

Although visceral fat (VF) can be quantified via computed tomography or dual-energy X-ray absorptiometry (DXA), their application for frequent VF assessment is limited because both methods are radiating in nature. Research suggests that ultrasound imaging can be used to predict VF safely without the risk of radiation exposure. However, the complexity and/or lack of replicability limits such application. **PURPOSE**: To develop an easy-to-replicate ultrasound protocol and a regression model that can accurately estimate VF area (VFA, cm^2). **METHODS**: Thirty healthy adults (9 males and 21 females, age: 23.2 ± 7.4 yr, body mass index: 22.3 ± 3.2 kg/m^2, body fat percentage: 22.3 ± 5.9 %) fasted for 8 hours or more before a DXA scan and ultrasound imaging were performed to estimate VFA. Ultrasound imaging (with a 3.5-MHz convex-array probe) was used to measure the thickness of 15 different sites within the abdominal cavity. Thickness was defined as the distance in cm from the internal abdominal wall to the anterior aortic wall. Stepwise linear regression was utilized to develop a regression model for VFA using the estimated VFA by DXA as a dependent variable, followed by a Bland-Altman plot and Pearson correlation to compare the technique reliability. **RESULTS**: The developed regression model ($F(4, 25) = 46.869$, $p = 0.001$) was (37.677 + (1.456*Age) - (26.963*Sex) - (11.336*VFT2) + (13.554*VFT4)), where age = years, sex: 1 = male or 2 = female, and VFT2/4 = ultrasound probe placement 2 cm to the left (VFT2) and right (VFT4) of the superior umbilical border, respectively. The regression model had high accuracy (adjusted $R^2 = 0.864$) and test reliability ($r = 0.927$, $p = 0.001$) at estimating VFA (31.4 ± 21.4 cm^2) when compared to the VFA (31.1 ± 21.1 cm^2) estimated by DEXA. **CONCLUSION**: Visceral fat area can be accurately estimated using an easy-to-replicate ultrasound protocol and regression model that eliminates the exposure to radiation caused by other body scanning methods.