ABSTRACT

Autor/en: Inga Schlecht, Beate Fischer, Simone Kohler, Michael Leitzmann

Kontaktadresse: Inga Schlecht
Institut für Epidemiologie und Präventivmedizin
Franz-Josef-Strauß-Allee 11
93053 Regensburg

E-Mail: Inga.Schlecht@klinik.uni-regensburg.de

Titel: Ultrasonography to quantify abdominal fat compartments

Background: Visceral adipose tissue (VAT) is strongly positively associated with cardiovascular disease, the metabolic syndrome, diabetes mellitus type 2 (DMT2), and cancer. In contrast, subcutaneous adipose tissue (SAT) has an independent anti-atherogenic effect and it is related to higher insulin sensitivity and a lower risk of developing DMT2 and dyslipidemia. The recognition of the importance of body fat distribution for future disease risk has led to a variety of methods to assess abdominal fat tissue, spanning from classic methods, such as waist circumference and waist/hip ratio, to more sophisticated methods, such as computed tomography (CT) and magnetic resonance imaging (MRI). Classical anthropometric measures cannot distinguish between VAT and SAT, and the use of sophisticated methods is limited in large scale cohort studies due to the associated exposure to ionizing radiation, high time consumption und prohibitive costs. A valid alternative for assessing VAT and SAT is demonstrated by Ultrasonography (US). The aim of this study was to test the feasibility and reproducibility of using US to quantify abdominal fat compartments.

Methods: Abdominal fat compartments were quantified using US in 100 randomly selected subjects aged 20 to 69 years. Reproducibility of SAT and VAT measurements was analyzed using the intra-class correlation coefficient (ICC) with 95% confidence intervals (CI). To assess the inter- and intra-rater reliability, each participant was examined twice by two observers. VAT was measured by the distance between the linea alba and the lumbar vertebra corpus and SAT by the distance between the skin and the linea alba.

Results: ICCs for observers 1 and 2 for SAT were 0.993 (95% CI=0.989-0.995) and 0.991 (95% CI=0.987-0.994), respectively. For VAT, the ICC was 0.995 (95% CI=0.993-0.997) for the first observer and it was 0.999 (95% CI=0.998-0.999) for the second observer. The ICCs

for the inter-rater reliability for SAT and VAT were 0.992 (95% CI=0.989-0.994) and 0.998 (95% CI=0.997-0.999), respectively. Bland-Altman plots also showed a high degree of inter- and intra-rater reliability. A single examination of SAT and VAT took approximately 5 minutes including data management of the collected parameters. Costs varied depending on the quality and scope of performance of the equipment. Consumables necessary for the examination were 0.15€ per participant.

Conclusion: This study demonstrates that using US as a non-invasive method to estimate VAT and SAT has excellent intra- and inter-rater reliability, with ICCs above 0.98. The US-based assessment of VAT and SAT represents a feasible, reproducible, and cost effective method that can be employed in large scale cohort studies.