

Intra-Rater Reliability of Diagnostic Ultrasound in the Measurement of Subcutaneous Adipose Tissue

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Introduction

Methods

Results

Conclusion

Obesity is associated with many serious health risks, and the cost of medical treatment is estimated at nearly 150 billion dollars annually (Center for Disease Control, 2013). Medical professionals need to find methods to not only treat and to help prevent obesity, but quickly and accurately assess it as well. With dozens of body fat assessment tools of varying reliability and validity, it's important to investigate all potential measures for use in combating the obesity epidemic (Strategic Plan for NIH Obesity Research, 2011).

Purpose

The purpose of this study is to answer the research question: "What is the intrarater reliability of diagnostic ultrasound in the measurement of subcutaneous adipose tissue?" Previous research has concluded that diagnostic ultrasound is a valid tool for measurement of total body fat percentage (Leahy et al., 2012), but research on the intrarater reliability of the tool is limited at this time.

75 participants were recruited to participate in this study from the FGCU campus and local community. Participants had their body fat assessed in a Bod Pod™ prior to ultrasound measurements to further expand data analysis. Age, gender, and ethnicity were collected to better assess factors that might influence reliability. Participants then had 2-site ultrasound measurements taken for adipose tissue size based on a previous study (Leahy et al., 2012). Each site was measured three separate times to evaluate intrarater reliability of the diagnostic ultrasound. The evaluator was blinded to the results of the measurements taken. The collected data was analyzed with intra-class correlation for intrarater reliability.

The sample size collected in this study was 75 participants from the local community. 57 participants described themselves as "Caucasian", 10 as "Hispanic", 4 as "African-American", 3 as "Asian", and 1 as "Middle Eastern". The ICC for diagnostic ultrasound in the measurement of subcutaneous adipose tissue was found to be .999 overall. The ICC was >.998 for all age groups and body fat groups. The ICC was .971 in the African-American group and .999 for all other ethnicities.

ICC by Body Fat %		
Classification	Sample Size	ICC
Body Fat <10%	7	.999 (.014)
Body Fat 10-20%	27	.999 (.010)
Body Fat 20-30%	29	.998 (.009)
Body Fat > 30%	12	.999 (.015)

Diagnostic ultrasound demonstrated strong intrarater reliability in the measurement of subcutaneous adipose tissue. Given the previously demonstrated validity of diagnostic ultrasound for this purpose, the results of this study provide support for the use of diagnostic ultrasound as an effective tool in the measurement of subcutaneous tissue. Further research is needed to evaluate the impact of race, gender, age, and body fat percentage on overall reliability. While no factors were found in this study that impacted reliability, a larger, more heterogeneous sample is needed to further clarify overall reliability.

References

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