Intra-Reliability of ImageJ processing of Ultrasound-derived cross-sectional area: Upper Leg Subcutaneous Fat

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Abstract

Purpose: The purpose of this study was to evaluate the reliability of ultrasound-derived cross-sectional area analysis of thigh subcutaneous fat (TSF) using ImageJ and if there was a positive correlation between TSF and echo intensity (EI) of the rectus femoris.

Methods: Ultrasonic images were obtained on a Phillips HD11 XE ultrasound system (Bothell, WA) using B-mode. Images were assessed by measuring the distance between TSF and rectus femoris. Each image was measured using ImageJ by two undergraduate research assistants.

Statistical Analysis: Intraclass correlation coefficients (ICC) were used to examine the reliability between two analysts, and were calculated with SPSS statistical package version 24 (SPSS Inc., Chicago, IL). The ICC estimate was calculated based on an absolute agreement, two-way mixed effects model. Internal consistency among the rates was measured using Cronbach’s alpha. Pearson correlation coefficient (PCC) measured the linear dependence of TSF and rectus femoris EI.

Results: The reliability of measuring TSF using panoramic ultrasound (PU) was high, with an ICC of 0.909. A Cronbach’s alpha score of 0.961 shows excellent internal consistency between the two analysts. The PCC between TSF and EI of the rectus femoris was 0.014, demonstrating very low strength (p = 0.944).

Conclusion

Between the two undergraduate research assistants, analyses of TSF closely resembled each other. So much that the consistency of the results unveiled 0.961 per Cronbach’s alpha score. The PU was highly reliable for measuring TSF. There was no significant correlation between the subcutaneous fat and muscle health.

References


Nielsen, M., and H. Nielsen. “Ultrasonic images were obtained from 30 participants in the Human Performance Lab of NDSU by a trained graduate research assistant. These images were taken from the side view and another three images were taken panoramic style. For the purposes of this study only the panoramic images will be discussed. The collected images were saved on a shared hard drive accessible to the researchers.”


Figure 1: Panoramic ultrasound of the rectus femoris

Figure 2: Measuring between the rectus femoris and subcutaneous fat

Figure 3: Correlation between rectus femoris Echointensity (EI) and subcutaneous fat (TSF)

Figure 4: Measuring between the rectus femoris and subcutaneous fat

Figure 5: Correlation between rectus femoris Echointensity (EI) and subcutaneous fat (TSF)

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Intraclass correlation coefficients (ICC) were used to examine the reliability between two analyzers, and were calculated with SPSS statistical package version 24 (SPSS Inc., Chicago, IL). The ICC estimate was calculated based on an absolute agreement, two-way mixed effects model. Internal consistency among the rates was measured using Cronbach’s alpha. Pearson correlation coefficient (PCC) measured the linear dependence of TSF and rectus femoris EI.

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