

ORIGINAL RESEARCH

ULTRASOUND IMAGING MEASUREMENT OF THE TRANSVERSUS ABDOMINIS IN SUPINE, STANDING, AND UNDER LOADING: A RELIABILITY STUDY OF NOVICE EXAMINERS

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ABSTRACT

Background: Military personnel and first responders (police and firefighters) often carry large amounts of gear. This increased load can negatively affect posture and lead to back pain. The ability to quantitatively measure muscle thickness under loading would be valuable to clinicians to assess the effectiveness of core stabilization treatment programs and could aid in return to work decisions. Ultrasound imaging (USI) has the potential to provide such a measure, but to be useful it must be reliable.

Purpose: To assess the intrarater and interrater reliability of measurements of transversus abdominis (TrA) and internal oblique (IO) muscle thickness conducted by novice examiners using USI in supine, standing, and with an axial load.

Study Design: Prospective, test-retest study

Methods: Healthy, active duty military (N=33) personnel were examined by two physical therapy doctoral students (primary and secondary ultrasound technicians) without prior experience in USI. Thickness measurements of the TrA and IO muscles were performed at rest and during a contraction to preferentially activate the TrA in three positions (hook-lying, standing, and standing with body armor). Percent thickness changes and intraclass correlation coefficients (ICC) were calculated.

Results: Using the mean of three measurements for each of the three positions in resting and contracted muscle states, the intrarater ICC (3,3) values ranged from 0.90 to 0.98. The interrater ICC (2,1) values ranged from 0.39 to 0.79. The ICC values of percent thickness changes were lower than the individual ICC values for all positions and muscle states.

Conclusion: There is excellent intrarater reliability of novice ultrasound technicians measuring abdominal muscle thickness using USI in three positions during the resting and contracted muscle states. However, interrater reliability of two novice technicians was poor to fair, so additional training and experience may be necessary to improve reliability.

Level of Evidence: 2b

Key Words: Ultrasonography; Transversus Abdominis; Body Armor

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