Original Research

The Reliability of a Novel Heel-Rise Test Versus Goniometry to Assess Plantarflexion Range of Motion

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Abstract

Background: Ankle plantarflexion (PF) active range of motion (ROM) is traditionally assessed in a non-weight-bearing (NWB) position with a universal goniometer. However, a convenient, reliable, low-cost means of assessing functional PF active ROM in a weight-bearing (WB) position has yet to be established.

Purpose: To compare the intra- and interrater reliability of PF active ROM measurements obtained from a goniometric NWB assessment, and a functional heel-rise test (FHRT) performed in WB.

Study Design: Reliability study.

Methods: Two physical therapy student examiners, blinded to each other's measurements, assessed PF active ROM through a NWB goniometric technique and a FHRT on all subjects within the same test session. Intra- and interrater reliability values were calculated using an intraclass correlation coefficient (ICC2,1, ICC2,k) and 95% confidence intervals. Standard error of measurement (SEM) and minimal detectable change (MDC) were recorded for each method.

Results: 43 healthy participants (mean ± SD, age: 22.7 ± 1.7 years, height: 1.7 ± 0.1 m, mass: 77.8 ± 17.2 kg) completed testing procedures. The within-session intrarater reliability (ICC2,1) estimates were observed for goniometry (right: 0.96, left: 0.95 - 0.97) and FHRT (right: 0.99, left: 0.99), as well as the interrater reliability (ICC2,k) of goniometry (right: 0.79, left: 0.79) and FHRT (right: 0.79, left: 0.87). Goniometry SEM (3.3 - 3.6°) and MDC (9.2 - 9.8°) were observed, in addition to FHRT SEM (0.6 cm) and MDC (1.6 - 1.7 cm). A weak correlation was found between FHRT and goniometric measurements (r = -0.03 - 0.13).

Conclusions: The FHRT was found to have good to excellent intra- and interrater reliability, similar to goniometric measurement. The lack of agreement between these measurements requires further exploration of a WB assessment of ankle PF active ROM.

Level of Evidence: 2b

Key words: Ankle, functional, heel-rise, plantarflexion, range of motion

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Statement of the Institutional Review Board approval of the study protocol: "The study submission and informed consent for the proposal referenced above has been reviewed and approved via the procedures of the University of South Dakota Institutional Review Board."

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