

ABSTRACT

Background: Accurate assessment of joint range of motion (ROM) is essential in physiotherapy for diagnosis, treatment planning, monitoring rehabilitation progress, and evaluating clinical outcomes. The Universal Goniometer (UG) is the most widely used tool for ROM assessment due to its simplicity, portability, and cost-effectiveness. However, the reliability of UG measurements may vary depending on the joint assessed, examiner skill, and measurement protocol.

Methods: A test-retest reliability study was conducted among 30 healthy physiotherapy students aged 18–30 years. A single trained examiner measured active ROM of the knee, elbow, and shoulder using a standard UG across two sessions separated by 48 hours. Intraclass Correlation Coefficients (ICC), Standard Error of Measurement (SEM), Minimal Detectable Change (MDC), and Bland–Altman analysis were used for statistical evaluation.

Results: Excellent intra-rater reliability was observed for knee flexion (ICC = 0.98) and extension (ICC = 0.97), as well as elbow flexion (ICC = 0.96) and extension (ICC = 0.94). Shoulder flexion (ICC = 0.92) and abduction (ICC = 0.91) also demonstrated excellent reliability, while shoulder internal rotation (ICC = 0.87) and external rotation (ICC = 0.88) showed good reliability. SEM values ranged from 3.8° to 10.1°, and MDC95 values ranged from 10.5° to 22.7°. No significant systematic bias was identified between sessions.

Conclusion: The Universal Goniometer demonstrates good-to-excellent intra-rater reliability for measuring ROM at the knee, elbow, and shoulder when standardized protocols are followed. The findings support its continued use as a reliable clinical assessment tool in physiotherapy practice and education.

Keywords: *Universal Goniometer, Intra-rater Reliability, Range of Motion, Physiotherapy, Joint Assessment*

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