

Publication

Validity and reliability of a portable gait analysis system for measuring spatiotemporal gait characteristics: comparison to an instrumented treadmill

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Gait analysis serves as an important tool for clinicians and other health professionals to assess gait patterns related to functional limitations due to neurological or orthopedic conditions. The purpose of this study was to assess the validity of a body-worn inertial sensor system (RehaGait[®]) for measuring spatiotemporal gait characteristics compared to a stationary treadmill (Zebris) and the reliability of both systems at different walking speeds and slopes.; Gait analysis was performed during treadmill walking at different speeds (habitual walking speed (normal speed); 15% above normal walking speed; 15% below normal walking speed) and slopes (0% slope; 15% slope) in 22 healthy participants twice 1 week apart. Walking speed, stride length, cadence and stride time were computed from the inertial sensor system and the stationary treadmill and compared using repeated measures analysis of variance. Effect sizes of differences between systems were assessed using Cohen's d, and limits of agreement and systematic bias were computed.; The RehaGait[®] system slightly overestimated stride length (+2.7%) and stride time (+0.8%) and underestimate cadence (-1.5%) with small effect sizes for all speeds and slopes (Cohen's d ≤ 0.44) except slow speed at 15% slope (Cohen's d > 0.80). Walking speed obtained with the RehaGait[®] system closely matched the speed set on the treadmill tachometer. Intraclass correlation coefficients (ICC) were excellent for speed, cadence and stride time and for stride length at normal and fast speed at 0% slope (ICC: .91-1.00). Good ICC values were found for stride length at slow speed at 0% slope and all speeds at 15% slope (ICC: .73-.90). Both devices had excellent reliability for most gait characteristics (ICC: .91-1.00) except good reliability for the RehaGait[®] for stride length at normal and fast speed at 0% slope and at slow speed at 15% slope (ICC: .80-.87).; Larger limits of agreement for walking at 15% slope suggests that uphill walking may influence the reliability of the RehaGait[®] system. The RehaGait[®] is a valid and reliable tool for measuring spatiotemporal gait characteristics during level and inclined treadmill walking.

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