ABSTRACT

Background: Two-dimensional (2D) analysis has the potential to identify individuals at risk for knee injury by measuring genu valgus during sport related tasks. The reliability of 2D mobile motion analysis in measuring genu valgus during a single leg hop test on individuals with anterior knee pain has not been examined.

Purpose: To assess the reliability and concurrent validity of 2D mobile motion analysis and compare it to visual observation while analyzing dynamic genu valgus during a single leg hop test in subjects with anterior knee pain.

Study Design: Cohort study; repeated measures

Methods: Nineteen subjects experiencing anterior knee pain completed a single leg hop test with both lower extremities. Two investigators independently estimated the degrees of genu valgus with visual observation alone during the subjects’ single leg hop. After the visual estimation, the investigators watched the video again using the 2D Spark Motion Pro™ application to pause the video and measured the amount of knee valgus with a virtual goniometer tool on the application. Interrater reliability was calculated using intraclass correlation coefficients (ICC) model 2, k and intrarater reliability using model 3, k. Minimal detectable change, concurrent validity and limits of agreement were calculated.

Results: Visual observation alone demonstrated interrater reliability ICCs of 0.682-0.685 on the symptomatic and non-symptomatic lower extremities respectively. The interrater reliability using the 2D application had ICC's of 0.927 and 0.792 on the symptomatic and non-symptomatic lower extremities respectively. The concurrent validity for 2D analysis and visual observation on the symptomatic lower extremity had ICC values of 0.96 (rater A) and 0.85 (rater B). The non-symptomatic lower extremity demonstrated concurrent validity ICC values of 0.95(rater A) and 0.65(rater B). The standard error of measurement(SEM) was 3.89° and 3.25° for the symptomatic and non-symptomatic lower extremity(LE) respectively for visual observation. When using the Spark Motion Pro™ application the SEM was 1.64° and 2.71° for the symptomatic and non-symptomatic LE respectively. The minimal detectable change (MDC) using visual observation alone was 5.5° and 4.6°. When using the application, it was noted at 2.32° and 3.83° on the symptomatic and non-symptomatic LE respectively.

Conclusion: The results of this study support the use of a 2D mobile application as a reliable tool for measuring knee valgus in symptomatic subjects and offers reduced error (SEM = 1.64°) when compared to visual observation alone (SEM = 3.89°).

Level of evidence: 2B

Key words: genu valgus, injury prevention, injury screening, two-dimensional

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The authors report no conflicts of interest