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RELIABILITY OF COMMON CLINICAL STANDING BALANCE TESTS FOR PEOPLE WITH HIP OSTEOARTHRITIS

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Purpose: Standing balance is essential for many daily activities, such as lower body dressing, ambulating and stair climbing. A variety of symptoms and physical impairments associated with hip osteoarthritis (OA) can impact on the balance system, including joint pain, muscle weakness, joint stiffness and sensory dysfunction. Importantly, impaired balance is recognized as a risk factor for falls, and falls are frequently reported in people with hip OA. Thus assessment of standing balance is an integral component of hip OA management. Clinical balance tests are frequently used to assess standing balance, however, to date, there is insufficient evidence regarding the clinimetric properties for clinical standing balance tests in people with hip OA. This study aimed to estimate the reliability of four common clinical balance tests in people with hip OA. A secondary aim was to estimate the amount of measurement error associated with each test.
Methods: This was a prospective study with repeated measures between two independent raters within a single session and within one rater over a one-week interval. To be eligible, participants were required to fulfil the inclusion criteria based on clinical diagnostic criteria for hip OA established by the American College of Rheumatology. At the first test session (Session 1), participants performed the balance tests with two independent raters (Rater A and Rater B) to examine between-rater reliability. At the second test session (Session 2), participants repeated the balance tests again with Rater A, (who was blinded to the results from Session 1) in order to examine within-rater reliability. Participants completed a self-reported global rating of change at the second session. This was used as a reference standard for stability and determined if any substantial change in the participant's hip condition had occurred between test sessions. The testing order of both the raters and the balance tests was randomized using a computerized random number generator. Reliability was estimated using intra-class correlation coefficients (ICC). Measurement error was expressed as standard error of measurement and minimal detectable change. Interpretation of ICC values was based on published recommendations, where values more than 0.75 indicate sufficient reliability and values more than 0.90 indicate optimal reliability, when the lower one sided 95% confidence interval was greater than 0.7.
Results: Thirty people (mean age 63.3 years, SD 5.71 years, range 50–75 years, 18 females (60%)) with hip OA participated. There was no missing data and no adverse events occurred at any testing occasion. The four-square step test, step test and timed single leg stance were sufficiently reliable between raters (ICC 0.85–0.94, lower 1-sided 95%CI: 0.71–0.89), whereas the step test (standing on study limb) and timed single leg stance (standing on non-study limb) were sufficiently reliable within a rater over a week interval (ICC 0.91, lower 1-sided 95%CI: 0.80–0.83). The step test (study limb) and timed single leg stance (non-study limb) achieved optimal levels of reliability (ICC >0.90, lower 1-sided 95%CI >0.70), with acceptable measurement error (<10%) for clinical outcome measures. Inspection of minimum/maximum scores showed a consistent ceiling effect for the timed single leg stance test.
Conclusions: This study provides estimates of reliability and measurement error of four clinical standing balance tests in a cohort of participants with hip OA. Only the step test (standing on the affected side) and the timed single leg stance demonstrated optimal levels of reliability for clinical measurement tests. When measurement error and ceiling effects are also considered, our data suggest the step test (standing on the affected side) is the most useful clinical measures of standing balance for people with hip OA.

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ASSOCIATION BETWEEN INFRAPATELLAR FAT PAT MAXIMUM AREA AND CHANGES IN KNEE SYMPTOMS AND STRUCTURES IN OLDER ADULTS: A LONGITUDINAL STUDY

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Purpose: The Infrapatellar fat pad (IPFP) is of uncertain significance for knee osteoarthritis (OA). The aim of this study was to describe the longitudinal associations between baseline IPFP maximum area and changes in knee pain, knee cartilage volume and cartilage defects in older adults.
Methods: 404 community-dwelling male and female adults aged 50–80 years were measured at baseline and approximately 2.6 years later. T1- or T2- weighted fat-suppressed magnetic resonance imaging (MRI) was utilized to assess maximum IPFP area, cartilage volume and cartilage defects at baseline and/or follow-up. Knee pain was assessed by the self-administered Western Ontario McMaster Osteoarthritis Index (WOMAC) questionnaire.
Results: After adjustment for confounders, IPFP maximum area was significantly associated with lower risks of increases in knee pain (relative risks (RRs): 0.74 to 0.76 for total knee pain, pain in bed and pain when standing upright, all $P < 0.05$), but not with other knee pain subscales. IPFP maximum area was beneficially associated with change in tibial cartilage volume (β: 0.79% per cm^2 at medial site and 0.72% per cm^2 at lateral site, both $P < 0.05$), but not with change in patellar cartilage volume. Further, it was significantly associated with reduced risks of increases in medial cartilage defects (RR: 0·66 and $P < 0.05$ at medial tibial site; RR: 0.66 and $P < 0.01$ at medial femoral site) but not with increases at other sites.
Conclusions: While the associations are not fully consistent, IPFP maximum area appears to have an independent protective role for symptoms and cartilage damage in knee OA.

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KINESTHESIA AND VIBRATION SENSE CANNOT BE USED INTERCHANGEABLY AS MEASURES OF SENSORY FUNCTION IN PATIENTS WITH ANTERIOR CRUCIATE LIGAMENT INJURY OR UNINJURED CONTROLS

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Purpose: Patients with an anterior cruciate ligament (ACL) injury are at high risk of developing OA. ACL injury and knee osteoarthritis (OA) are both associated with impaired sensory function. Sensory function is commonly assessed as knee kinesthesia using laboratory equipment. To enable evaluation of larger groups of subjects, and evaluation outside the laboratory, portable equipment would be preferable. Vibration sense, assessed with portable equipment, is used as a measure of sensory function in subjects with OA, but is sparsely studied in subjects with ACL injury. A sufficiently high correlation between kinesthesia and vibration sense would indicate that one measurement can replace the other.
The purpose of this investigation was to study the association between kinesthesia and vibration sense to elucidate whether these measurements could be used interchangeably. In addition, the associations between kinesthesia, vibration sense and functional performance and patient-reported outcomes, respectively, were assessed.
Methods: Fifty three patients with ACL injury (mean age 24 years, range 18–35) and 46 matched controls (mean age 26 years, range 18–35) were included. Sensory function was assessed two ways: 1) by the threshold to detection of passive motion (TDPM) for knee kinesthesia; and 2) by vibration perception threshold (VPT) at the medial malleolus and the medial femoral condyle for vibration sense. As a measure of motor function, the one leg hop test for distance was used. The Knee injury and Osteoarthritis Outcome Score (KOOS) and the Tegner Activity Scale (TAS) were used as measures of self-reported outcomes and activity level, respectively. For the comparisons, Pearson's correlation coefficient (r) and Spearman rank correlation coefficient (rs) were used as appropriate.
Results: A low correlation was found between TDPM and VPT at the medial malleolus in patients ($r = 0.208$, $p = 0.139$) and controls ($r = -0.279$, $p = 0.060$). No correlation was found between TDPM and VPT at the femoral condyle in patients ($r = 0.009$, $p = 0.950$) or controls ($r = -0.180$, $p = 0.231$). No relation was found between the sensory measures and the one-leg hop test in the patient group ($r = 0.116$–0.136, $p = 0.41$–0.48). There were no or low correlations between the sensory measures and one-leg hop test in the control group ($r = 0.013$–0.302,