

assistance were also included. Testers were blinded to the status of subjects, the results of each test round and each others' test results. Intra-class correlation coefficients (ICC) and kappa values were interpreted as: 0.0–0.40 (poor); 0.40–0.75 (fair to good); and 0.75–1.00 (good to excellent). Prevalence and bias adjusted kappa (PABAK) was not performed for kappa calculations.

**Results:** A total of 41 subjects (mean age 25 years 18 females), were recruited among adult overhead athletes from the municipality of Odense, DK.

Data were tested and found to be normally distributed for all continuous variables. Bland Altman plots showed no funnel effects, though, systematic bias and statistical significant difference between testers were present in ten (42 %) of the 24 tests.

In six static tests, evaluating the scapular position and the maximal passive shoulder internal rotation, ICC values were within 0.53–0.89. In six semi-dynamic tests, measuring the onset of scapular upward rotation and the positions of the scapula during five different humeral abduction positions, ICC values were ranging from 0.25–0.47. During dynamic movements nine tests dichotomously evaluated whether winging was present or not. Here, five tests showed kappa values between 0.17–0.71, and in the remaining four tests, kappa could not be calculated. Finally, isometric humeral external rotation strength measured with/without scapular fixation had an ICC within 0.95–0.96, and one test of shoulder proprioception showed ICC equal to 0.68.

**Conclusion:** An extended test battery to investigate the inter-examiner reliability for assessing the scapular positioning and function were compiled. Assessment methods ranged from merely static to dynamic evaluations, measured either quantitatively or qualitatively. Unevenly distributed between the static, semi-dynamic and dynamic measurements, the inter-examiner reliability proved to be "good to excellent" in six (25%), "fair to good" in 11 (46%) and "poor" in seven (29%) of the 24 tests. Systematic bias between testers appeared in some (42 %), but not all, tests within the different measurement categories, questioning the overall accuracy of these tests. However, within the static measurements, four of the tests had ICC values within "good to excellent" and no systematic bias. In conclusion, improvement of clinimetric properties of tests for measuring scapular positioning and function with semi-dynamic, dynamic and dichotomously evaluations are needed.

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### RELATIONSHIP BETWEEN KNEE EXTENSOR TORQUE AND PHYSICAL FUNCTION IN MEN WITH EARLY KNEE OSTEOARTHRITIS

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**Purpose:** The aim of this study was to correlate the peak knee extensor torque with the general and specific physical function in men with early knee osteoarthritis.

**Methods:** It were selected men, aged between 40 and 70 years. The subjects underwent a physical therapy evaluation and radiographic examination for the diagnosis of knee OA according to the ACR criteria (American College Rheumatology) and classified regarding the severity degree of the disease according to the classification of Kellgren and Lawrence (1957). Volunteers responded to the WOMAC questionnaire in which the total score of physical function and two items that compose this domain was calculated. For assessment of knee extensor torque, the volunteers underwent the isokinetic evaluation of the knee (extensor torque), on concentric / eccentric mode, using the speed of 60 ° / s. Based on the five maximal repetitions performed, it was obtained the peak knee extensor torque normalized by body weight and multiplied by one hundred. Data were analyzed through of Statistica 7.0 program, taking into account the descriptive values (mean and standard deviation) at first. It was evaluated the normality by the Shapiro-Wilks test, then the Spearman correlation test was performed between the peak torque normalized by body weight (PT / weight x 100) and values obtained for each question in the physical function domain of WOMAC, using  $\alpha \leq 0.05$ .

**Results:** It were assessed twenty six men with OA grade 2 (KL), with a mean age of 56 ( $\pm 8$ ), height 1.74 ( $\pm 0.07$ ), weight 84.2 ( $\pm 13.6$ ) and BMI 27.9 ( $\pm 4.6$ ). There was significant and moderate correlation ( $r > 0.4$ ) between the extensor torque (60 ° / s) and activities "Climbing stairs" ( $r = -.45$ ,  $p = 0.021$ ) and "Getting up being seated" ( $r = -.41$ ,  $p = 0.036$ ). On the other hand, there was no correlation of extensor torque with total physical function domain score ( $p = 0.094$ ).

**Conclusions:** The extensor torque seems to play an important role in physical function in men with knee OA grade II and its importance seems to be more related to some specific activities. Therefore functional training could be associated to complement the treatment of these patients.

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### DECREASE OF MUSCLE STRENGTH IS ASSOCIATED WITH INCREASE OF ACTIVITY LIMITATIONS IN EARLY KNEE OSTEOARTHRITIS: 3-YEAR RESULTS FROM THE CHECK STUDY

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**Purpose:** Muscle weakness has been hypothesized as being a crucial factor in the development of activity limitations in knee osteoarthritis (OA). Longitudinal evidence to support this hypothesis is scarce. The aims of the study were: 1) to determine whether a decrease in muscle strength over three years is associated with an increase in activity limitations; and 2) to examine whether the longitudinal association between muscle strength and activity limitations is moderated by knee joint proprioception and laxity in early symptomatic knee OA.

**Methods:** Three-year follow-up data of 146 subjects with early symptomatic knee OA from the Cohort Hip and Cohort Knee (CHECK) were used. Muscle strength, proprioception and laxity were assessed using specifically designed measurement devices. Self-reported and performance-based activity limitations were measured with the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), the get-up-and-go test, walk-test and stair-climb test. Statistical analyses included paired *t*-tests and regression analyses. In regression analyses, the association between muscle strength and activity limitations was adjusted for relative confounders.

**Results:** Overall, small 3-year changes in muscle strength and activity limitations were observed. A 3-year decrease in muscle strength was independently associated with an increase in performance-based activity limitations, on all four measures. Proprioception and laxity did not moderate this association.

**Conclusions:** In patients with early knee OA, a decrease in muscle strength is associated with an increase in activity limitations. Our results are in line with the hypothesis that muscle weakness is a causal factor in the development of activity limitations in early knee OA. Further well-designed experimental studies are indicated.

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### CORRELATION OF 1-REPETITION MAXIMUM AND RATINGS OF PERCEIVED EXERTION IN ADULTS

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**Purpose:** The current gold standard for determining proper dosage of strength training for rehabilitation is the 1-repetition maximum (1RM). This method requires a patient to elicit a maximum force through the targeted muscle. For patients with knee osteoarthritis (OA), maximum quadriceps contractions often provoke considerable pain; this pain response may mask the true strength of the muscle. Thus, 1RM testing is not always a feasible or accurate method of testing strength or determining proper strength training dosage. A viable alternative to 1RM testing would be extremely clinically useful for rehabilitation specialists working with patients with OA. One potential alternative to 1RM testing is use of perceived exertion scales. Perceived exertion scales were first introduced for dosage of aerobic training, but the utility of these scales has also been examined for dosage of resistance training. Previous studies have examined use of the Borg Rating of