**CO0284**

**Interest of isometric F/E ratio to determine deconditioning syndrome in chronic low back pain patients (CLBP)**

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**Objective** It is possible to substitute the isokinetic tests by isometric tests to determine back muscle deconditioning syndrome in CLBP patients?

**Patients and methods** Thirty-five CLBP patients, of a 39.7 years median age, 14 females and 21 males, included in a program of the type trunk reconditioning carried out the isokinetic and isometric tests on dynamometer CONTREX 2000°. The isometric tests were carried out with 15°, 30° and 45° of flexion of the trunk with and without correction of gravity. The data were collected to be analyzed by the test of correlation of Pearson. The sensitivity and the specificity of the isotonic test were calculated.

**Results** Without correction of gravity, the correlation to 15°, 30° and 45° of flexion between the isokinetic and isometric tests was for the flexor muscles respectively of 0.94, 0.84 and 0.79 and for the extensor muscles of 0.58, 0.62 and 0.48. With correction of gravity, it was for the flexor muscles of 0.82 to 15° and 30° and 0.72 with 45° of flexion, whereas it was for the extensors of 0.67, 0.72 and 0.67, respectively for the same angles. The best correlation for ratio F/E between the isokinetic and isometric tests was obtained with 30° flexion without correction of gravity and proved very poor of 0.51.

**Discussion/Conclusion** The correlations of the peak of force of flexor were very good whereas those of the extensor muscles are weaker. The correlations for the flexor/extensor ratio were poor. With the results of this study the use of the isometric ratios does not seem relevant to identify back muscle deconditioning syndrome, such as usually done with inversion isokinetic ratio (flexor/extensor).

**Disclosure of interest** The authors declare that they have no competing interest.

http://dx.doi.org/10.1016/j.rehab.2016.07.040

**CO0285**

**Evolution of isotonic torque ratios of shoulder rotator muscles**

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**Objective** Shoulder (IR) and external rotator (ER) muscles play an important role in the stability of glenohumeral joint. The ratio between the peak torque of ER and IR in concentric (ER/IRPT) and mixed (ER-ECC/IR-CONPT) are usually measured to evaluate the effects of muscle weakness, sport activities, injury and treatment (Greenfield et al., 1990; Scoville et al., 1997). However, ER/IRPT and ER-ECC/IR-CONPT failed to provide some indication on the evolution of the ER/IR torque ratio (ER/IRTorque) and mixed torque ratio (ER-EC/IR-COTorque) during the range of motion (ROM).

The aim of this study was to examine the ER/IRTorque and ER-EC/IR-COTorque during ROM in regard to the ER/IRPT and ER-ECC/IR-CONPT values.

**Patients and methods** Twenty-one healthy trained (23.0±2.7 y) underwent an isokinetic concentric IR and ER strength test on a Cybex Norm® dynamometer in a seated position (45° shoulder abduction in scapular plane), at 60°.s−1 for both sides. ER/IRTorque and ER-EC/IR-COTorque were continuously recorded (PowerLab®) then averaged per range of 10° throughout 110°. ER/IRPT and ER-ECC/IR-CONPT were calculated according conventional method.

**Results** Repeated Anova test revealed that ER/IRT significantly increased during internal rotation (P<0.05) with an inconsistent value during ROM. ER/IRT was significantly lower than ER/IRPT in more than 80% of ROM.

**Discussion/Conclusion** ER/IRPT and ER-ECC/IR-CONPT are classically determined according the peak torque value of RE and RI, regardless of the difference between angle for which each value is reached. However, we showed a variation of ER/IRTorque and ER-EC/IR-COTorque during the ROM. Coombs (2002) has already reported the effect of angular knee position on the hamstring/quadriceps torque ratio value. ER/IRTorque and ER-EC/IR-COTorque appears an additional indicator on the dynamic glenohumeral strength balance.

In addition to PT ratio, ER/IRTorque and ER-EC/IR-COTorque ratios during the range of motion could assess to risk factors for shoulder injuries, specific adaptations to exercise training and rehabilitation.

**Keywords** Isokinetic; Shoulder; Rotator muscles

**Disclosure of interest** The authors declare that they have no competing interest.

http://dx.doi.org/10.1016/j.rehab.2016.07.041

**CO0286**

**An injury prevention program is able to reduce the number of injury complaints at medium-term in athletics**

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**Objective** The incidence of injuries in athletics is important, with consequences at short and long terms in sport, health, social and professional levels. It is therefore important to define strategies to reduce the incidence and severity of injuries in athletics. The objective of this study was to determine whether an injury prevention program (IPP) can reduce the occurrence and/or severity of injuries related to the practice of athletics.

**Material and methods** The IPP has been developed, based on current scientific knowledge, targeting exercises on the most common injuries in athletics (hamstring muscle injury, Achilles and patellar tendinopathy, low back pain, ankle sprain) and selecting exercises known to treat and/or prevent these injuries (care stability, hamstring and leg eccentric muscle strengthening, pelvis balance and stabilizing work). IPP takes about 15 minutes, 2 to 3 times per week, with progression levels. During the 2014–2015 athletic season, the IPP has been proposed in an athletic population, youth to senior at competition level and training at least 3 times a week, in who training loads, IPP compliance and injury complaints were collected.
Measurement properties of the Star Excursion Balance Test in the anterior cruciate ligament-deficient subjects – preliminary analysis

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Objective The Star Excursion Balance Test (SEBT) has been lately used in the anterior cruciate ligament (ACL) deficient patients but its measurement properties are still unknown in this population. The purpose of this study was to estimate: the intrarater reliability, agreement, the construct validity of the SEBT, versus the one leg hop test (OLHT) and the self-reported function.

Patients and methods The ACL-deficient patients (n=18) performed three trials of the SEBT in the anterior (A), posteromedial (PM) and posterolateral (PL) direction and three trials of the OLHT bilaterally. The self-reported function was evaluated with the Lysholm score and the International Knee Documentation Form (IKDC 2000).

Results The intrarater reliability was excellent for the SEBT (ICC: 0.94–0.99) with acceptable agreement (MDC: 1.39–6.00). Significant correlations (P<0.05) were found for the injured limb: SEBT-PM vs. Lysholm score (r=0.56), SEBT composite score vs. Lysholm score (r=0.50), SEBT-A vs. OLHT (r=0.56) and for the non-injured limb: SEBT-PM and OLHT (r=0.64), SEBT-PM vs. Lysholm score (r=0.54), SEBT-PL vs. Lysholm score (r=0.53), SEBT composite score vs. Lysholm score (r=0.57).

Discussion/Conclusion The excellent reliability and agreement of the SEBT are in concordance with the results obtained in healthy subjects, indicating that the SEBT can be reliably employed in ACL-deficient patients. Moderate positives correlations found between the SEBT parameters and the Lysholm score reveal good construct validity of the SEBT. However, moderate negative correlation found between SEBT-A and OLHT suggest that these two parameters seem evaluate different construct.

Keywords Validity; Star Excursion Balance Test; Anterior cruciate ligament

Disclosure of interest The authors declare that they have no competing interest.

http://dx.doi.org/10.1016/j.rehab.2016.07.042

CO0289

Interest of a biomechanical analysis of running on a treadmill coupled with functional testing and isokinetic evaluation during return to sport after anterior cruciate ligament reconstruction

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Objective A criterion of the anterior cruciate ligament reconstruction (ACL-R) success is the return to sport at the same level as before surgery. Return to sport (RtS) decision seems to be a key element in this success: if too early RtS exposes to risk of injury, too late RtS influences the motivation to return to the same level. Functional tests (Hop Tests) and isokinetic assessments (Isok Tests) are usually performed to guide this decision. However, a precise and objective biomechanical analysis of running pattern would be more similarly to the sport activity. In this context, our objective was to compare the running and sprinting biomechanical analysis, with the usual tests during return to sport.

Patients and methods Sixteen patients practicing a pivot-contact competitive sport were included prospectively and assessed at 6, 9 and 12 months postoperatively after a first ACLR by: Hop Tests, a Star Excursion Balance Test (SEBT), concentric Isok Tests at 60°/s and 240°/s and eccentric 30°/s, and sprint and 12 km/h running biomechanical evaluation recordings on a instrumented treadmill. Correlation analyses were performed between all these parameters for each value, “healthy” side and side “operated”.

Results Biomechanical stiffness of the lower extremity during running was correlated with the concentric isokinetic flexor strength (r=0.62 side “operated” and r=0.56 side “healthy”). The sprint horizontal force was correlated with eccentric isokinetic strength (r=[0.59 to 0.67]). The index of force application technique in the sprint were correlated with those of Hop Test (r=[0.52 to 0.71]). There was no correlation for the variables “operated” and “healthy” to step length, or for SEBT variables.

Discussion/Conclusion If the characteristics of the force application technique to the ground during the race could be estimated indirectly by Isok Tests and Hop Tests, only an instrumented treadmill analysis allows direct qualitative assessment of running pattern (step length symmetry). So, it seems that the association of these assessments is relevant in the decision to return to sport.

Keywords Anterior cruciate ligament reconstruction; Return to sport; Biomechanic assessment

Disclosure of interest The authors declare that they have no competing interest.

http://dx.doi.org/10.1016/j.rehab.2016.07.044