

FUNCTIONAL ASSESSMENT POSTER

ISOKINETIC ECCENTRIC-CONCENTRIC H:Q RATIOS IN SOCCER PLAYERS

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Introduction Flexors (H) and extensors (Q) thigh muscles isokinetic evaluations are commonly used in soccer players to monitor leg strength values during the training period and to show eventual individual muscle imbalances (1). As a consequence, all H/Q ratios are very useful in sports medicine for lower limbs injury prevention; in particular the functional ratio (H eccentric: Q concentric) was recently considered, for soccer players, the most effective measurement to check leg muscles imbalances (2) and to perform individual training modifications in order to prevent H injuries (1,2). The aim of the present study was to detect H and Q strength and different H/Q ratios in soccer players with a new eccentric/concentric isokinetic device.

Methods The Genu3 knee concentric isokinetic device (Easytech, Florence, Italy) has been recently improved, for eccentric movements evaluation, as follows: the movement of the lever is produced by an hydraulic brake with a low-friction rotating piston controlled by an oil pump unit that sets the working pressure and, as a consequence, the gradual and instantaneous resistances. With this prototype we started to test 8 semi-professional soccer players (means±SD: age 25,8±6,1 years; height 176,7±8,6 cm; weight 76,4±9,9), trying to detect all Q and H peak torque (PT, N/m) measurements following the Hill's curve (concentric-isometric-eccentric). In this respect we used a "3x60 protocol" (3 concentric repetitions at 60°/s, 5 seconds isometric test at 60° leg flexion position, 3 eccentric repetitions at 60°/s), calculating PT values for Q and H, all the H:Q ratios and the functional H(ecc):Q(con) ratio.

Results We observed significant increases in PT values in right (R) and left (L) legs from concentric to isometric and from isometric to eccentric in both legs (Table 1), with H/Q ratios at the lower range of normal values (between 0,55 and 0,60 all) and functional ratios at 0,83 R and 0,85 L.

| | LQ | LH | RQ | RH |
|------|--------|--------|--------|--------|
| ECC | 345,57 | 206 | 336,85 | 200,85 |
| ISO | 312,71 | 170 | 309,85 | 171,57 |
| CONC | 247,14 | 147,85 | 243,85 | 151,71 |

Table 1- Means of PT values measured in soccer players in 3 different modes.

Conclusion Our preliminary results confirm the validity of Hill's curve, showing the progressive increase of the isokinetic strength from concentric to isometric to eccentric mode. On the other hand we could show that the new isokinetic prototype has to be considered a complete instrument for evaluation and training of H and Q muscles in football players, with PT and ratios values in agreement with previous studies (1,2). Finally, on the basis of all H/Q ratios results, we can evaluate our soccer players as athletes with reduced H strength and with relative risk of H injuries.

References

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- 2 Delextrat A, Gregory J, Cohen D. The use of the functional H:Q ratio to assess fatigue in soccer. *Int J Sports Med* 2010; 31 (3): 192-7.