

## Strength of knee flexor and extensor muscles in young male orienteers

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In orienteering, a specially prepared map and a compass are used to navigate point to point in unfamiliar and uneven ground. Races test navigational skill, and running ability of the competitors. High levels of fitness and running speed are requested to cover long distances and climbs, and to compete successfully in international events. The strength of knee flexor and extensor muscles was investigated in young male orienteers.

Eight junior Italian team orienteers (experimental group, EG, age,  $19\pm 1.6$ yr; weight,  $62\pm 7.0$ kg; height,  $175\pm 5.4$ cm; BMI, body mass index,  $20\pm 1.3$ kg/m<sup>2</sup>), and a control group (CG) of 8 cross country track and fields runners ( $20\pm 4.5$ yr;  $67\pm 3.6$ kg;  $179\pm 3.5$ cm;  $21\pm 1.2$ kg/m<sup>2</sup>) volunteered. Right lower limb was dominant for all participants. Running capacities were tested on 3000m mean running speeds (EG,  $17.8\pm 1.0$ km/h; CG,  $20.1\pm 0.2$ km/h). Each athlete performed 5 repetitions of right and left knee flexion and extension at the angular speeds of 60-120-180-240-300deg/sec respectively. The peak torques of each movement at different angular speeds were measured by an isokinetic dynamometer. The obtained values were averaged within subject. Descriptive statistics were computed within group, movement, angular speed, and side. The differences between groups were compared by Mann-Whitney test; those within group, between sides were compared by Wilcoxon test. Statistical significance was set at 5% for all comparisons.

Ages, weights, heights, and BMI of EG and CG did not differ ( $p>0.05$ , for all comparisons). CG runners were significantly faster than EG ( $p<0.001$ ). On average in both groups, right knee flexor and extensor muscles were stronger than those of contralateral limb, for all the angular speeds, but no significant differences were found ( $p>0.05$  for all comparisons). On average, EG performed peak torques larger than those obtained by CG, in both sides, and movements. The differences were significant in right knee flexor muscles at 60, 120, 300deg/sec ( $p<0.04$ ; 0.03; 0.05 respectively), in left knee flexors at 60deg/sec ( $p<0.04$ ), and in right knee extensor muscles at 60deg/sec ( $p<0.02$ ).

Further investigations into this matter should be extended to a larger group of participants and to other muscular districts. Data could be of interest for athletes, coaches, and physicians to allow a correct training planning, to prevent accidental injuries, and also to quantify the effects of rehabilitation.

### Key words

Isokinetic dynamometer, knee flexor and extensor muscles, muscular strength, orienteering