

## Isokinetic evaluation of knee flexors and extensors in young male orienteers

Michela Cristina Turci<sup>1</sup>, Antonio La Torre<sup>2</sup>, Lorenzo Boldrini<sup>3</sup>, Stefano Respizzi<sup>4</sup>, Gianluca Vernillo<sup>2</sup>, Gianpiero Grassi<sup>5</sup>

<sup>1</sup> Department of Biomedical Sciences for Health, Università degli Studi di Milano, Milano, Italy - <sup>2</sup> Department of Biomedical Sciences for Health, School of Motor Sciences, Università degli Studi di Milano, Milano, Italy - <sup>3</sup> Isokinetic Medical Group, FIFA Medical Centre of Excellence, Milano, Italy - <sup>4</sup> Department of Rehabilitation, IRCCS Humanitas Research Hospital, Rozzano, Italy - <sup>5</sup> FISO, Federazione Italiana Sport Orientamento, Trento, Italy

Orienteering races usually develop in wooded lands with large differences in slopes. In addition to the climbs, long descents are frequently covered. Therefore, lower limb muscular strength is necessary to sustain these challenges on rough terrains (1). Eight male orienteers of junior Italian team (OR; age, 19±1.6yr), 8 cross country track and fields experienced runners (TF; 20±4.5yr), and 8 sedentary persons (control group CG; 23±2.7yr), all with right lower limb dominance volunteered. Between groups, no age-, weight-, height-, and BMI-related differences were found (ANOVA,  $p>0.05$ ). Each participant performed and an isokinetic dynamometer measured 5 repetitions of right and left knee flexion and extension at the angular speeds of 60-120-180-240-300deg/sec respectively. The ratios of peak torques between knee flexors and extensors were also computed, at each angular speed. Descriptive statistics were calculated within subject, group, movement, angular speed, and side. For each movement, the effects of group and side, and group×side interactions on peak torques at different speeds were compared by ANOVA (statistical significance 5%). On average within group, flexor and extensor muscles of the right knee were stronger than those of contralateral limb, but no significant differences were found. Side-related differences were similar in all groups ( $p>0.05$ ). In both sides and movements at each angular speed, OR performed larger peak torques than TF and CG ( $p<0.001$ ). For each angular velocity, the ratios between flexors and extensors were larger in OR ( $p<0.001$ ). For orienteers, overcoming natural obstacles, and engaging eccentric work of knee muscles when running downhill could represent effective training tools. Data could be of interest for athletes, coaches, physical therapists, and physicians to set efficient training plans, to prevent trauma, and to define rehabilitation treatments. Further investigations should be extended to other muscular districts, and to other sports.

### References

[1] Yeung et al. (2009) Br J Sports Med 43: 589-594.

### Keywords

Isokinetic dynamometer; knee flexors/extensors; muscular strength; orienteering.