

extensor and flexor muscle groups on anterior cruciate ligament (ACL) injury risk.

METHODS A total of 64 elite soccer players and 45 sedentary controls were enrolled in this study. Radiographic and isokinetic measures were taken before the start of season. The angle between mid-diaphysis line of the tibia and between the anterior and posterior edges of the medial tibial plateau is measured as tibial slope via lateral graphies. Isokinetic strength of knee extensor and flexor muscle groups was measured at 60 and 300°/sec through a Cybex 6000 NORM dynamometer. Individual player exposure and injuries prospectively recorded during the two and a half year period.

RESULTS In total, 11 non-contact ACL injuries (10 dominant and 1 non-dominant leg, incidence= 0.2/1000 playing hour) had been registered during the study period. Tibial slope of the injured players in both dominant and non-dominant legs was higher compared with the uninjured players. The difference reached significant level only for the dominant leg ($p < 0.001$). The tibial slopes of the dominant legs of the injured players were higher than that of the non-dominant legs ($p = 0.042$). Players with a tibial slope over the mean group value had 5.62 times "Odds Ratio" increased ACL injury risk. Injured players had higher eccentric quadriceps strength ($p = 0.007$) and lower eccentric flexor/extensor ratio ($p = 0.031$) at 60°/sec in both dominant and non-dominant legs than uninjured players.

DISCUSSION & CONCLUSION The findings of the study revealed that higher tibial slope seems to be related to increased ACL injury risk. In addition, higher eccentric quadriceps strength and lower eccentric flexor/extensor ratio should also be taken into consideration as contributing factors.

KEYWORDS tibial slope, knee, isokinetic strength, ACL injury

Aerobic training responses in young swimmers of different level

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OBJECTIVE Some authors (e.g. Maclaren and Coulson, 1999; Dekerle, 2006) reported that aerobic training has a positive effect on critical velocity in swimming. However, it raises the question whereas this effect is similar among swimmers of different performance level. Therefore, the purpose of this study was to determine the training responses in aerobic parameters (critical velocity and critical stroke rate) in young swimmers of different level during an in-season period of training.

METHODS 3 groups of 6 young swimmers of both gender belonging to the same swimming club participated in this study. All participants have been trained by the same coach and for the same club for the previous two years. Swimmers were divided according to the value of critical velocity value determined using 50 m and 400 m front crawl tests. Group 1 comprised of 6 swimmers with the best performance in the test (high level), group 3 comprised of 6 swimmers with the lower performance (poor level) and group 2 was the intermediate group. The evaluations took place in two different moments: beginning of the in-season and after 12 weeks of training. For each swimmer, critical velocity and critical stroke rate were determined in both moments.

RESULTS In groups 1 and 2 critical velocity increased between the first and the second moment (1.15 vs. 1.18 m.s⁻¹; 1.04 vs. 1.07 m.s⁻¹; $p < 0.05$) whereas in group 3 the increase in critical velocity was not significant ($p > 0.05$). Although critical stroke rate decreased in the same period for all groups, this decrease was not significant in none of them.

DISCUSSION & CONCLUSION As expected, critical velocity enhanced during the training period, suggesting that 12 weeks of swimming training cause the improvement in the aerobic capacity. The swimmers were able to perform the same intensity without increasing their stroke rate to swim at a higher velocity. The combination of stroke rate with critical velocity could be useful physiological and technical criteria for coaches for monitoring endurance training in swimmers; despite more research is needed to understand the effects of training in different level groups.

KEY WORDS Physiological, aerobic, technique, training, swimming.

References

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