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ISOKINETIC ANALYSIS OF ACCELERATION AND DECCELERATE TIME OF ANKLE IN RUNNERS AND TRIATHLETES

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SUMMARY

Sports that involve running, such as running long distance and triathlon show high rates of overuse injuries in the lower limbs with an emphasis on the ankle joint. The appropriate reaction time muscle is essential to protect the joints from damage during these sports. The goal of this study was to evaluate and compare the acceleration and deceleration time of the muscles dorsiflexors and ankle plantar flexors through isokinetic dynamometer at a speed of 180 degrees per second of distance runners, triathletes and non-athletes. Seventy-five evils were divided into three groups: a Triathlete Group (TG) (n = 26), the Long-Distance Runners Group (LDRG) (n = 23), and the non-athlete Control Group (CG) (n = 26). The isokinetic parameters were Measured using the Biodex (System 3) isokinetic dynamometer. The comparison between Group Triathlete, Runner Long Distance Group and Control Group showed statistical differences only for the variable acceleration time during the concentric contraction of the dorsiflexors between the control group and long distance runner, so that the controls had less time. In conclusion, the group distance runner Showed higher value of isokinetic variable Accelerate team of the dorsiflexors and plantar flexors in concentric contraction of DF.

INTRODUCTION

Sports such as running long distance and triathlon has shown a high rate of overuse injuries in the lower limbs, especially in the ankle joint [1]. The inappropriate reaction time of the leg muscles may correlate with deficits in these muscles protective effect on joint stability [2], which may contribute to increased vertical forces of the ground reaction. The reaction mechanism muscle is related to the artrocinético reflection, which is influenced by the velocity and acceleration which are important parameters of motor function but are less than investigated muscle strength and endurance [3]. This phenomenon of acceleration is searched through methodologies such as electromyography and trapdoor experiments [4], however isokinetic analysis is a more dynamic evaluation method [5] and shows a behavior closer to the functionality of the sport.

Therefore the goal of this study was to evaluate and compare the acceleration and deceleration of the muscles dorsiflexors and ankle plantar flexors through isokinetic dynamometry in two speeds, 60 and 180, long distance runners, triathletes and non-individuals athletes.

METHODS

A total of 75 males, with a mean age of 30.26 ± 6.51 years, a mean height of 1.74 ± 0.06 m, and a mean weight of 71.26 ± 9.41 kg, were recruited for this study. These patients were divided into three groups: a triathlete group (TG) composed of 26 triathletes who regularly trained for this sport for competition for at least one year (6.5 ± 5.6 years); a long-distance running group (LDRG) composed of 23 long-distance runners subjected to regular training for this sport for competition for at least one year (6.5 ± 5.6 years) and a control group (CG) composed of 26 non-athletes who did not regularly train for any sports but performed some type of physical activity two to three times per week for at least the three months prior to the evaluations. The three groups did not have any ankle joint injuries in the last six months and did not experience pain during the experimental period. All subjects gave written informed consent. The evaluate the isokinetic variables used a Biodex Isokinetic Dynamometer (System 3, Software version 3.2). After positioning, three submaximal repetitions were performed to familiarize the patient with the equipment. To register the data, a set of 30 repetitions at 180 ^{o}/s were completed in the concentric/eccentric mode and eccentric/concentric mode for both plantar flexion and dorsiflexion. All of these tests were bilateral and standardized the right lower limb as the first to be evaluated. Ten seconds of rest was allowed between the sets.The statistical tests ANOVA and Tukey's post hoc; Kruskal-Wallis and Müller-Dunn post hoc and Chi-square were used.

RESULTS AND DISCUSSION

The comparison between Group Triathlete (TG), Runner Long Distance Group (LDRG) and Control Group (CG) (Table 1) showed statistical differences only in the variable acceleration time during the concentric contraction of the dorsiflexors between the control group and long distance runner, so that the controls had less time. This result may suggest impairment in sensorimotor control this activity,

position and velocity tested, since the concentric dorsiflexion for joggers must be effective and timely manner so that there is synchrony of motion, joint alignment, postural stability, equilibrium between phases acceleration and braking and thus better impact absorption [23]. However, the position of the test and the angular speeds used, distinct movements made during the run, may explain longer time to reach the angular velocity of the test. Despite these limitations of isokinetic evaluation (angular positioning and velocity), its use in the analysis of athletes is consecrated by the possibility of having accurate data on muscle performance [24]. Furthermore, it is important to highlight the difficulties in comparing the various studies on isokinetic ankle due to differences in protocols, number of repetitions, speed and type of contraction, as well as positioning the brand and individual dynamometer [25]. Thus, this finding may be important to guide the training and fitness of distance runners and triathletes in the prevention of overuse injuries.

CONCLUSIONS

In Conclusion, the group distance runner Showed higher value of isokinetic variable Accelerate team of the dorsiflexors and plantar flexors in concentric contraction of DF.

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Table 1 - Means, standard deviations (SD) of the variables in isokinetic speed of 180 ° / second, concentric-eccentric mode (ECC / CO) and concentric-eccentric (CO / ECC) and the comparison between Group Triathlete, Runner Group long Distance and Control Group

	Group T	**Group CL**	**Group C**	**p**
	Mean (SD)	**Mean (DP)**	**Mean (DP)**	
Mode ECC/CO				
AT CO.DF	181,15 (47,96)	183,69 (27,75)[c]	178,26 (105,93)[a]	0,003[*]
DT CO.DF	238,84 (23,14)	246,95 (28,97)	237,50 (34,17)	0,231
Mode CO/ECC				
AT CO.FP	16,73 (4,7)	17,17 (5,01)	15,76 (4,9)	0,37
DT CO.FP	80,76 (2,6)	81,08 (3,1)	80,76 (2,6)	0,817
AT ECC.DF	307,69 (390,23)	328,45 (351,26)	413,46 (647,38)	0,057
DT ECC.DF	181,92 (14,42)	183,043 (10,08)	179,80 (7,7)	0,28

ECC, eccentric, CO, concentric, FP, plantar flexion, DF, dorsiflexion, TW, total work, AT, acceleration time; DT, deceleration time, T, triathletes, CL, distance runners C, controls; the : CL significantly different from group b: significantly different from group T c: significantly different from group C; * p <0.05;