VII Congresso de Ciência do Desporto
VI Simpósio Internacional de Ciência do Desporto
03, 04 e 05 de Dezembro de 2019

FATIGUE PROFILE DURING PROLONGED EXERCISE WITH LOW AND HIGH MUSCLE GLYCOGEN CONTENT

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Introduction: The exercise performed with low muscle glycogen content (L-Gly) present a significant performance decrease. Although the energy availability is the frequent explanation for this lower tolerance (i.e., peripheral factor), the increase of some metabolites related whit central factors (e.g., free-tryptophan) can also contribute for the fatigue in L-Gly exercise. **Objective:** Thus, the aim of this study was investigated the profile of the fatigue during L-Gly exercise. **Methods:** Eight physical active men (age of 26 ± 3 years) underwent an incremental test to determinate the maximal oxygen consumption (VO2max) in the two-legged exercise model, which was used in all exercises. After that these participants performed i) tree sessions with high volume (> 30 min) and high intensity (70 – 90 % of VO2max), separated by 24h, a low-carbohydrate diet was applied (0.3 g.Kg-1.day-1), ii) muscle biopsy to determinate the glycogen content, iii) two efforts at 80% of VO2max (E1 and E2) followed by a time to exhaustion at 90% of VO2max (Tlim), iv) tree days of high carbohydrate regimen (4.7 g.Kg-1.day-1) to induce the supercompensation of glycogen (S-Gly). Muscle biopsy and exercise model were repeated after the supercompensation period. The twitch interpolation technique was applied at baseline and after E1, E2 and Tlim efforts. The L-Gly and S-Gly situations were compared using Friedman test followed by Wilcoxon procedure, when necessary. **Results:** Glycogen content was lower in L-Gly (0.6 ± 0.1 mg.100mg-1) than S-Gly (4.5 ± 0.5 mg.100mg-1) ($p = 0.01$). Although no differences were observed between situations during E1 (L-Gly: 686.9 ± 93.9 W.min; H-Gly: 722.7 ± 128.9 W.min) and E2 (L-Gly: 686.6 ± 199.9 W.min; H-Gly: 599.6 ± 103.0 W.min) ($p > 0.16$), the power output during Tlim effort was lower in L-Gly (129.7 ± 113.5 W.min) in comparison to S-Gly (293.4 ± 197.0 W.min; $p = 0.03$). No changes were observed for twitch superimposed in the L-Gly (18%; $p > 0.16$), but during the S-Gly this parameter presented higher values after Tlim than E2 responses (30%; $p = 0,02$). The twitch potentiated decrease from baseline values in L-Gly situation after E1, E2 and Tlim (-37%; $p < 0.02$), which not occur in S-Gly (-4%; $p > 0.10$). In the L-Gly situation the peak force decreases after E1, E2 and E3 (-29%; $p < 0,02$), which occur in S-Gly only after the Tlim (-19%; $p < 0,03$). The voluntary activation was lower after Tlim than E2 values ($p = 0,02$) in the S-Gly. **Conclusions:** The profile of fatigue is influenced by the glycogen content. In the low glycogen situation fatigue presented a peripheral profile since E1 effort, which was evidenced with decreases in twitch potentiated. However, central factors (i.e., increase in the twitch superimposed accompanied by decrease in voluntary activation), were evidenced after the Tlim effort in the high glycogen situation.

Key words: Twitch interpolation; supercompensation; low carbohydrate