



## **EFFECT OF THE QUADRICEPS MUSCLE FATIGUE ON MUSCLE PERFORMANCE, STATIC AND DYNAMIC BALANCE IN HEALTHY YOUNG MEN**

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Prolonged light-moderate exercise, or high intensity training, generates immediate biochemical events the human body, which induce muscular fatigue. Fatigue, can negatively influence muscular performance (MP) and therefore, balance during daily living activities or sports events. The aim of this study was to determine the immediate effect of unilateral quadriceps muscle fatigue, induced by an isokinetic exercise protocol in MP and static and dynamic balance in healthy young men. 18 healthy men, volunteered to participate in this study (age: 18-25 y/o; moderately active). All subjects performed 50 isokinetic concentric contractions (180°/s) of the dominant quadriceps; immediately after MP and static and dynamic balance were assessed bilaterally. MP measurements were performed using an isokinetic dynamometer by determining isometric peak torque (IPT), isokinetic peak torque (KPT), work at PT. Maximal isometric (60° of knee-flexion) and concentric isokinetic (60°/s) contractions test were performed. Static balance (SB) was assessed with the path length (cm) and velocity (cm/s) of the center of pressure (COP) oscillation using Humac Balance System, under four conditions of unipedal standing (10s) on stable and unstable surface with open and closed eyes. The evaluation of dynamic balance (DB) was carried out measuring the COP displacement in AP/ML (mm) and displacement velocity (mm/s) during the descent of stairs, using the pressure templates (OpenGo, Moticon GmbH). All data was collected immediately before (Pre) and after (Post) exercise. Fatigue was achieved in all participants (rate=27.7±2.7%). Significant decrease in IPT, KPT and work to PT was detected post-exercise bilaterally (p<0.05). Interaction between the condition and the lower limbs, were only seen for the IPT (p<0.01) (dominant leg; pre: 176.4±11.5 Nm, post: 111.5±7.1 Nm, p<0.03; no-dominant leg; pre: 139.2±10.8 Nm, post: 113.5±8.9 Nm, p<0.03). No differences in any of the variables of SB on stable surface with open and closed eyes were detected (p>0.05). During unstable surface with close eyes no differences were found (p>0.05). Instead, relative to open eyes (OE) path length and velocity of the COP showed a decreased with an interaction between two factors (p=0.09). AP displacement decrease during the descent of stairs (dominant leg; pre: 9.5±1.4 mm, post: 9.0±1.1 mm; no-dominant leg; pre: 18.4±2.8mm, post: 14.4±1.9 mm; p-model=0.003) with

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significant difference between lower limbs ( $p=0.005$ ). Findings suggest that MP is affected bilaterally for muscle fatigue of the dominant quadriceps. Also, lower path length and velocity of the COP displacement in an unstable surface with OE and the AP displacement during the functional activity was seen. It has been established that fatigue of the joint stabilizing musculature may increase the risk of musculoskeletal injuries probably due to the changes in these variables. Modification in the individual's balance may be the result of a compensatory/anticipatory strategy to keep the COP within the support base.