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Editors:

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EFFECTS OF A STRENUOUS ECCENTRIC KNEE EXTENSOR EXERCISE ON THREE DIMENSIONAL RUNNING BIOMECHANICS AND PHYSIOLOGIC PARAMETERS DURING AN EXHAUSTIVE ENDURANCE TEST.

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INTRODUCTION:

The occurrence of exercise-induced muscle damage (EIMD) can affect the running pattern and endurance performance. However, the EIMD-induced changes in biomechanical and physiologic parameters remain poorly understood. The aim of this study was to examine the effects of a single isokinetic eccentric (Ecc) exercise and ensuing DOMS on running biomechanics, physiologic measures and muscle activity during an endurance exercise performed 48h later.

METHODS:

Ten healthy, moderately active adult men completed two treadmill running tests (at 80% Maximal aerobic speed) until exhaustion, with a week interval between both tests. Participants were submitted to a bilateral isokinetic eccentric protocol on the knee extensors 48hours before the second test. The subject's running kinematics (using a 3D motion system), heart rate, ventilation, pulmonary gas exchange and muscle activity were continuously recorded during the running tests. Delayed-Onset Muscle Soreness, plasma creatine kinase, muscle extensibility, maximal isometric force were assessed before and 48h after the ECC exercise.

RESULTS:

In presence of EIMD, the running time to exhaustion was shorter ($-30 \pm 4\%$, $p < 0.05$) while the Borg rate of perceived exertion was higher ($p < 0.01$). Except for the maximal heart rate which appeared significantly higher with EIMD ($p < 0.05$), the physiological data showed no significant difference between both endurance tests. In contrast, the 3D analysis and muscle activity revealed several modifications in presence of EIMD. The step frequency, the sagittal range of motion (ROM) of shoulder, and the muscular activity of the rectus femoris and the vastus lateralis increased significantly during the propulsion phase ($p < 0,05$). In contrast, several other parameters decreased significantly including the stance time, the dorsiflexion of the ankle at the break phase, the maximal knee flexion during the stance phase, the ROM of pelvis during swing phase, the muscular activity of the vastus lateralis and the gastrocnemius at the braking phase ($p < 0,05$).

CONCLUSION:

Our data suggest that the presence of knee extensors EIMD altered the running biomechanics and endurance performance without significant changes of the physiological parameters. Further investigations are required to explore whether the EIMD-induced biomechanical modifications are the result of pain perception or impaired muscle function.