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Neuromuscular Fatigue after maximal Concentric and Eccentric Contractions of Knee Extensor

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Objective The aim of this study was to investigate after different maximal contractions concentric and eccentric would cause different neuromuscular fatigue of knee extensor.

Methods Ten healthy young men ($21 \leq \text{age} \leq 24$) who were not adapted by electrical stimulation were the subjects. The subjects were asked to arrive at the laboratory in three weeks at the same time of every week to avoid the effects of biological rhythms. Each subject performed three group maximal contractions on the ISOMED2000 isokinetic muscle tester according to the requirements. The subjects performed the same neuromuscular function test before and after exercise. The centripetal motion scheme: 3*30, M1(knee flexion)-CON, M2(knee extension)-CON. angular velocity is 60° , interval 30s in each group. Centrifugal motion scheme: 3*30, M1(knee flexion)-ECC, M2(knee extension)-ECC. angular velocity is 60° , interval 30s in each group.

Results The decrease rate of peak torque after concentric exercise was $55.93 \pm 13.20\%$, which was significantly higher than that after centrifugal exercise ($20.06 \pm 11.06\%$, $P < 0.01$). The total work of the concentric movement was $8737.20 \pm 1543.43\text{J}$, which was significantly smaller than that of the centrifugal exercise group ($14312.20 \pm 2978.31\text{J}$, $P < 0.01$). The decline rate of MVC in concentric exercise was 24.89 ± 10.54 and that in centrifugal exercise was 19.32 ± 9.90 , there was no significant difference between the two groups. Double Twitch induced a very significant decrease in PT-SSR RFD-SSN RHD-SS ($P < 0.01$). There was no significant difference in VA decline rate. PAP decreased from $142.82 \pm 14.55\%$ to 125.23 ± 11.36 after concentric exercise, and after eccentric exercise PAP decreased from $141.12 \pm 15.72\%$ to 126.02 ± 10.45 .

Conclusions The neuromuscular fatigue caused by two kinds of exercise. Peripheral fatigue accounted for 39.19% after concentric exercise and 23.59% after centrifugal exercise, but there was little difference in the degree of central fatigue. All of them showed low frequency fatigue, and the low frequency fatigue after centrifugal exercise was more obvious.

Key Word: Neuromuscular fatigue; Electrical stimulation; High-frequency fatigue; Low-frequency fatigue; PAP.