Effects of Different Isokinetic Training Programs on Hamstring/Quadriceps Ratio and Proprioception in Patients with Patellofemoral Pain

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Objectives: To determine the effects of different isokinetic training programs; eccentric training, concentric training and combined (concentric-eccentric) training on quadriceps and hamstring muscle strength functional ratio (H/Qfunc) and knee proprioception in Patellofemoral Pain Syndrome (PFPS) patients.
Methods: Thirty patients with unilateral PFPS were randomly assigned to 3 groups: concentric (CON, n=10) (31.23±3.12 years), eccentric (ECC, n=10) (33.73±2.21 years) and combined (combined, n=10) (30.41±4.35 years). In accordance with the progression principle, the training program was divided into 3 mesoscycles, and the sets and angular speeds were increased in each mesocycle. All groups were treated for 8 weeks. To determine H/Qfunc, eccentric quadriceps and concentric hamstring peak torques were evaluated at 60°/sec with Biodex System 3 (Biodex® Corp., Shirley, NY, USA). 20° and 60° of knee flexion target angles were used to evaluate the knee proprioception. Peak torques and proprioception were evaluated before and 8-week after training. Repeated measure of ANOVA was used for the analysis.
Results: There was a significant difference in H/Qfunc between groups at 60°/sec ($F= 9.048$, $p<0.001$). The mean improvement difference in ECC and CON-ECC groups were better than CON group. Proprioception improvement was found significant after 8-weeks training for both on 20° ($F=150.879$ $p<0.001$) and 60° ($F=247.561$, $p<0.001$) of knee flexion. The mean improvement was similar for 20° ($F=1.964$, $p=0.132$) and 60° ($F=0.493$, $p=0.711$) of knee flexion between the groups.
Conclusion: Isokinetic training with the emphasis on eccentric training of quadriceps muscle had a significant effect in H/Qfunc in PFPS patients. This is mostly based on the improvement in quadriceps eccentric peak torque and the improvement in balance between hamstring and quadriceps muscles. Eccentric and combined (concentric-eccentric) training is more appropriate model for strengthening compared to only concentric training.

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