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Mechanical Responses to Hip Versus Knee Induced Muscle Fatigue in Patellofemoral Pain Syndrome

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Abstract : Impaired skeletal muscle endurance may be an important causal factor in the development of patellofemoral pain syndrome (PFPS). However, there is lack of information regarding the effect of hip versus knee muscle fatigue on isokinetic parameters, and myoelectric activity of hip and knee muscles in these patients. Purpose: The study was conducted to investigate the effect of hip abductors versus knee extensors fatigue protocol on knee proprioception, hip and knee muscle strength and their myoelectric activity in patients with PFPS. Methods: Fifteen female patients with PFPS participated in the study. They were tested randomly under two fatiguing conditions; hip abductors and knee extensors fatigue protocols. Isolated muscle fatigue of two muscles was induced isokinetically on the affected side in a two separate sessions with a rest interval of at least three days. After determining peak torque, patients performed continuous maximal concentric-eccentric contraction of the selected muscle until the torque output dropped below 50% of peak torque value for 3 consecutive repetitions. Knee proprioception, eccentric hip abductors' peak torque, eccentric knee extensors' peak torque, EMG ratio of vastus medialis obliquus (VMO) / vastus lateralis (VL), and EMG activity of gluteus medius (GM) muscle, were recorded before and immediately after each fatigue protocol using the Biodex Isokinetic system and EMG Myosystem. Results: Two-way within subject MANOVA revealed that eccentric knee extensors' peak torque decreased significantly after hip abductors fatigue protocol compared to pre fatigue condition ($p<0.05$). On the other hand, there was no statistically significant difference in the eccentric hip abductors' peak torque after admitting knee extensors fatigue protocol ($p > 0.05$). Moreover, no significant difference was found in knee proprioception, EMG ratio of VMO/VL, and EMG activity of GM muscle, after either hip or knee fatigue protocol ($p>0.05$). Conclusion: A hip focused rehabilitation program may be beneficial in improving knee function through correcting faulty kinematics and hence decrease knee loading in patients with PFPS.

Keywords : electromyography, knee proprioception, mechanical responses, muscle fatigue, patellofemoral pain syndrome
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