

**ELECTRONIC GUIDE TO THESES APPROVED BY
DEPARTMENT OF BIOMECHANICS
PREPARED BY NERVEEN ABD EL SALAM ABD EL KADER AHMED**

Department of Biomechanics
Master Degree
2016

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| Author | : | Alaa Amr Ahmed Mohammed |
| Title | : | Activation Pattern of Lower Extremity Muscles in Backward Versus Forward Walking in Patellofemoral Pain Syndrome |
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| Abstract | : | |
| <p>Background: There is an increased popularity for using backward walking (BW) in the rehabilitation of patellofemoral pain syndrome (PFPS). Yet, little is known regarding the activation of hip and knee muscles during BW in patients with PFPS. Purpose: The purpose of this study was to compare the activation of knee extensors, hip abductors, and adductors in BW versus forward walking (FW) in patients with PFPS. In addition, to investigate the difference in activation of the tested muscles between both the PFPS and control groups during FW and BW. Methods: Sixteen females with PFPS and sixteen matched healthy controls with mean age 20.88 ± 1.95 years participated in the study. Surface EMGs from vastus medialis obliquus (VMO), vastus lateralis (VL), gluteus medius (GM), and adductor longus (AL) muscles were collected during FW and BW at a speed of 3 km/hr using Myomonitor IV EMG System. Statistical analysis was performed using 2 x 2 mixed design MANOVA with the alpha level set at 0.05. Results: The PFPS group had significantly higher normalized root mean square values of VMO, VL, and GM muscles by 97.5%, 44.4%, and 34.6%, respectively, with no significant difference in AL activity during BW versus FW. Moreover, during FW, the PFPS group showed significantly higher activation of VMO, VL, and AL muscles compared to control group. Conversely, the EMG activity of GM was significantly lower during FW in the PFPS group. In addition, no significant difference in activation was found during BW between both groups, except for significantly higher AL activity in the PFPS compared to controls. Conclusion: BW improves the activation of hip abductors and knee extensors particularly the VMO in patients with PFPS. Consequently, the addition of BW to the rehabilitation of PFPS may be beneficial for correcting patellar malalignment resulting from hip or knee muscles imbalance.</p> | | |
| Key words | 1. | Adductor longus. |
| | 2. | Backward walking. |
| | 3. | Electromyography. |
| | 4. | Gluteus medius. |
| | 5. | Patellofemoral pain syndrome. |
| | 6. | Vastus lateralis. |
| | 7. | Vastus medialis obliquus. |
| | 8. | Lower Extremity Muscles |
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| Title | : | Isokinetic Characteristics of Hip Muscles in Amateur Weight Lifters |
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| Year | : | 2016. |
| Abstract | : | |
| <p>Background: Amateur weight lifting is one of the most popular activities among young adults. Yet, there is a deficiency in research concerning its effect on hip muscles' strength. Purpose: The purpose of the study was to assess the concentric and eccentric normalized peak torque values of hip extensors, abductors and external rotators bilaterally in amateur weight lifters as compared to those of the non-lifters. Methods: Thirty male individuals (15 amateur weight lifters and 15 non-lifters) with mean age of 21.76 ± 2.58 years, weight 76.7 ± 12.92 kg and height 1.73 ± 0.074 m participated in this study. Data were collected using the Biodex Isokinetic system at an angular velocity of $120^\circ/\text{sec}$. Results: 2x2 Mixed design MANOVA revealed that the concentric peak torque values of hip extensors and abductors of both sides increased significantly in the weight lifters compared to the non-lifters with no differences in-between for the external rotators ($p < 0.05$). Additionally, there were no statistically significant differences for the eccentric peak torque values of all tested muscles of both sides between the two groups ($p > 0.05$). Moreover, there were no significant differences between the dominant and non-dominant sides for both the concentric and eccentric peak torque values of all tested muscles in both groups ($p > 0.05$). Conclusion: Exercises for amateur weight lifters must be reviewed to include external rotators in their training programs. Additionally, eccentric training for hip muscles must be involved to prevent future injuries.</p> | | |
| Key words | 1. | Amateur weight lifters. |
| | 2. | Hip muscles. |
| | 3. | Muscle imbalance. |
| | 4. | Isokinetic. |
| Classification number | : | |
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| Arabic Title Page | : | الخصائص الایزوکینیتیکیة لعضلات الفخذ لرافعي الأثقال من الهواة |
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| Author | : | Marwa Yehia Sayed Ebrahim |
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| Year | : | 2016. |
| Abstract | : | |

Background: Recreational weight lifting is one of the most popular outdoor activities among young adults. Yet, there is a deficiency in research concerning its effects on shoulder muscle groups' strength and on normal agonist/antagonist ratios. **Purpose:** The purpose of this study was to investigate the isokinetic concentric shoulder muscles strength values and the related agonist/antagonist ratios in the recreational weight lifters as compared to those of the non-lifters. **Methods:** Thirty-four men (16 recreational weight lifters and 18 non-lifters) with mean age 21.09 ± 2.66 years, weight 78.50 ± 15.09 kg, and height 168.78 ± 28.68 cm participated in this study. Concentric peak torques of shoulder flexors, extensors, abductors, adductors, internal rotators and external rotators and agonist/antagonist ratios were collected at $120^\circ/\text{sec}$ using the Biodex isokinetic dynamometer. **Results:** Statistical analyses using one way MANOVA revealed that all mean body weight adjusted strength values were significantly greater in recreational weight trainees compared with controls ($p < 0.05$). Strength ratios were significantly lower in recreational weight trainees compared with controls except for flexors/extensors ratio ($p < 0.05$). **Conclusion:** These results suggested that recreational weight exercises place trainees at risk for muscle imbalances. Thus, training pattern must be reviewed for strength balance to prevent injuries.

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| Key words | 1. | Isokinetic. |
| | 2. | Muscle imbalance. |
| | 3. | Shoulder complex. |
| | 4. | Weight lifting. |
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