**A Comparison of Hip Strength and Core Endurance in Males With and Without Patellofemoral Pain Syndrome**

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**Introduction**

**Context:** Patellofemoral pain syndrome (PFPS) is a result of various biomechanical factors that can cause increased stress to patellofemoral joint structures. Historically, clinicians have managed PFPS with a focus on quadriceps function as well as other impairments such as iliotibial band, lateral retinaculum, hamstring, and gastrosoleus tightness. More recently, researchers have investigated the influence of proximal structures on knee pathology. Specifically, they have examined the influence of excessive hip adduction and internal rotation on patellofemoral joint function. Hip abductor, extensor, and external rotator muscle function is critical for controlling faulty hip kinematics that may contribute to PFPS. Furthermore, core muscle function is another important factor to provide pelvic stability and normalize lower extremity kinematics. To date, a plethora of evidence supports hip weakness in females with PFPS. However, data do not exist for males with PFPS.

**Objective:** The purpose of this study was to compare hip strength and core endurance in males with and without PFPS.

**Hypothesis:** Males with PFPS will exhibit significantly less hip strength and core endurance than controls.

**Methods**

**Research Design:** This investigation represented a cross-sectional, quasi-experimental study. The independent variables was group (males with PFPS and controls). The dependent variables were hip strength and core endurance.

**Subjects:** Sixteen males with (age 26.5 ± 4.0 years; height 182.3 ± 7.8 cm; mass 82.7 ± 12.4 kg) and without (age 24.4 ± 1.8 years; height 180.2 ± 6.0 cm; mass 84.3 ± 15.2 kg) PFPS volunteered for this study. A sample of convenience was recruited from the greater Central Savannah River Area. Subjects with PFPS were recruited by word of mouth and the distribution of flyers around the Medical College of Georgia/Georgia Health Sciences University campus, local physician offices, Augusta State University, and local recreational facilities.

**Procedures:** We assessed isometric hip strength using handheld dynamometry and stabilization straps in accordance with the “make test.” Following practice trials, subjects performed 3 maximum voluntary isometric contractions of the hip abductors, extensors, and external rotators. Peak force values for the 3 trials were averaged and expressed as a percentage of body mass. Subjects performed the front plank, horizontal extension test and side-bridge to assess anterior, posterior and lateral core endurance, respectively. The time that subjects maintained each position was recorded to the nearest 1/10th of a second.

**Statistical Analysis:** Independent t-tests were used to determine between-group differences for each variable. Statistical analyses were conducted using a significance level less than 0.05, which was adjusted for multiple comparisons using the Bonferroni-Holm correction. Effect sizes (ES) were calculated using Cohen’s d.

**Results**

### Hip Strength

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Mean (ES)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abduction</td>
<td>90</td>
<td>0.017</td>
</tr>
<tr>
<td>Extension</td>
<td>84</td>
<td>0.005</td>
</tr>
<tr>
<td>External Rotation</td>
<td>131</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Discussion**

Results from this investigation partially supported our hypotheses. Males with PFPS generated significantly less hip abductor, extensor, and external rotator force during strength testing. Although core muscle endurance findings were not significantly different, their moderate effect sizes suggested that males with PFPS have reduced core endurance than controls. Researchers have theorized that poor trunk and hip control can lead to excessive pelvic drop, hip adduction and hip internal rotation, motions known to cause increased patellofemoral joint loading. Therefore, the combination of hip weakness and less core endurance suggested that males with PFPS may have poor proximal control that could contribute to PFPS.

**Clinical Relevance**

Males with PFPS demonstrated less hip strength and core endurance that may contribute to PFPS. Clinicians should consider prescribing exercises that target the hip and trunk musculature when treating males with PFPS.