An exercise therapy program targeting proximal muscle strength and power is feasible in people with patellofemoral pain

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Exercise is the cornerstone of treatment

Successful outcome at 1 year = 41 – 67% (Collins 2008; van Linschoten, 2009)

43% Favorable outcomes at 5-8 years (Lankhorst 2016)
Exercise is the cornerstone of treatment.

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Favorable outcomes at 5–8 years (Lankhorst, 2016).
Proximal muscle rehabilitation is effective for patellofemoral pain: a systematic review with meta-analysis

Simon Lack,1 Christian Barton,1,2,3,4 Oliver Sohan,1 Kay Crossley,5 Dylan Morrissey1,6

Hip and knee focused exercise seems to help

Hip targeted more beneficial in short term

What prescription principles?

LA TROBE UNIVERSITY

Sport and Exercise Medicine Research Centre

Sinead Holden,1,2 Michael Skovdal Rathleff,1,3 Martin Bach Jensen,1 Christian J Barton4

How can we implement exercise therapy for patellofemoral pain if we don’t know what was prescribed? A systematic review

@DrChrisBarton
Proximal muscle rehabilitation is effective for patellofemoral pain: a systematic review with meta-analysis

Simon Lack, ¹ Christian Barton, ¹,²,³,⁴ Oliver Sohan, ¹ Kay Crossley, ⁵ Dylan Morrissey ¹,⁶

Type of exercise reported according to studies’ titles

14 RCTs

Neuromuscular: 13
Strength: 1
Endurance: 5
Power: 3
Undetermined: 4

Type of exercise according to American College of Sports Medicine

14 RCTs

Neuromuscular: 5
Strength: 1
Endurance: 3
Power: 1
Undetermined: 4
Hip extensor rate of force development

Control Group

PFP Group

- 90% Max
- 60%
- 30%

↓ 67%
↓ 55%
↓ 51%
Study aims

1. Feasibility of a 12-week progressive resistance training program targeting proximal muscle strength and power

2. Clinical outcomes and changes in hip strength and power
Characteristics of the participants (n = 11)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (men/women)</td>
<td>5/6</td>
</tr>
<tr>
<td>Age (years)</td>
<td>33 (10)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>23.2 (3.1)</td>
</tr>
<tr>
<td>Symptoms duration (months)</td>
<td>26 (12)</td>
</tr>
</tbody>
</table>
Exercise program

- 12-week (3 x per week)
- 3-5 exercises targeting hip and trunk and tailored to individual
- 5-8 physiotherapy consultations (exercise only)
The muscles ability to move against resistance

Greater resistance is needed for about 8-12 repetitions in a slower controlled manner

Generally the rest time is about 2-3 minutes between sets
How quickly a given load can be moved or force generated

Exercise against heavy resistance in an explosive manner for a low number of repetitions and 3-6 sets

An extended rest (3-5 minutes) is often needed to fully recover.
Outcomes

→ Global rating of change
→ Worst pain in previous week
→ Anterior knee pain scale
→ KOOS – Patellofemoral
→ Hip muscle capacity (isometric strength; 10 RM; Power)
Feasibility?

• 1 withdrawal – pregnant

• Very poor exercise compliance data after first 3-4 weeks (Physitrack)

• 1 Adverse outcome (pain flare) – settled within 1 week

• Typically progressed well (strength 3-5 weeks; power 4-8 weeks)
### Hip Muscle Function

<table>
<thead>
<tr>
<th>Muscle Function</th>
<th>Pre</th>
<th>Post</th>
<th>Mean Difference (95%CI)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hip abduction isometric strength</strong></td>
<td>122.91 (19.82)</td>
<td>136.34 (31.01)</td>
<td>-13.43 (-25.55; -1.30)</td>
<td>0.99</td>
</tr>
<tr>
<td><strong>Hip extension isometric strength</strong></td>
<td>83.26 (34.24)</td>
<td>96.60 (33.94)</td>
<td>-13.34 (-28.06; 1.38)</td>
<td>0.64</td>
</tr>
<tr>
<td><strong>Hip abduction 10RM</strong></td>
<td>53.59 (14.40)</td>
<td>72.24 (12.02)</td>
<td>-18.65 (-24.88; -12.43)</td>
<td>2.22</td>
</tr>
<tr>
<td><strong>Hip extension 10 RM</strong></td>
<td>54.98 (15.48)</td>
<td>73.88 (7.21)</td>
<td>-18.90 (-27.72; -10.09)</td>
<td>1.92</td>
</tr>
<tr>
<td><strong>Hip abduction peak power</strong></td>
<td>1.97 (0.89)</td>
<td>2.53 (1.16)</td>
<td>-0.55 (-1.09; -0.08)</td>
<td>0.78</td>
</tr>
<tr>
<td><strong>Hip extension peak power</strong></td>
<td>2.97 (1.40)</td>
<td>3.63 (1.22)</td>
<td>-0.65 (-1.28; -0.02)</td>
<td>0.77</td>
</tr>
</tbody>
</table>

*Significant difference.*
Global scale of perceived recovery

- Completely-recovered: 1
- Markedly better: 3
- Moderately better: 6
- Same
- Moderately worse
- Markedly worse
<table>
<thead>
<tr>
<th>Self-reported outcomes</th>
<th>Pre</th>
<th>Post</th>
<th>Mean difference (95%CI)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worst pain last week</td>
<td>5.70 (1.57)</td>
<td>1.00 (1.25)</td>
<td>4.7 (3.68; 5.71)*</td>
<td>3.36</td>
</tr>
<tr>
<td>AKPS</td>
<td>76.30 (11.59)</td>
<td>90.10 (8.63)</td>
<td>-13.80 (-19.57; -8.02)*</td>
<td>1.81</td>
</tr>
<tr>
<td>KOOS-PF</td>
<td>74.30 (18.38)</td>
<td>89.10 (9.80)</td>
<td>-14.80 (-24.36; -5.23)*</td>
<td>1.37</td>
</tr>
<tr>
<td>Kinesiophobia</td>
<td>33.70 (8.11)</td>
<td>29.10 (5.97)</td>
<td>4.60 (-0.51; 9.71)</td>
<td>0.66</td>
</tr>
<tr>
<td>Physical activity level (MET·min·wk⁻¹)</td>
<td>3,567.6 (5,092)</td>
<td>5,944.3 (5,955)</td>
<td>-2,376.7 (-6,606.6; 1,853.2)</td>
<td>0.40</td>
</tr>
</tbody>
</table>
TAKE HOMES

1. Prescribing strength and power is feasible

2. Moderate-large improvements in strength and power

3. Associated with large improvements in pain and function

4. Does better exercise prescription improve long term outcomes?
Questions?

www.patellofemoral.trekeducation.org