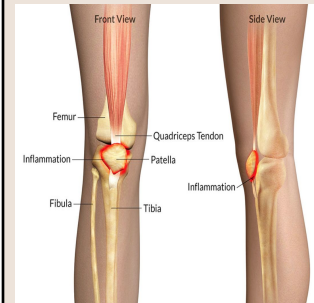


# A more effective treatment for Patellofemoral pain.

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Title of Evidence Based Article: Hip and Knee Strengthening Is More Effective Than Knee Strengthening Alone for Reducing Pain and Improving Activity in Individuals with Patellofemoral Pain: A systematic Review with Meta-analysis.



## Objectives

- Background information
- Causes
- Asking questions and finding answers
  - Describe prior research and need for further inquiry
- Data analysis (listing research characteristics)
- Results
  - Characteristics of included trials
  - Interpretation
- Implications for Physical Therapy
- Alternative treatments
- Conclusion



## Background:

**What is Patellofemoral pain:** Retropatellar and or peripatellar pain. One of the most common musculoskeletal conditions presenting to general practice and sports medicine clinics.

### → Incidence:

Varied percentages of individuals with knee pain is PFP. Incidence increased with athletes and young adults

Women diagnosed at a rate of 2:1

### → Duration

Short and Long term effects.

- ◆ Up to 90% have lasting pain over 4 years
- ◆ Up to 25% have pain after 20 years.

## Structure of the Patellofemoral complex

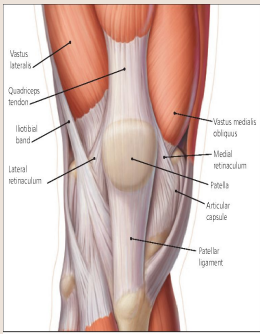


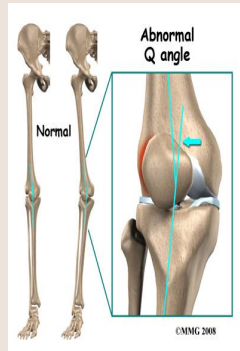
Figure 4. Schematic of the right knee, anterior view. Dynamic stability.

### Passive Structures (stabilizers)

- Patellar tendon
- Superficial and deep lateral retinaculum
- Patellofemoral ligament

### Active/Dynamic structures

- Quadriceps muscles
- Resultant pull
- Q-angle



## Causes

### Local Factors: (patellofemoral joint and surrounding tissues)

- Altered mechanics of the joint
- Impaired quadriceps strength

### Non-Local Factors: (mechanics of the joints distal and proximal)

- Increased pronation of the foot
- Increased hip abduction
- Increased femoral medial rotation

#### Extrinsic

- Increased duration of exercise.
- Sudden increase of mileage.
- Change of training surface.
- Inappropriate/no footwear.
- Overweight.

## Aggravating Factors

1. Walking
2. Ascending Stairs
3. Running
4. Flexion > 90 degrees
5. Squatting

## Relieving Factors

1. Rest
2. Knee extension



Usually a diagnosis of exclusion.

## Traditional Treatment

- Usually focused on local factors
  - Knee orthoses
  - Strengthening of the quadriceps muscles.
- Possible suggestions
  - Strengthening hip abductors, lateral rotators and extensors
    - Can be associated with or without knee strengthening
    - Doing so can decrease patellofemoral joint stress.



## Focus of the research:

The aim of this systematic review was to examine the efficacy of knee strengthening, associated or not with hip strengthening (from now on referred to as hip and knee strengthening), to increase strength, reduce pain, and improve activity in individuals with patellofemoral pain.

## Questions to be answered:

1. Does hip and knee strengthening increase strength, reduce pain, and improve activity in individuals with patellofemoral pain compared to no intervention at all? Are any benefits maintained beyond the intervention period?
2. Is hip and knee strengthening more effective than knee strengthening alone for increasing strength, reducing pain, and improving activity in individuals with patellofemoral pain? Are any benefits maintained beyond the intervention period?



## Why was the review needed?

### Prior research:

- Hip strengthening has positive effect on pain reduction.
- Addition of hip strengthening decreased pain during activity (CI 95%), but not functional ability.
- Some showed improvement of pain but research included bias.
- Others did not compare with other types of treatment.

## Listing inclusion criteria

### Participants

- Individuals with PFP.
- Age, physical activity and pain assessed for similarities to compare subject similarity.
- Excluded studies with individuals with other knee conditions. (numerous)

### Interventions

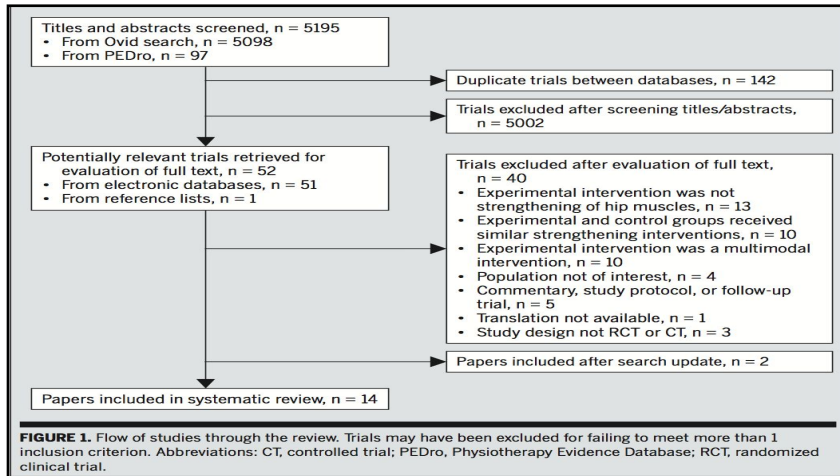
- Must consist of hip and/ or knee strengthening
  - Using body weight, free weights, machines or tubing
- Dose of exercise expected to improve strength
- Research must be assessing for strengthening
- FITT determined to assess similarity

### Control Group

1. Question 1: Efficacy of hip and knee strengthening, control group could be no intervention.
2. Effect of hip and knee strengthening, control group could be only exercises focusing on knee musculature only.

### Outcome Measures

- 3 areas of interest: Strength, Pain and Activity
  - Strength: measured by peak force/ torque generation, max contraction (MMT or HHD)
  - Pain: self reported (VAS or numeric scale)
  - Activity: direct measure of capacity or performance.



## Included trials

**Characteristics: 14 trials (673 total participants)**

- Effects of hip and knee strengthening for increasing strength (n=9)
- Reducing pain (n=14)
- Improving activity (n=12)

**Control groups**

- 4 trials answered the first study question
  - Hip and knee vs. No intervention
- 11 trial answered the second study question
  - Hip and knee vs. Knee strengthening alone

Mixture of study types

Random allocated participants 93%

Drop out rate < 15%

Blinded assessor 57%

No double blind studies of participants or therapists

## Characteristics continued...

**Participants:**

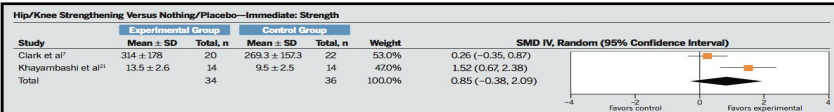
- Mean Age: 21-35 years
- Majority of trials: patients with pain > 3 months with pain intensities ranging from 3-8/10
- Not all participants were highly active individuals, but did have PFP.

**Intervention:**

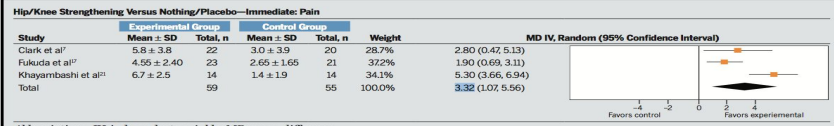
- All trials, experimental intervention was strengthening of hip muscles.
  - 79% included hip and knee strengthening.
- Hip muscles targeted:
  - Lateral Rotators
  - Abductors
  - Extensors
- Training:
  - Average of 2-3 times per week with as many as 7 times.
  - Average duration of 6 weeks SD +/- 2.5 weeks.
  - Time for each training: 30-120 min each time.
  - Parameters: listed in table 2: Body weight, percentages of 1-RM, percentage of body weight
    - Progressions for each week or each training listed and type of load indicated.
    - Performed at home or in the clinic.

## Outcome measures:

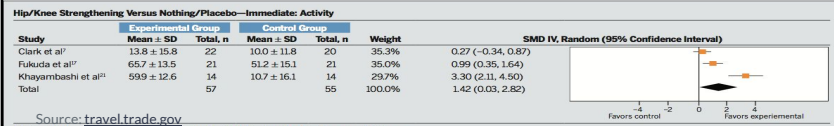
- **Measures of strength:**
  - Max voluntary force production (isometric, concentric and eccentric contractions)
- **Measures of pain intensity:**
  - Validated self-reporting (numeric, VAS)
- **Measures of Activity:**
  - Questionnaires based on performance of ADLs
    - LEFS
    - WOMAC
    - AKPS
    - Knee Function Scale



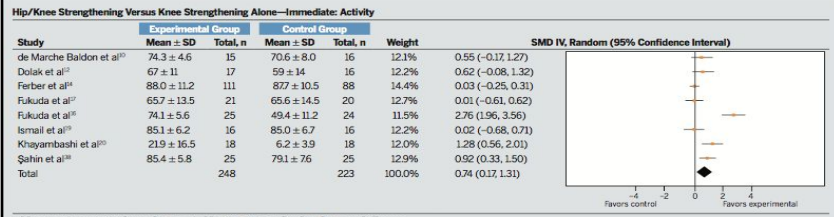
Abbreviations: IV, independent variable; SMD, standardized mean difference.  
**FIGURE 2.** Standardized mean differences of the effect of hip and knee strengthening versus nothing/placebo on strength, immediately after the intervention (n = 70).



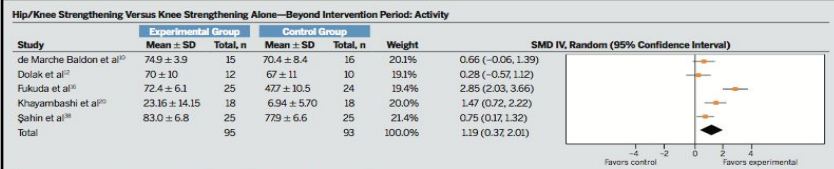
Abbreviations: IV, independent variable; MD, mean difference.  
**FIGURE 3.** Mean differences of the effect of hip and knee strengthening versus nothing/placebo on pain intensity (0-10 scale), immediately after intervention (n = 114).



Source: [travel.trade.gov](http://travel.trade.gov)  
 Abbreviations: IV, independent variable; SMD, standardized mean difference.  
**FIGURE 4.** Standardized mean differences of the effect of hip and knee strengthening versus nothing/placebo on activity, immediately after intervention (n = 112).



Abbreviations: IV, independent variable; SMD, standardized mean difference.  
**FIGURE 8.** Standardized mean differences of the effect of hip and knee strengthening versus knee strengthening alone on activity, immediately after intervention (n = 471).



Abbreviations: IV, independent variable; SMD, standardized mean difference.  
**FIGURE 9.** Standardized mean differences of the effect of hip and knee strengthening versus knee strengthening alone on activity, beyond the intervention period (n = 188).



Abbreviations: IV, independent variable; SMD, standardized mean difference.  
**FIGURE 5.** Standardized mean differences of the effect of hip and knee strengthening versus knee strengthening alone on strength, immediately after intervention (n = 359).



Abbreviations: IV, independent variable; MD, mean difference.  
**FIGURE 6.** Mean difference of the effect of hip and knee strengthening versus knee strengthening alone on pain intensity (0-10 scale), immediately after intervention (n = 517).



Abbreviations: IV, independent variable; MD, mean difference.  
**FIGURE 7.** Mean difference of the effect of hip and knee strengthening versus knee strengthening alone on pain intensity (0-10 scale), beyond the intervention period (n = 101).

# Discussion

There is enough evidence that hip and knee strengthening is effective in reducing pain and improving activity with individuals with patellofemoral pain. It is also clinically significant when comparing it to knee strengthening alone.

Benefits continue even after intervention periods.

Trainings were long enough to increase hip and knee musculature endurance. (Due to inactivity from pain, endurance loss is usually a result).

Change in strength was not significant enough to be clinically significant.

- Could be because intervention was not long enough or intense enough.
- Muscle adaptations occur after 8-12 weeks.
  - (those that were 8-12 weeks showed higher strength measures)
- Most interventions did not minister correct intensity set by American College of Sports medicine:
  - 60-70% of 1RM
  - Some loads or duration of sessions were not reported

## Implications to Therapy

- Why is this important to us?
- As direct care providers we can be the first line of treatment to help the patient understand their symptoms and give them non-invasive options for care.
- We can assist the patient in developing a plan of care to alleviate pain.
- We can focus our treatments on specific areas.
- By decreasing pain the patient can get back to prior function and enjoying their social participation.
- By focusing on Hip and Knee strengthening we can work towards saving the patient time and money by avoiding time and money lost by dealing with more expensive treatments and tests.

## Alternatives to Exercises

- Taping: Improve patellar tracking
- Knee braces and sleeves
- Orthotics
  - Controlling excessive foot pronation and reducing Q angle.
- Biofeedback
- Lumbo-pelvic Manipulation: Decrease in quads inhibition.
- Activity Modification: Avoiding aggravating activities, decrease in BMI
- Injections and surgery

## Conclusion

Hip and knee strengthening is not only effective, but also superior to knee strengthening alone, for decreasing pain intensity and improving activity in people with patellofemoral pain. The results of the meta-analyses, based on 14 trials, indicated that strength training of the hip muscles, accompanied by strengthening of the knee muscles, 3 times a week for 6 weeks can be expected to decrease pain and improve activity in people with moderate-to-high levels of patellofemoral pain. The training benefits are maintained beyond the intervention period.

Strengths of the article

Weaknesses of the article

## References

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