



# Does hip strengthening increase functional outcomes and decrease pain in women with patellofemoral joint dysfunction? A systematic review

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## Introduction

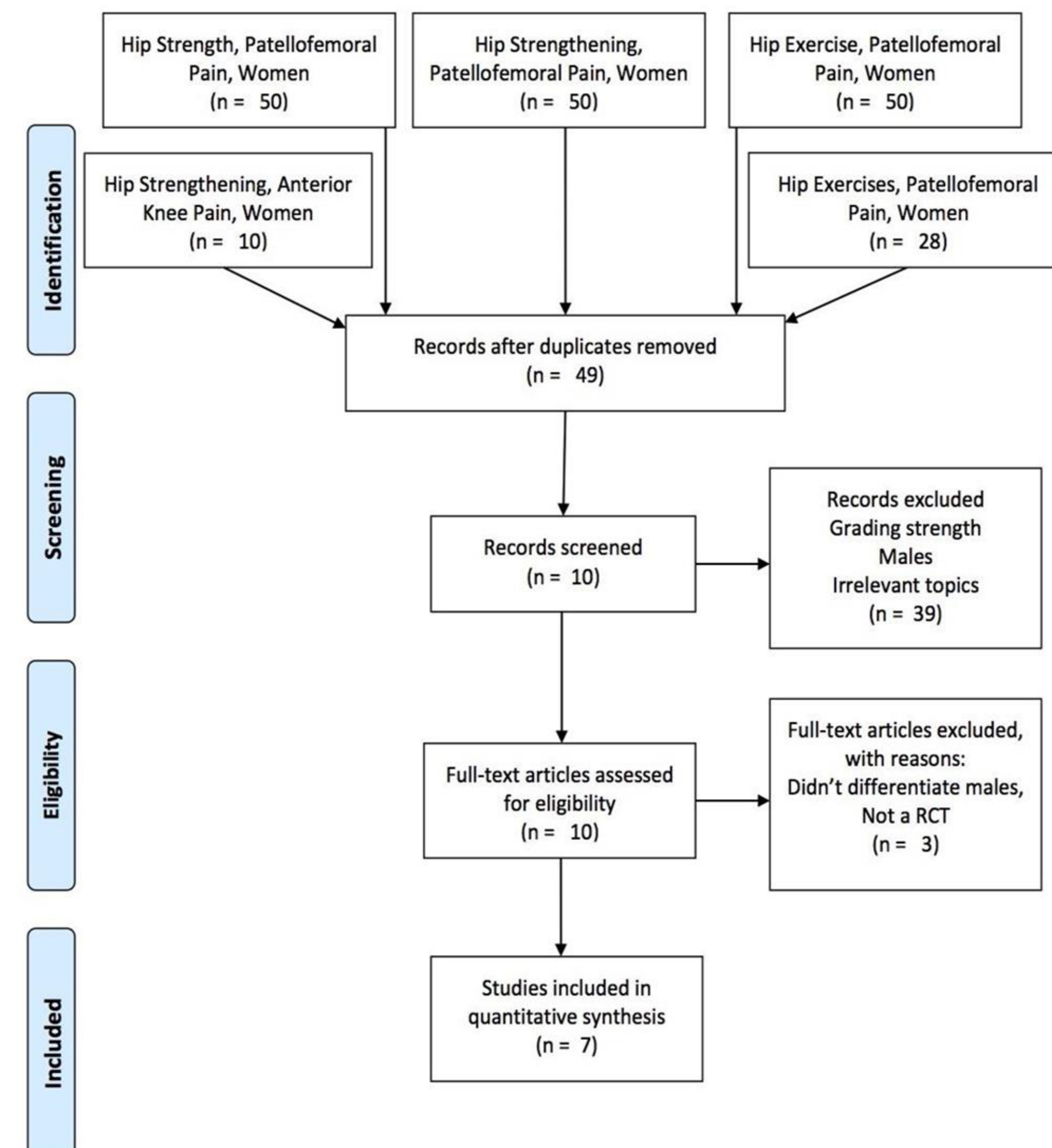
Musculoskeletal injury, particularly knee pain, is becoming more prevalent in the female athletic population. Since Title IX was signed into law in 1972 mandating that individuals would not be excluded from educational activity, the amount of females participating in high school athletics has increased 902% and the amount of females participating in collegiate activities has increased 456%<sup>1</sup>. This stark increase in active females has led to an increase in many musculoskeletal injuries much like their male counterparts. Knee pain is particularly common<sup>1</sup>. Yet one cause of knee pain that is more unique to female athletes and more difficult to fully resolve is patellofemoral joint dysfunction (PFJD). This particular problem seems to even continue long after the athlete has ceased competitive play due to an ongoing active lifestyle. The common treatment has been to treat the problem joint, the knee, but could individuals have a faster and better long term recovery when being treated with a more global approach? Treatment for PFJD has recently started to include the hip. Through the use of common physical therapy functional outcome measures, females appear to have benefited better when a physical therapist involves the hip joint in treatment along with the knee<sup>1</sup>. This leads to the question of does hip strengthening increase functional outcomes and decrease pain in women with patellofemoral joint dysfunction?



## Methods

Five collections of search terms were used to search databases resulting in 206 studies identified. The number of studies after duplicates were removed resulted in 49 studies. The 49 studies were screened via title and abstract for relevance and inclusion criteria of female subjects diagnosed with patellofemoral joint dysfunction and a hip-strengthening component of rehab. After this screening, 10 studies remained. The 10 studies were

## Methods cont.



reviewed in full text leading to an additional 3 studies excluded. (See diagram above for outline of the process.) The 7 selected studies were evaluated to determine level of research and quality of study using the American Academy for Cerebral Palsy and Developmental Medicine (AACPD) assessment tool<sup>2</sup>. The AACPD uses a series of 7 yes or no response questions resulting in a scoring system out of a possible 7. Scores of 6-7 yes responses are considered **strong**. Scores of 4-5 yes responses are considered **moderately strong**. Scores of 3 or less yes responses are considered **weak**.

## Results

All studies were considered high level design being level II randomized controlled trials. Out of the 7 studies, 3 indicated strong quality of study, 3 moderate quality of study, and only 1 showed weak quality. Subjects placed in groups with a hip strengthening component in their treatment had a decrease in pain on the VAS and an increase in function via LEFS and isometric strength measures. Out of the 7 studies, 5 used the VAS, 5 used the LEFS, and 4 used isokinetic strength testing as outcome measures. The studies using VAS reduced scores from average 6.4 to 1.4, a 77.7% improvement. The studies using LEFS increased

## Results cont.

scores from 53.8 to 70.3, an average of 30.6% improvement. The studies using isokinetic strength all showed improvement with an average increased strength of 25.9% compared to controls which decreased 4.3%. (See Table below for results of scoring the 7 selected studies.)

Table 1

Article Number	Study	Level of Quality	1	2	3	4	5	6	7
1	2014 De Marche Baldon, R.	II (4/7)	No	Yes	Yes	No	Yes	Yes	No
2	2012 Fukuda T	II (7/7)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	2011 Dolak K	II (4/7)	Yes	Yes	Yes	No	Yes	No	No
4	2012 Dolak KL	II (4/7)	Yes	No	Yes	Yes	Yes	No	No
5	2014 Herbst	II (2/7)	Yes	No	No	No	Yes	No	No
6	2010 Fukado T	II (6/7)	Yes	Yes	Yes	No	Yes	Yes	Yes
8	2012 Khayambashi	II (6/7)	Yes	Yes	Yes	No	Yes	Yes	Yes

## Discussion

Out of the seven studies that were reviewed and analyzed, some common functional outcome measures were noted. The lower extremity functional scale (LEFS)<sup>3,4,6,7,8</sup>, visual analog scale (VAS)<sup>3,5,6,7,8</sup> and isometric strength<sup>5,6,7,8</sup> assessed by the use of a dynamometer were used in more than half of the studies. The inclusion criteria for the subjects in the studies reviewed were pain associated with functional activities such as ascending/descending stairs, hopping, running, squatting, kneeling, prolonged sitting, and insidious onset of symptoms<sup>3,4,5,6,7,8</sup>. Exclusion criteria for the subjects in the studies reviewed included having other knee pathologies and history of knee surgery in the past year<sup>3,4,5,6,7,8</sup>. Among the studies, a hip strengthening component was necessary for inclusion into the systematic review<sup>3,4,5,6,7,8,9</sup>. There were variations in the approaches used for strengthening the hip joint between the studies that should be taken into consideration. One study separated their subjects into two exercise groups, a hip strengthening group and a quad strengthening group. Both groups were non-weight bearing and exercises were performed for four weeks. The subjects who performed knee exercises showed no significant improvements in pain reported by the VAS, while the hip group showed significant improvements in pain after four weeks. Both groups then performed the same weight bearing exercises after their initial four week intervention plan and showed

## Discussion cont.

equally significant improvements in pain and LEFS scores after the addition of the weight bearing exercises<sup>7</sup>. Throughout all the research open and closed chain exercises were used<sup>3,4,5,6,7,8,9</sup>. There was no indication as to why they were chosen other than it was the preference of the researchers. Based on these results, closed chain exercises for the hip and the knee should be included in therapeutic interventions and open chain exercises should be used sparingly. Overall, the limitations of the studies were small sample sizes used (less than 100 subjects) and therefore the studies could not be given the highest level of research design. After reviewing the results of those subjects with a hip strengthening component added to their treatment it can be said that a standard physical therapy protocol should include a global approach to treatment that includes a hip strengthening component as well as a focus at the knee.

## Conclusion

Overall, the evidence supports that a hip-strengthening component is necessary to incorporate into a traditional physical therapy protocol for women with patellofemoral joint dysfunction. Adding the hip strengthening exercise components of hip flexors and abductors were shown to help decrease pain and improve function in all studies reviewed. It is unclear whether the hip strengthening exercises are better as open chain vs closed chain in nature. The improvements were evidenced from the various functional outcome measures, LEFS, VAS, and isokinetic strength test, that are typically used within the clinical setting indicating the usefulness of the hip exercises in a therapy protocol. Recommendations for therapists would be to treat these patients with a global treatment approach by strengthening the hip joint as well as focusing at the knee.

## References

References are available upon request.