**Article Full Title**

The effects of joint mobilization on individuals with patellofemoral pain: a systematic review

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**Paper Abstract**

*Objective:* To investigate and synthesize the effects of joint mobilization on individuals with patellofemoral pain syndrome. *Data sources:* Five electronic databases (CINAHL, the Cochrane Central Register of Controlled Trials, PubMed, Scopus, and SPORTDiscus) were used. *Review methods:* Each database was searched from inception to 1 November 2017. Randomized controlled trials investigating a manual therapy intervention, with or without co-interventions, for persons with patellofemoral pain were included. Two reviewers independently screened the retrieved literature and appraised the quality of the selected studies using the PEDro rating scale. A third reviewer was used in cases of discrepancy to create a consensus. *Results:* A total of 361 articles were identified in the search. Twelve randomized trials with a total of 499 participants were selected for full review. Within-group improvements in pain and function were noted for the manual therapy groups. Between-group improvements for short-term outcomes (three months or less) were greatest when joint mobilization was directed to the knee complex and used as part of a comprehensive approach. *Conclusion:* In the articles reviewed, joint mobilization appears to be most effective in improving pain and function when coupled with other interventions, although its discrete effect is unclear due to the reviewed studies' design and reporting.

*Keywords:* Knee; manipulation; manual therapy; pain; patellofemoral.

**NIH Risk of Bias Tool**

Quality Assessment of Systematic Reviews and Meta-Analyses

1. **Is the review based on a focused question that is adequately formulated and described?**

Yes

1. **Were eligibility criteria for included and excluded studies predefined and specified?**

Yes

1. **Did the literature search strategy use a comprehensive, systematic approach?**

Yes

1. **Were titles, abstracts, and full-text articles dually and independently reviewed for inclusion and exclusion to minimize bias?**

Yes

1. **Was the quality of each included study rated independently by two or more reviewers using a standard method to appraise its internal validity?**

Yes

1. **Were the included studies listed along with important characteristics and results of each study?**

Yes

1. **Was publication bias assessed?**

Yes

1. **Was heterogeneity assessed? (This question applies only to meta-analyses.)**

Cannot Determine, Not Reported, Not Applicable

**Key Finding #1**

When joint mobilizations were used as co-interventions, short term improvements in pain and function were frequently reported.

**Key Finding #2**

Mobilization targeted to the knee resulted in significant improvements in pain and function when compared to spinal thrust mobilization, suggesting that localized treatment is more effective than proximal treatment directed to the spine.

**Key Finding #3**

Use of knee joint mobilization in isolation is not recommended based on the available data.

**Key Finding #4**

**Please provide your summary of the paper**

This systematic review found that manual therapy can have a positive effect on pain and function in the short term (3 months) for patients with Patellofemoral Pain Syndrome (PFPS). The authors investigated 12 randomized trials and found that manual therapy (MT) was most effective when it was targeted locally to the knee versus proximally at the spine, and when it was implemented as part of a comprehensive rehabilitation program. The studies that used MT in isolation compared to a control group did not show a significant improvement in either pain or function, which further supports the notion of MT being used implemented as a part of a comprehensive approach rather than treatment in isolation. The authors noted, however, that conclusions should be drawn with caution as there were some methodological, study quality, and data availability concerns with some of the trials selected for this review.

**Please provide your clinical interpretation of this paper. Include how this study may impact clinical practice and how the results can be implemented.**

This paper supports the use of manual therapy/mobilization techniques for treatment of Patellofemoral Pain Syndrome (PFPS) only when it is included as a part of a comprehensive strategy. The authors do not suggest using mobilization as a standalone treatment based on the available data. Perhaps, capitalizing on the pain modulatory effects of manual therapy to then allow patients to perform exercises with less pain, through greater ROM, or both would be indicated. Furthermore, determining whether or not manual therapy/mobilization is received and perceived well by the patient will help the clinician determine if mobilization is included in their plan.