**Article Full Title**

Effectiveness of Manual Therapy for Pain and Self-reported Function in Individuals With Patellofemoral Pain: Systematic Review and Meta-analysis

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**Paper Abstract**

Study Design Systematic literature review with meta-analysis. Background Management of patellofemoral pain (PFP) may include the utilization of manual therapy (MT) techniques to the patellofemoral joint, surrounding soft tissues, and/or lumbopelvic region. Objectives To determine the effectiveness of MT, used alone or as an adjunct intervention, compared to standard treatment or sham for reducing pain and improving self-reported function in individuals with PFP. Methods An electronic literature search was conducted in the PubMed, Ovid, Cochrane Central Register of Controlled Trials, and CINAHL databases for studies investigating MT for individuals with PFP. Studies published through August 2017 that compared MT (local or remote to the knee), used alone or in combination with other interventions, to control or sham interventions were included. Patient-reported pain and functional outcomes were collected and synthesized. Trials were assessed via the Cochrane risk-of-bias tool, and a meta-analysis of the evidence was performed. Results Nine studies were included in the review, 5 of which were rated as having a low risk of bias. The use of MT, applied to the local knee structure, was associated with favorable short-term changes in self-reported function and pain in individuals with PFP, when compared to a comparison (control or sham) intervention. However, the changes were clinically meaningful only for pain (defined as a 2-cm or 2-point improvement on a visual analog scale or numeric pain-rating scale). The evidence regarding lumbopelvic manipulation was inconclusive for pain improvement in individuals with PFP, based on 3 studies. Conclusion The data from this review cautiously suggest that MT may be helpful in the short term for decreasing pain in patients with PFP. Several studies integrated MT into a comprehensive treatment program. Changes in self-reported function with the inclusion of MT were shown to be significant, but not clinically meaningful. The limitations in the studies performed to date suggest that future research should determine the optimal techniques and dosage of MT and perform longer follow-up to monitor long-term effects.

**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?**

Cannot Determine, Not Reported, Not Applicable

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.)**

Yes

**Key Finding #1**

Manual therapy directed around the patella may be beneficial to decrease pain in patients with patellofemoral pain (PFP).

**Key Finding #2**

Local manual therapy for PFP is likely effective when performed alongside other therapies such as proximal hip strengthening, stretching, and activity modification.

**Key Finding #3**

In order to determine whether manual therapy alone has an effect on pain and function for patients with PFP, more studies with consistent methods of intervention are necessary.

**Key Finding #4**

**Please provide your summary of the paper**

In this systematic review and meta-analysis, the authors performed a thorough search through multiple engines and developed inclusion and exclusion criteria to standardize the articles they analyzed as much as possible. Main criteria included parameters requiring texts to be full length randomized control trials and specific to anterior knee pain and/or patellofemoral pain (PFP), to include manual therapy as a main treatment strategy, and to have at least ten participants with a dropout rate of less than 20%. After the analysis, the authors found that manual therapy to the patellar area showed moderate evidence of short-term pain relief as compared to controls or sham treatment. While patients also self-reported increases in function following manual therapy intervention as part of their PFP rehabilitation, the effects were variable and not clinically significant. The effects of lumbopelvic manual therapy on PFP pain reduction was inconsistent among the studies, though quadriceps muscle strength improvement was noted in the studies involving lumbosacral manual therapy. Overall, the authors recognized that the varying etiological definitions of PFP, and therefore differing intervention approaches, resulted in studies with inconsistent treatment approaches that are challenging to compare in analyses. While it was determined that more defined research is necessary, the authors also concluded that manual therapy is likely beneficial when provided as part of multimodal treatment to best help patients with PFP until more specific and applicable data are obtained.

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

The clinical implications of this paper highlight the need for individualized treatment based on patient responses as well as evidence from the literature. Manual therapy targeted at the patella may be beneficial in treating patients with patellofemoral pain, and the analysis suggests this is especially true when manual therapy is paired with other intervention approaches.