**Article Full Title**

Osteopathic Manipulative Treatment Versus Exercise Program in Runners With Patellofemoral Pain Syndrome: A Randomized Controlled Trial

**Author Names**

Zago, J., Amatuzzi, F., Rondinel, T., Matheus, J.P.

**Reviewer Name**

Hannah Koch, SPT

**Reviewer Affiliations**

Duke University School of Medicine, Doctor of Physical Therapy Division

**Paper Abstract**

Context: The effects of an exercise program (EP) for the treatment of patellofemoral pain syndrome (PFPS) are well known. However, the effects of osteopathic manipulative treatment (OMT) are unclear. Objective: To evaluate the effects of OMT versus EP on knee pain, functionality, plantar pressure in middle foot (PPMF), posterior thigh flexibility (PTF), and range of motion of hip extension in runners with PFPS. Design: This is a randomized controlled trial. Setting: Human performance laboratory. Participants: A total of 82 runners with PFPS participated in this study. Interventions: The participants were randomized into 3 groups: OMT, EP, and control group. The OMT group received joint manipulation and myofascial release in the lumbar spine, hip, sacroiliac joint, knee, and ankle regions. The EP group performed specific exercises for lower limbs. The control group received no intervention. Main Outcome Measures: The main evaluations were pain through the visual analog scale, functionality through the Lysholm Knee Scoring Scale, dynamic knee valgus through the step-down test, PPMF through static baropodometry, PTF through the sit and reach test, and range of motion through fleximetry. The evaluations were performed before the interventions, after the 6 interventions, and at 30-day follow-up. Results: There was a significant pain decrease in the OMT and EP groups when compared with the control group. OMT group showed increased functionality, decreased PPMF, and increased PTF. The range of motion for hip extension increased only in the EP group. Conclusion: Both OMT and EP are effective in treating runners with PFPS.

**NIH Risk of Bias Tool**

Quality Assessment of Controlled Intervention Studies

1. **Was the study described as randomized, a randomized trial, a randomized clinical trial, or an RCT**

Yes

1. **Was the method of randomization adequate (i.e., use of randomly generated assignment)?**

Yes

1. **Was the treatment allocation concealed (so that assignments could not be predicted)?**

Yes

1. **Were study participants and providers blinded to treatment group assignment?**

Yes

1. **Were the people assessing the outcomes blinded to the participants' group assignments?**

Yes

1. **Were the groups similar at baseline on important characteristics that could affect outcomes (e.g., demographics, risk factors, co-morbid conditions)?**

Yes

1. **Was the overall drop-out rate from the study at endpoint 20% or lower of the number allocated to treatment?**

Yes

1. **Was the differential drop-out rate (between treatment groups) at endpoint 15 percentage points or lower?**

Yes

1. **Was there high adherence to the intervention protocols for each treatment group?**

Yes

1. **Were other interventions avoided or similar in the groups (e.g., similar background treatments)?**

Yes

1. **Were outcomes assessed using valid and reliable measures, implemented consistently across all study participants?**

Yes

1. **Did the authors report that the sample size was sufficiently large to be able to detect a difference in the main outcome between groups with at least 80% power?**

Yes

1. **Were outcomes reported or subgroups analyzed prespecified (i.e., identified before analyses were conducted)?**

Cannot Determine, Not Reported, or Not Applicable

1. **Were all randomized participants analyzed in the group to which they were originally assigned, i.e., did they use an intention-to-treat analysis?**

Yes

**Key Finding #1**

There was a statistically significant decrease in patient reported pain outcomes in both the osteopathic manipulative treatment and exercise program groups, when compared with the control group. However, there was no statistically significant difference in the amount of pain decreased when comparing the two intervention groups, indicating they are equally effective in pain reduction.

**Key Finding #2**

The study demonstrated that there was an increase in functionality, evaluated through the LKSS questionnaire, in both the osteopathic manipulation treatment and exercise program groups. The effect size of this improvement indicates that both interventions experiences clinically revenant improvements in patients' functionality from baseline.

**Key Finding #3**

The data suggests that exercise program intervention produces a significant and relevant effect size improvement in hip extension range of motion when compared to the control group. This discovery was only in the exercise program group and not in the osteopathic manipulation treatment group. This indicates that if improvement in hip extension range of motion is an intended effect of treatment, the exercise program intervention may be more beneficial in accomplishment of this goal.

**Key Finding #4**

**Please provide your summary of the paper**

This paper is the first randomized control trial to compare the effects that osteopathic manipulative treatments and exercise programs have on runners with Patellofemoral Pain Syndrome.The osteopathic manipulation treatments included myofascial release and thrust manipulations. The exercise program group based their protocol on previous literature regarding PFPS. This included a variety of exercises targeting the lower extremities for strength and flexibility. The study evaluated the treatments’ effects on pain and functionality, plantar pressure in middle foot, posterior thigh flexibility and hip range of motion. Participants in the study were required to attend 6 sessions of a 40 minute treatment, twice a week for 3 weeks. An interval of 48 hours was required between each treatment session. The overall results of the study indicate that both treatment options were effective in reducing the patient’s pain and increasing functional mobility, when compared to the control group. This indicates that if the overall goal of physical therapy for a runner with PFPS is to reduce pain and increase function, then both treatment options are viable. However, there are additional benefits to be gained from the exercise program treatment. The exercise program group experienced greater improvements in plantar pressure in middle foot, dynamic knee valgus, and hip extension range of motion: factors that are believed to be linked to Patellofemoral Pain Syndrome. The paper recognizes the need to continue to investigate this topic with subsequent studies, specifically looking at the effects of combining osteopathic manipulative treatment and exercise programs.

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

This study supports the use of both osteopathic manipulative treatments and an exercise program targeting the lower extremities for strength and flexibility in the treatment of Patellofemoral Pain Syndrome in runners. This paper helps to grow the literature supporting that conservative treatment options are effective and clinically relevant in treating runners with PFPS. Since there is no significant difference in decreases in pain levels or increases in functionality between the two treatment groups, this gives physical therapists and their patients the ability to use either treatment techniques when treating PFPS. This is beneficial because it allows patients and therapists the autonomy to choose between two research backed treatment options.

There are areas for research growth in the topic. Future research is indicated to compare the effects of the individual treatments being administered independently versus being paired together in order to identify optimal treatment strategies for this patient population. Further research may identify if there is a difference in treatment outcomes between the combined versus independent treatments, influencing future treatment approaches.

Additionally, the population studied consists of runners. Future research should analyze each treatment's effects on the patient's ability to return to running at previous volume and intensity levels when comparing the overall treatment effectiveness, which is not a factor evaluated in this study. Research should also address the long term effects of each treatment. Considering the exercise program produced significant improvements in plantar pressure in middle foot, dynamic knee valgus, and hip extension range of motion, it may be beneficial to evaluate if patients continue to experience these benefits overtime.

Overall, this research demonstrates that an exercise program and osteopathic manipulative treatments are both plausible treatment options of PFPS in runners. This may influence clinical care by increasing the usage of these conservative methods and overall improving patients pain levels and functionality. This study helps to identify areas of exploration in research needed to progress the understanding and knowledge of physical therapy’s place in the treatment of Patellofemoral Pain Syndrome in runners.