**Article Full Title**

A comparison of two manual physical therapy approaches and electrotherapy modalities for patients with knee osteoarthritis: a randomized three-arm clinical trial.

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**Paper Abstract**

A broad spectrum of physical therapy exercise programs provides symptom relief and functional benefit for patients with knee OA. Manual physical therapy, including tailored exercise programs provide relatively higher level benefits that persists to one year. It is currently unknown if there are important differences in the effects of different manual physical therapy techniques for patients with knee OA and there are virtually no studies comparing manual physical therapy and electrotherapy modalities. The aim of the study was to compare long-term results between three treatment groups (mobilization with movements [MWMs], passive joint mobilization [PJM], and electrotherapy) to determine which treatment is most effective in patients with knee OA. A single-blind randomized clinical trial with parallel design was conducted in patients with knee OA. Seventy-two consecutive patients (mean age 56.11 ± 6.80 years) with bilateral knee OA were randomly assigned to one of three treatment groups: MWMs, PJM, and electrotherapy. All groups performed an exercise program and received 12 sessions. The primary outcome measures of the functional assessment were the Western Ontario and McMaster Universities Osteoarthritis index (WOMAC) and Aggregated Locomotor Function (ALF) test scores. The secondary outcome measures were pain level, measured using a pressure algometer and a visual analogue scale (VAS), range of motion (ROM), measured using a digital goniometer, and muscle strength, evaluated with a handheld dynamometer. Patients were assessed before treatment, after treatment and after 1 year of follow-up. Patients receiving the manual physical therapy interventions consisting of either MWM or PJM demonstrated a greater decrease in VAS scores at rest, during functional activities, and during the night compared to those in the electrotherapy group from baseline to after the treatment (p < 0.05). This improvement continued at the 1-year follow-up (p < 0.05). The MWMs and PJM groups also showed significantly improved WOMAC and ALF scores, knee ROM and quadriceps muscle strength compared to those in the electrotherapy group from baseline to 1-year follow-up (p < 0.05). In the treatment of patients with knee OA, manual physical therapy consisting of either MWM or PJM provided superior benefit over electrotherapy in terms of pain level, knee ROM, quadriceps muscle strength, and functional level.

**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

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

Yes

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

Yes

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

Yes

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

Yes

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

Yes

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

No

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

No

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

Yes

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

Yes

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

Yes

**12.**  **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

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

Yes

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

No

**Key Finding #1**

No significant differences were observed in the level of function, ROM, and muscle strength between the three groups from baseline to end of treatment

**Key Finding #2**

Manual therapy in the form of MWM or PJM intervention showed a greater increase in functional score, flexion and extension ROM, and quadriceps muscle strength compared to electrotherapy at the 1-year follow-up

**Key Finding #3**

MWM or PJM intervention demonstrated a greater decrease in pain at rest, during activity, and at night compared to electrotherapy from baseline to after treatment. This improvement continued after 1-year follow-up

**Please provide your summary of the paper**

Managing osteoarthritis (OA), a degenerative joint disorder characterized by increasing joint pain, stiffness, and limitation in ROM, has focused on controlling pain and reducing the disability. Studies have shown that manual therapy in combination with exercise has important benefits for patients with knee OA. However, few studies compare the benefit level with the use of different manual therapy techniques. With that, this paper aimed to investigate the effect of two manual therapy interventions, MWM and PJM, in comparison to electrotherapy in the long-term management of knee OA. Participants were blinded and randomized to the three groups using a web service. The interventions were performed by the same experienced physical therapist to reduce bias. In addition, a decent percentage of the participants were followed-up for one year. Even though the primary outcome measured the level of function, the second outcome measured pain, ROM, and muscle strength, all of which are highly important in the management of OA. Although the results showed support and improvement of manual therapy techniques over electrotherapy, further studies need to be conducted to validate the results. This study contains several limitations, including the inability to ensure that patients performed the home exercises correctly and adhered to them since this information was provided verbally, and the lack of intention-to-treat analysis that could have led to an overestimation of the results.

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

The results from this study suggest that the addition of manual treatment interventions, such as MWM or PJM, to standardized exercise programs, proves to be more beneficial than electrotherapeutic modalities in treating the dysfunction associated with knee OA. In addition, these results add another level of support for the benefit of manual therapy to the previously reported studies. This study provides further understanding of the use of techniques, such as sustained manual glides and knee flexion and extension, to reduce pain and improve the ROM in those patients. Currently, manual therapy has been incorporated into the therapy plan of knee OA patients. Further studies with larger study groups and an intention-to-treat analysis would be beneficial to validate these results.