

Effectiveness of Theragun and Ergonomic Advice on Pain and Function in Patients with Knee Osteoarthritis: A Randomized Controlled Trial

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Background: Knee osteoarthritis (OA) is a chronic degenerative joint disorder associated with pain, functional limitations, balance deficits, and reduced quality of life. Non-pharmacological interventions, including physiotherapy and patient education, remain the cornerstone of management. Percussive therapy devices such as Thera Gun have recently gained attention for their potential benefits in reducing pain and improving function.

Objective: To evaluate the effectiveness of Theragun combined with ergonomic advice on pain, functional ability, and balance in patients with knee osteoarthritis.

Methods: A randomized controlled trial was conducted on patients with knee OA, who were allocated into an experimental group receiving Theragun therapy with ergonomic advice and a control group receiving conventional physiotherapy. Interventions were provided over three weeks. Outcome measures included pain (Numeric Pain Rating Scale), functional status (WOMAC), and balance (Timed Up and Go test).

Results: The experimental group demonstrated significantly greater improvements in pain reduction, functional performance, and balance compared to the control group.

Conclusion: Incorporating Theragun therapy with ergonomic advice is an effective adjunct to conventional physiotherapy in improving pain, function, and balance in knee osteoarthritis patients.

INTRODUCTION-

Knee osteoarthritis is a chronic degenerative joint disease causing pain, limited mobility, and reduced quality of life. Non-pharmacological interventions such as patient education, exercise, and ergonomic modification are core treatment recommendations in clinical guidelines. Percussive therapy devices like Theragun may reduce muscle stiffness, improve circulation, and modulate pain, potentially benefiting knee osteoarthritis patients. It is one of the leading causes of disability among middle-aged and elderly individuals and significantly affects activities of

daily living such as walking, stair climbing, and sit-to-stand movements. Pain, reduced mobility, and balance deficits associated with knee osteoarthritis increase the risk of falls and negatively impact quality of life.^{1,2}

Knee osteoarthritis is a chronic, progressive degenerative joint disorder characterized by articular cartilage degradation, subchondral bone remodeling, osteophyte formation, and synovial inflammation. It is a major contributor to pain, functional disability, and reduced quality of life, particularly among middle-aged and elderly populations. The global burden of knee osteoarthritis continues to rise due to increasing life expectancy, obesity, sedentary lifestyles, and biomechanical stress on the knee joint. Pain, joint stiffness, muscle weakness, and impaired balance commonly associated with knee OA significantly limit functional activities such as walking, stair negotiation, and transfers, thereby increasing the risk of falls.¹

Non-pharmacological management remains the cornerstone of knee osteoarthritis treatment, with physiotherapy playing a central role in symptom management and functional restoration. Conventional physiotherapy interventions, including therapeutic exercises, electrotherapy modalities, and activity modification, aim to reduce pain, improve joint mobility, enhance muscle strength, and promote functional independence. Alongside these interventions, patient education and ergonomic advice are essential for long-term self-management and prevention of disease progression.³

Percussive therapy delivers rapid mechanical stimuli to soft tissues, which may reduce muscle stiffness, enhance local blood flow, stimulate mechanoreceptors, and modulate pain through neurophysiological mechanisms. These effects may contribute to improved functional performance and balance control in patients with knee osteoarthritis.⁴

Despite the increasing clinical use of percussive therapy, limited randomized controlled trials have examined its effectiveness when incorporated into structured osteoarthritis management programs.⁴

Vibration therapy utilizes the human body's response to vibrations through various mechanoreceptors and is therefore regarded as an effective modality for training and rehabilitation, offering potential health benefits when applied correctly.¹

Mechanism of Action of Theragun

Theragun is a percussive therapy device that delivers rapid, repetitive mechanical impulses to soft tissues at a high frequency and low amplitude. These percussions penetrate deep into the muscle and myofascial tissues, producing both neurophysiological and biomechanical effects that contribute to pain relief and functional improvement in patients with knee osteoarthritis.⁴

1. Pain Modulation (Neurophysiological Mechanism)

Percussive stimulation activates cutaneous and deep mechanoreceptors such as Pacinian corpuscles and muscle spindle afferents. This sensory input inhibits nociceptive transmission at the spinal cord level through the Gate Control Theory of Pain, thereby reducing pain perception. Additionally, rhythmic mechanical stimulation promotes the release of endogenous opioids such as endorphins, leading to central pain inhibition and analgesic effects.⁴

2. Reduction of Muscle Stiffness and Myofascial Restrictions

Theragun delivers high-frequency oscillatory forces that help break down myofascial adhesions and reduce abnormal muscle tone, resulting in decreased muscle stiffness and spasm, improved viscoelastic properties of soft tissues, and enhanced flexibility of periarticular muscles. Reduction in periarticular muscle tightness decreases abnormal joint loading and improves knee joint biomechanics in osteoarthritis.⁴

3. Improvement in Local Circulation

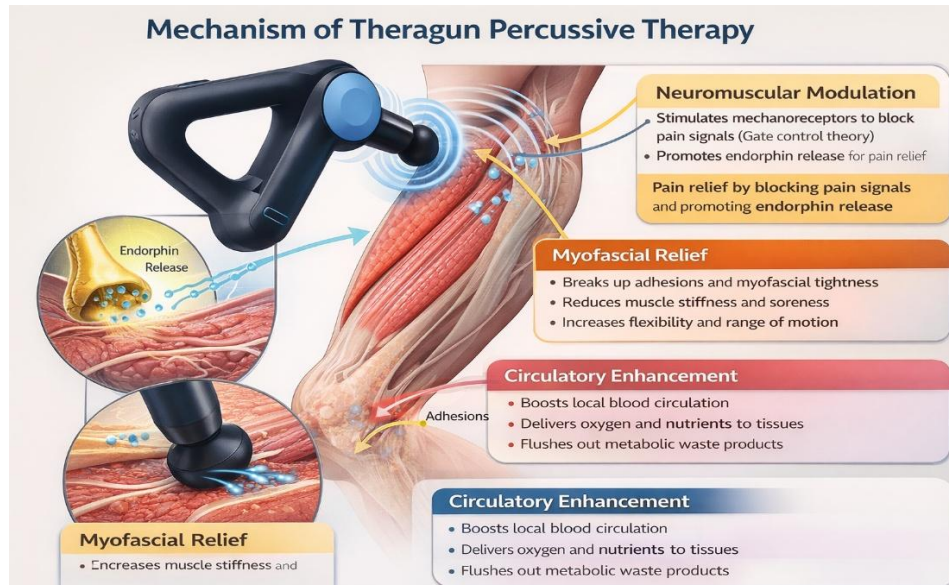
Percussive therapy increases local blood flow by inducing mechanical vibration and intermittent compression of soft tissues. Enhanced circulation improves oxygen and nutrient delivery while facilitating the removal of metabolic waste products and inflammatory mediators, contributing to pain reduction and tissue recovery.⁴

4. Enhancement of Neuromuscular Function

Rapid mechanical impulses stimulate muscle spindles and Golgi tendon organs, improving neuromuscular activation and proprioceptive feedback. This leads to improved muscle recruitment, better joint stabilization, and enhanced balance and functional mobility, thereby reducing fall risk in knee osteoarthritis patients.^{1,2}

5. Functional Improvement

By reducing pain, improving muscle flexibility, enhancing circulation, and optimizing neuromuscular control, Theragun facilitates improved performance in functional activities such as walking, sit-to-stand, and stair negotiation, leading to better outcomes on functional assessment tools such as WOMAC and Timed Up and Go (TUG).⁴



NEED OF THE STUDY- The Theragun is an electric massage device which may be classed as a medicinal or physical recovery tool. This research intends to present a theoretical review of the Theragun as an efficient tool in the Knee OA. Ergonomics is to ensure a good fit between the workers and their job, thereby maximizing worker comfort, safety and health, productivity and efficiency. Due to vibration, blood circulation is improved to have a thermal effect, so this study we are going to rule the effectiveness of effectiveness of theragun and ergonomic advice on pain and functions in patients with knee osteoarthritis

AIM-To find the effect of effectiveness of theragun and ergonomic advice on pain and functions in patients with knee osteoarthritis

OBJECTIVE-

Primary Objective

1.To evaluate the effectiveness of Theragun therapy combined with ergonomic advice on pain reduction and functional improvement in patients with knee osteoarthritis.

Secondary Objectives

- 1.To compare the effect of Theragun plus ergonomic advice versus ergonomic advice alone on pain intensity in patients with knee osteoarthritis.
- 2.To assess the improvement in knee joint function and activities of daily living following Theragun intervention.
- 3.To determine the effect of Theragun therapy on muscle stiffness and mobility around the knee joint.
- 4.To analyze patient compliance and short-term clinical outcomes of ergonomic advice in knee osteoarthritis management.

Research Question-

What is the effect of Theragun therapy on muscle stiffness and mobility around the knee joint in individuals with knee osteoarthritis?

HYPOTHESIS

Null Hypothesis (H₀): There will be no significant difference in pain reduction and functional improvement between patients with knee osteoarthritis receiving Theragun therapy combined with ergonomic advice and those receiving ergonomic advice alone.

Alternative Hypothesis (H₁): There will be significant reduction in pain and improvement in functional outcomes in patients with knee osteoarthritis receiving Theragun therapy combined with ergonomic advice compared to those receiving ergonomic advice alone.

METHOD:

Type of study - Randomized Control Trial

Sample design - Simple Random Sampling

Study population – Diagnosed case of OA of knee

Sample size - 30 Participants [group a – 15 , group b – 15]

Study setting – Physiotherapy OPD Study duration - 6 months Treatment duration - 3 weeks

Method of collection of data: Data will be collected by the primary investigator.

SELECTION CRITERIA-

Inclusion Criteria

1. Patients diagnosed with knee osteoarthritis (clinical and/or radiological).
2. Age between 40–70 years.
3. Both male and female participants.
4. Patients experiencing knee pain for more than 3 months.
5. Patients with mild to moderate knee osteoarthritis (e.g., Kellgren–Lawrence grade I–III).
6. Patients willing to participate and provide written informed consent.

Exclusion Criteria

1. Patients with severe knee osteoarthritis (Kellgren–Lawrence grade IV).
2. History of knee surgery, fracture, or ligament injury in the past 6 months.
3. Presence of inflammatory joint diseases (e.g., rheumatoid arthritis, gout).

4. Neurological disorders affecting lower limb function.
5. Patients receiving intra-articular injections or other physical therapy interventions in the last 3 months.
6. Open wounds, infections, or skin conditions around the knee.
7. Patients with pacemakers or contraindications to vibration/percussive therapy.
8. Pregnant women.

OUTCOME MEASUREMENT

Visual Analog Scale (VAS) / Numeric Pain Rating Scale (NPRS)

- Measures pain intensity
- Simple, reliable, and commonly used in knee OA studies

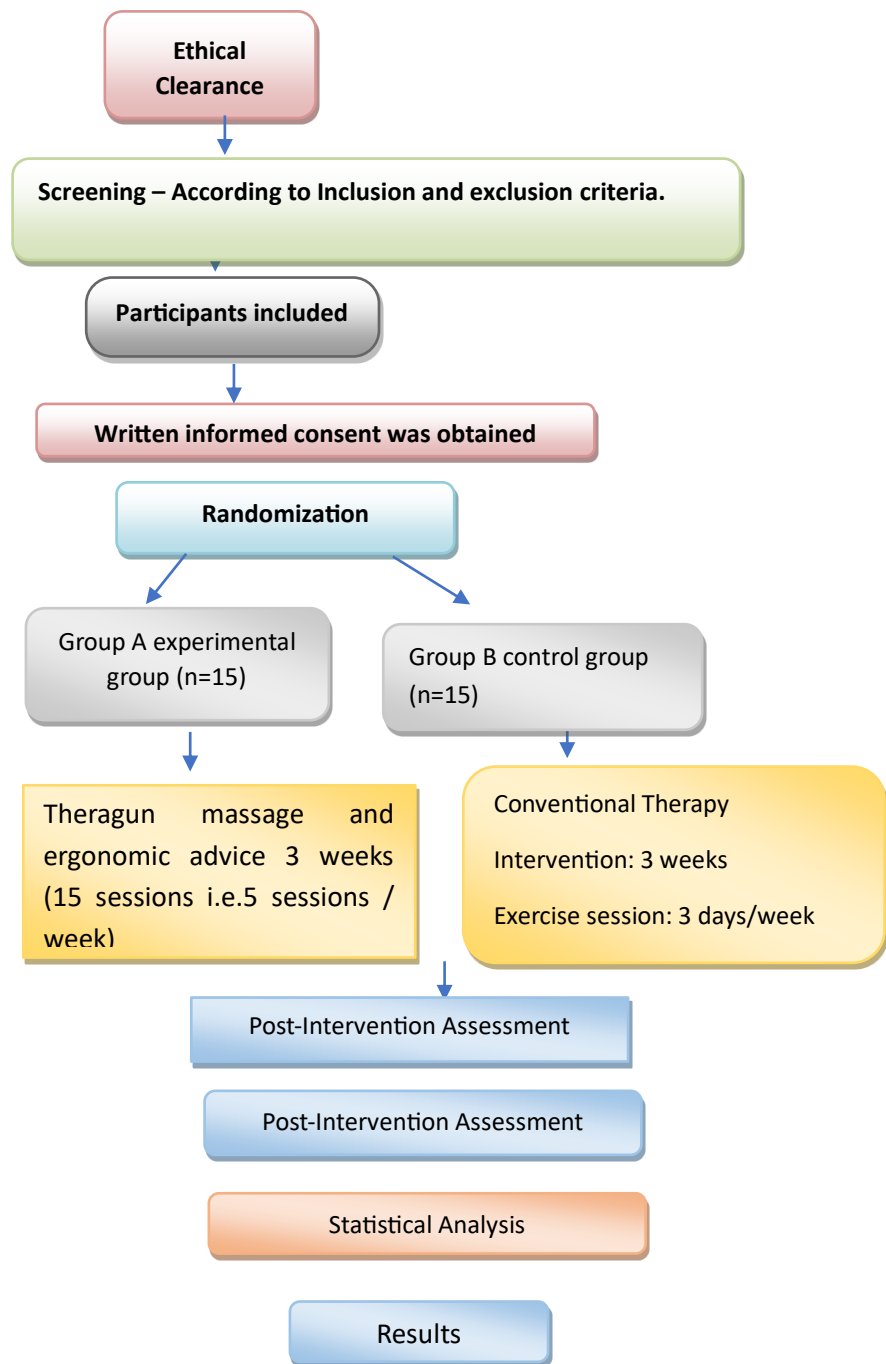
WOMAC Index (Western Ontario and McMaster Universities Osteoarthritis Index)

- Assesses pain, stiffness, and physical function
- Gold standard for knee osteoarthritis

Material to be used

1. Theragun device
2. VAS/NPRS
3. WOMAC scale
4. **Ergonomic Advice Leaflet**- Includes posture correction, activity modification, and joint protection techniques
5. **Data Collection Sheet / Case Record Form**
6. **Stationery**- Pen, paper, clipboard

PROCEDURE



A total of 30 patients with knee osteoarthritis who met the inclusion criteria were randomly divided into two groups: Group A (experimental group, n = 15) and Group B (control group, n = 15). Baseline assessment of pain, functional status, and knee range of motion was performed for all participants. Group A received Theragun massage along with ergonomic advice and conventional therapy for a duration of 3 weeks, with Theragun administered for 15 sessions (5 sessions per week) and exercise therapy given 3 days per week. Group B received only conventional therapy, including range of motion, strengthening, and stretching exercises, for 3 weeks with sessions conducted 3 days per week. At the end of the intervention period, all outcome measures were reassessed to evaluate the effectiveness of the interventions

Intervention

Group A (Experimental Group, n = 15)

Participants in Group A received Theragun massage along with ergonomic advice and conventional therapy for a period of 3 weeks. Theragun therapy was applied to the quadriceps, hamstrings, calf muscles, and peri-knee soft tissues for 10–15 minutes per session, 5 sessions per week, totaling 15 sessions. Ergonomic advice regarding proper posture, activity modification, joint protection techniques, and avoidance of knee-straining activities was provided and reinforced during each session. In addition, participants performed conventional exercises including knee range of motion, quadriceps and hamstring strengthening, and stretching exercises for 3 days per week throughout the intervention period.

Group B (Control Group, n = 15)

Participants in Group B received only conventional therapy for 3 weeks. The conventional therapy program included active and passive knee range of motion exercises, quadriceps and hamstring strengthening exercises, and stretching exercises. These exercise sessions were conducted 3 days per week under the supervision of a physiotherapist. No Theragun therapy or ergonomic advice was provided to this group

DATA ANALYSIS

The collected data were entered and analyzed using appropriate statistical software. Descriptive statistics were used to summarize demographic variables and baseline characteristics. Pre- and post-intervention scores of pain (VAS/NPRS), functional status (WOMAC), and knee range of motion were analyzed. Paired t-test was used to compare within-group pre- and post-intervention outcomes, while independent t-test was applied to compare post-intervention outcomes between Group A and Group B. The level of statistical significance was set at **p < 0.05**

RESULT AND DEMOGHRAOHIC

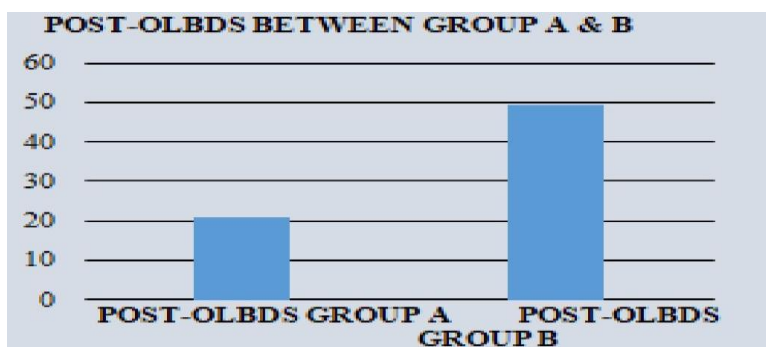
Table 1. Inter Group Comparison of Post-Treatment WOMAC

N=30	GroupA Mean±SD	Group B Mean±SD	T Value	P Value
WOMAC	48.00±16.549	49.40±16.079	2.246	0.41

Table 2: Inter Group Comparison of Pretreatment NPRS

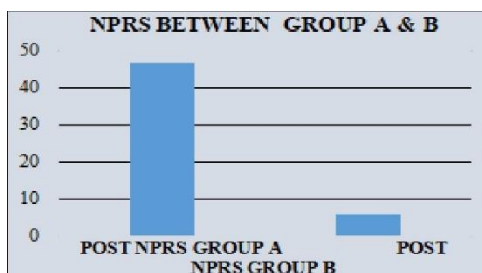
N=30	Group A Mean±SD	Group B Mean± SD	T Value	P Value
NPRS	47±.640	5.67±1.175	- 15.051	004

Graph 1 .Inter Group Comparison of Post-Treatment



Statistical significant improvement was seen in Group A when compared to Group B

Graph 2: Inter Group Comparison of Post-Treatment NPRS



Statistical significant improvement was seen in Group A when compared to Group B

The results found in this study disclosed that after a three week treatment programmed, Group A, who received Theragun machine and ergonomic advice; was seen statistically greater significant improvement as compared to Group B (p value < 0.05).

DICUSSION-

The aim of the study was to find out the effectiveness of Theragun to improve the Functional activity.

The result of the present study demonstrated that improvement in Functional activity with that decrease in pain intensity was also noted with NPRS and after the treatment NPRS score was decreased and improved in function. Also, there was a significant improvement in daily living activities of the participants of Group A than group B after the end of the training period.

This study is unique and gives the introduction of Theragun but very few researches are in evidence of Theragun According to study done by, Ragia M. Kamel 1 , Heba M. Moawed et, al they conducted a study on a subject for Effect of percussion massage gun on hamstring flexibility in patients with knee osteoarthritis. They also added that Theragun is more effective in reducing pain.

When comparing the results of the present study with existing Indian evidence, parallels emerge regarding the benefits of augmenting conventional physiotherapy with structured therapeutic components. For instance, Sarangapani and Kotteeswaran conducted a randomized controlled trial in individuals with knee osteoarthritis where participants received balance training in addition to conventional exercises versus conventional exercises alone. They reported that the group receiving balance training experienced significantly greater improvements in balance (TUG) and quality of life as measured by WOMAC scores compared with the exercise-only group after an 8-week intervention period

Similar to the results of that study, the current research demonstrated that combining Theragun percussive therapy with ergonomic advice produced superior outcomes in pain reduction and functional improvements relative to conventional physiotherapy alone. Both studies emphasize the value of adding targeted modalities – balance training in the Indian RCT and percussive therapy with ergonomic education in the present trial – to enhance clinical outcomes. While Sarangapani and Kotteeswaran focused on improving balance and overall quality of life, the current trial additionally highlights the potential of percussive therapy to modulate soft tissue and pain mechanisms, and ergonomic guidance to promote joint-protective behaviour during daily activities.

Thus, the Indian evidence on balance training strengthens the argument that multimodal, physiotherapy-based interventions yield better pain and functional outcomes than exercise alone in knee osteoarthritis, supporting the integration of adjunctive therapies like Theragun in comprehensive rehabilitation plans.

Conclusion

The present randomized controlled trial concludes that the combination of Theragun therapy with ergonomic advice is more effective than conventional physiotherapy alone in reducing pain and improving functional ability in patients with knee osteoarthritis. Significant improvements were observed in pain intensity, functional performance, and mobility, indicating that percussive therapy along with patient education enhances overall treatment outcomes. These findings

support the role of multimodal physiotherapy interventions in the conservative management of knee osteoarthritis.

Clinical Implications

The results of this study suggest that Theragun therapy can be safely and effectively incorporated as an adjunct to conventional physiotherapy for patients with knee osteoarthritis. The addition of ergonomic advice helps patients adopt joint-protective strategies during daily activities, potentially reducing symptom recurrence and functional limitations. This combined approach may improve patient compliance, enhance functional independence, and reduce the risk of falls. Clinicians can consider integrating percussive therapy and ergonomic education into routine rehabilitation programs to optimize pain relief and functional outcomes in knee osteoarthritis management.

Limitations

The present study has certain limitations that should be considered while interpreting the results. The sample size was relatively small, which may limit the generalizability of the findings to a broader population of patients with knee osteoarthritis. The duration of the intervention was short, and long-term follow-up was not conducted, making it difficult to determine the sustainability of treatment effects. Blinding of participants and therapists was not possible due to the nature of the intervention, which may have introduced performance bias. Additionally, the study relied primarily on subjective outcome measures such as pain and self-reported function, without incorporating objective biomechanical or imaging assessments.

Future Recommendations

Future studies should include larger sample sizes and multicenter designs to enhance external validity. Long-term follow-up is recommended to evaluate the persistence of pain relief and functional improvements. Further research comparing different intensities, frequencies, and treatment durations of Theragun therapy would help establish standardized clinical protocols. Inclusion of objective outcome measures such as gait analysis, muscle strength, and imaging findings may provide deeper insight into the mechanisms of improvement. Additionally, studies exploring cost-effectiveness and patient adherence would support wider clinical implementation of Theragun therapy combined with ergonomic advice in knee osteoarthritis rehabilitation.

References-

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