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Original Research Article

Clinical Evaluation of Analgesic and Anti-Inflammatory Effects of Body Massage Oil in Subjects with Musculoskeletal Disorders: A Randomized, Single-Blind, Placebo-Controlled Study

Gangothri Kumar[1], Tahira H. S.[2], Varsha V. M.[3]

[1]Research Consultant, Department of R & D, Greenspace, Karnataka, India
[2]Chief of R & D, Department of R & D, Greenspace, Karnataka, India
[3]Research Associate, Department of R & D, Greenspace, Karnataka, India

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Corresponding author: Dr. Gangothri Kumar
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Abstract

Background: Musculoskeletal disorders (MSDs) are among the leading causes of pain, disability, and reduced quality of life worldwide. Although rescue oral analgesics and non-steroidal anti-inflammatory drugs (NSAIDs) are widely prescribed for pain management, their prolonged use is associated with adverse effects on gastrointestinal, cardiovascular, and renal systems. Topical herbal formulations are the choice for delivering localized analgesic and anti-inflammatory effects. Body Massage Oil is formulated using Ayurvedic medicinal oils and botanicals traditionally indicated and also well researched for pain relief and inflammation.

Objective: To evaluate the efficacy, safety, and tolerability of Body Massage Oil in reducing musculoskeletal pain and improving functional outcomes compared with a placebo oil.

Methods: This was a prospective, randomized, single-blind, placebo-controlled clinical trial involving 60 participants with mild-to-moderate musculoskeletal pain. Participants were randomized equally to receive either placebo oil (n=30) or Body Massage Oil (n=30). Study medication was applied and well massaged twice daily over the affected area for 15 consecutive days. Clinical assessments were performed at baseline, Day 8, and Day 15. Primary outcome measures included changes in pain severity, pain intensity assessed using the Visual Analogue Scale (VAS), and functional improvement. Secondary outcomes included changes in PEG (Pain, Enjoyment of life, and General activity) score, sleep quality, local tolerability, pigmentation changes (if present), and adverse events. Within-group analyses were performed using paired statistical testing.

Results: Both placebo and investigational product groups demonstrated statistically significant improvements from baseline. In the placebo group, pain severity, pain intensity, and PEG scores showed significant reductions at the end of the study (paired $p<0.05$). The Body Massage Oil demonstrated greater numerical reductions across all assessed parameters, with highly significant within-group improvements in pain severity ($p=0.0000145$), pain intensity ($p=0.00015$), and PEG score ($p=0.000025$). No major safety concerns or treatment-related serious adverse events were reported in the available study data. The statistical dataset provided descriptive analyses and within-group comparisons; however, between-group statistical comparisons were not available.

Conclusion: Body Massage Oil demonstrated clinically meaningful improvements in musculoskeletal pain and functional status over the 15-day treatment period and was well tolerated. The findings support the potential utility of this Ayurvedic topical formulation as a complementary approach for the management of acute and chronic musculoskeletal pain.

Keywords: Body massage oil, Inflammation, Musculoskeletal disorders, Pain management, randomized placebo-controlled trial, Topical analgesic.

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Introduction

Musculoskeletal disorders (MSDs) represent one of the leading causes of chronic pain, physical disability, and reduced quality of life worldwide. Common musculoskeletal disorders include osteoarthritis, low back pain, neck pain, tendon injuries, muscle strain, ligament sprain, and soft tissue inflammation and sports injury. These conditions frequently impair mobility, reduce work productivity, limit activities of daily living, and adversely affect psychological well-being through

persistent pain and functional impairment. In developing nations, the elderly population is expanding quickly and by 2050, according to projections, 79% of people in the globe who are 60 or older will reside in developing countries. With rising age, there is a tendency towards decrease in body weight or skeletal muscle mass, which may cause a decline in muscle strength, thereby making the older adults susceptible to several MSDs related health issues.

The prevalence of MSDs among Indian adults' ranges between 7% to 77% as per the research evidence and as the Indian population ages, it is anticipated that the prevalence of MSDs, which is a major cause of physical disability in older adults, would noticeably increase. Work-related musculoskeletal disorders (WMSDs) are among the most common occupational illnesses and injuries. WMSDs involve damage to components of the musculoskeletal system including muscles, peripheral nerves, joints, bones, tendons, ligaments, and blood vessels caused by improper use or prolonged overexertion. Symptoms typically begin with fatigue, pain, and discomfort, eventually progressing into chronic musculoskeletal conditions that impair limb mobility and reduce muscle strength and function. [1]

Pain associated with musculoskeletal disorders is a complex physiological and psychological phenomenon resulting from tissue injury, inflammatory mediators, peripheral sensitization, and central pain processing mechanisms. Consequently, effective management of musculoskeletal pain requires interventions capable of simultaneously reducing inflammation, alleviating pain, and improving functional capacity while maintaining an acceptable safety profile. [2]

Conventional management of musculoskeletal pain includes oral analgesics such as paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, and corticosteroids, in addition to topical analgesics and physical rehabilitation. Although NSAIDs remain the cornerstone of pharmacological treatment because of their anti-inflammatory and analgesic actions, prolonged administration is associated with gastrointestinal irritation, peptic ulceration, renal impairment, cardiovascular complications, and other systemic adverse effects. These limitations have stimulated growing interest in safer therapeutic alternatives, particularly topical formulations that provide localized drug delivery with minimal systemic exposure.

Topical analgesics have gained increasing acceptance because they directly target painful tissues, achieve therapeutic concentrations at the site of inflammation, minimize systemic drug exposure, and reduce the likelihood of adverse reactions commonly associated with oral medications. Although designed for localized pain relief, they are also effective in managing a range of painful conditions. These include acute pain, such as strains, muscle aches, and sprains, sports injury, as well as chronic inflammatory pain, such as osteoarthritis-related pain, and neuropathic pain, including postherpetic neuralgia and pain from diabetic peripheral neuropathy. [3] Ayurveda has traditionally emphasized the external application of medicated oils (Taila Kalpana) for the management of pain, inflammation, stiffness, and disorders affecting muscles, joints, tendons, and ligaments. Classical Ayurvedic texts describe Abhyanga (therapeutic oil massage) as an important treatment modality for alleviating pain (Shoola), reducing swelling (Shotha), improving mobility, nourishing tissues, and restoring musculoskeletal function. Medicated oils prepared using herbal ingredients possessing Vedanasthapana (analgesic), Shothahara (anti-inflammatory), and Vatahara (Vata-pacifying) properties have been extensively employed for the management of musculoskeletal disorders. [4], [5]

Massage therapy itself has also demonstrated beneficial effects by improving local circulation, reducing muscle stiffness, enhancing lymphatic drainage, promoting tissue relaxation, and improving patient comfort. Combining topical herbal medicines with therapeutic massage therefore represents a rational strategy for managing musculoskeletal disorders through complementary pharmacological and mechanical mechanisms. Body Massage Oil is a proprietary topical massage oil developed by Greenspace using Ayurvedic principles and contains Tila (Sesamum indicum), Eranda (Ricinus communis), Nirgundi (Vitex negundo), Rasna (Alpinia galanga), Ushira (Vetiveria zizanioides), and Narikela (Cocos nucifera) in a sesame oil base, as described in the study protocol. Each ingredient has been selected based on traditional Ayurvedic indications and published pharmacological evidence supporting analgesic and anti-inflammatory activity. The formulation is intended to provide synergistic effects by targeting multiple inflammatory pathways involved in musculoskeletal pain.

The complementary mechanisms of these herbal ingredients suggest that Body Massage Oil may simultaneously modulate inflammatory mediators, reduce peripheral nociceptor activation, improve local microcirculation, decrease oxidative stress, and enhance tissue recovery. Such a multimodal mechanism is particularly relevant for musculoskeletal disorders, where pain arises from multiple overlapping inflammatory and mechanical pathways rather than a single pathological process. Although numerous experimental studies have reported the pharmacological activities of the individual herbal ingredients, high-quality

randomized controlled clinical trials evaluating standardized polyherbal topical formulations remain relatively limited. Furthermore, scientific validation of traditional Ayurvedic formulations through well-designed placebo-controlled studies is essential to facilitate evidence-based integration into contemporary pain management practices. The present randomized placebo-controlled clinical trial was therefore undertaken to evaluate the efficacy, safety, and tolerability of Body Massage Oil in subjects with mild-to-moderate musculoskeletal pain.

The primary objective of the study was to determine whether topical application of Body Massage Oil could significantly reduce pain severity and pain intensity while improving functional status compared with baseline over a 15-day treatment period. Secondary objectives included assessment of PEG score, improvement in sleep quality, local tolerability, and overall safety. It was hypothesized that the synergistic pharmacological actions of the herbal constituents would provide clinically meaningful analgesic and anti-inflammatory benefits while maintaining excellent tolerability, thereby supporting the use of Body Massage Oil as a safe complementary therapeutic option for the management of musculoskeletal disorders.

Materials and Methods

Study Design: Prospective, randomized, single-blind, placebo-controlled, parallel-group clinical trial to evaluate the efficacy, safety, and tolerability of Body Massage Oil in subjects with musculoskeletal disorders. The study comprised two treatment arms with an allocation ratio of 1:1 and was conducted over a treatment period of 15 days, with clinical assessments performed at baseline, Day 8, and Day 15.

Primary Objective: To evaluate the efficacy of Body Massage Oil in reducing the pain severity and functional improvements

To also assess the time taken for the onset of analgesic effect and duration of sustained pain relief.

Secondary Objective: To assess if Body Massage Oil is effective in improving sleep patterns, effective in reducing pigmentation if any and safety and tolerability.

Study Setting: The study was conducted at Apollo 247 Dr. Utsa Basu's Clinic in accordance with the approved study protocol. Eligible participants were recruited after screening and informed consent procedures. The study was designed to evaluate the effectiveness of topical application of the investigational product under routine clinical conditions while ensuring standardized assessments throughout the study period.

Ethical Considerations

The trial was approved by Clinimed Independent Ethics Committee (Protocol No. GS-RRBMO-2025-01). The trial was registered with the Clinical Trials Registry–India (CTRI) number: CTRI/2026/03/105726.

The clinical trial was conducted in accordance with the ethical principles of the Declaration of Helsinki and International Council for Harmonization (ICH) Good Clinical Practice (GCP) guidelines.

Written informed consent was obtained from all participants prior to enrollment. Confidentiality of participant information was maintained throughout the study. [6], [7]

Study Population: A total of 60 participants meeting eligibility criteria were enrolled and randomized equally into two study groups, with 30 participants allocated to the placebo group and 30 participants allocated to the investigational product group. Both male and female participants aged 15–85 years were eligible for enrollment.

Inclusion Criteria

- Male or female participants aged between 15 and 85 years.
- Musculoskeletal pain of idiopathic, systemic, or traumatic origin persisting for more than 24 hours.
- Mild-to-moderate pain corresponding to 5–74 mm on the Visual Analogue Scale (VAS).
- Willingness to provide written informed consent and comply with study procedures.

Exclusion Criteria

- Rheumatoid arthritis, gouty arthritis, or psoriatic arthritis.
- History of fracture involving the affected joint.
- Current treatment with corticosteroids, NSAIDs, or systemic analgesics.
- Severe disability interfering with routine daily activities.
- Known hypersensitivity to any ingredient of the investigational product.
- Open wounds or skin injury at the intended site of application.
- Any other medical condition considered unsuitable for participation by the investigator.

Sample Size Calculation: The sample size was determined to provide adequate statistical power for detecting a clinically meaningful difference in pain-related outcomes between the investigational product and placebo groups. Assuming a two-sided significance level (α) of 0.05, a statistical power ($1-\beta$) of 80%, and an anticipated moderate effect size (Cohen's d = 0.75) based on previous clinical

studies of topical analgesic interventions, the minimum required sample size was calculated using the following equation for comparison of two independent groups:

$n = 2(Z\alpha/2+Z\beta)^2\sigma^2/\Delta^2$

Where:

- n = sample size required per group
- $Z\alpha/2$ = 1.96 for a two-sided 95% confidence interval
- $Z\beta$ = 0.84 corresponding to 80% statistical power
- σ = estimated standard deviation
- Δ = expected mean difference between treatment groups

The calculation yielded a minimum requirement of approximately 26 participants per treatment group. To compensate for an anticipated dropout rate of approximately 10–15%, the sample size was increased to 30 participants in each group, resulting in a total study population of 60 participants.

Accordingly, 60 eligible participants were randomized equally into the placebo group (n = 30) and the investigational product group (n = 30). [8]

Randomization and Blinding: Eligible participants were randomized into one of two treatment groups in a 1:1 ratio. The study followed a single-blind design in which participants remained unaware of treatment allocation. One group received placebo oil, while the second group received the investigational formulation Body Massage Oil. Allocation was performed according to the computerized randomization method.

Investigational Product: The investigational product, Body Massage Oil, is a polyherbal body massage oil prepared using a sesame oil base and standardized herbal ingredients in the following composition: Tila (Sesamum indicum) (0.3mg), Eranda (Ricinus communis) (0.3mg), Nirgundi (Vitex negundo) (0.3mg), Rasna (Alpinia galanga) (0.3mg), Ushira (Vettiver zizanioides) (0.1mg), Narikela (Cocos nucifera) (0.3mg).

Intervention: Participants assigned to the placebo group applied placebo oil twice daily (morning and evening) over the affected region for 15 consecutive days. Participants allocated to the investigational group applied Body Massage Oil twice daily using the same schedule.

Participants were instructed to:

- Massage the oil gently until absorbed.
- Avoid washing the treated area for at least two hours following application.
- Refrain from using any additional oral or topical analgesic medication during the study period.

Compliance was monitored throughout the study using participant compliance records.

Primary Outcome Measures

The primary efficacy endpoints measures included:

- Change in pain intensity measured using the Visual Analogue Scale (VAS).
- Change in pain severity from baseline to Day 15.
- Improvement in functional ability assessed using the Brief Pain Inventory (BPI).
- Assessment of onset of analgesic effect.
- Duration of sustained pain relief following application of the investigational product.

Secondary Outcome Measures

- Change in PEG (Pain, Enjoyment of Life, and General Activity) score.
- Improvement in swelling, tenderness, and stiffness.
- Improvement in sleep quality.
- Evaluation of pigmentation changes, where applicable.
- Assessment of local tolerability, including redness, itching, and burning sensation.
- Monitoring of serious adverse events.

Safety Assessment: Participants were reviewed during the scheduled follow-up visit to identify any local or systemic adverse events. Particular attention was paid to redness, irritation, burning sensation, itching, allergic reactions, and any serious adverse event requiring medical intervention. Participants experiencing clinically significant adverse reactions were withdrawn from the study and managed appropriately according to the investigator's clinical judgment.

Statistical Analysis: Descriptive statistical analyses were performed for all efficacy variables. Continuous variables were summarized as mean ± standard deviation (SD), median, minimum and maximum values, 95% confidence intervals, and mean differences where applicable.

Within-group comparisons between baseline and end-of-study assessments were evaluated using paired statistical testing, with statistical significance determined using p-values ($p = <0.005$). The statistical report provided within-group analyses for pain severity, pain intensity, and PEG scores for both placebo and investigational product groups.

Results

Participant Disposition

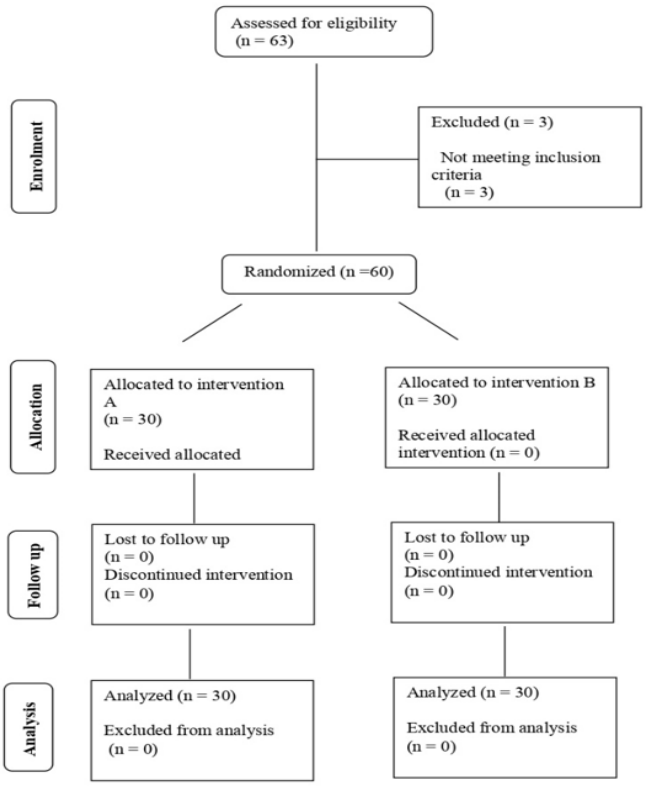

Fig. 1: CONSORT flow diagram of participants

Baseline Demographic Characteristics: A total of 60 participants were enrolled and randomized equally into the placebo group (n = 30) and the investigational product (IP) group (n = 30). Both groups comprised adult male and female participants with mild-to-moderate musculoskeletal disorders.

Participants in the placebo group ranged in age from 21 to 68 years, whereas participants in the investigational product group ranged from 20 to 60 years. Body weight ranged from approximately 60 to 75 kg in the placebo group and 52.4 to 77.0 kg in the investigational product group. Baseline BMI values indicated that most participants were within the normal to slightly overweight category in both treatment groups. The mean age of participants was 47.57 ± 12.28 years in the placebo group and 42.47 ± 11.10 years in the IP group.

Overall, the two treatment groups appeared comparable with respect to baseline demographic characteristics, suggesting successful randomization before initiation of the study intervention.

Pain Severity Score

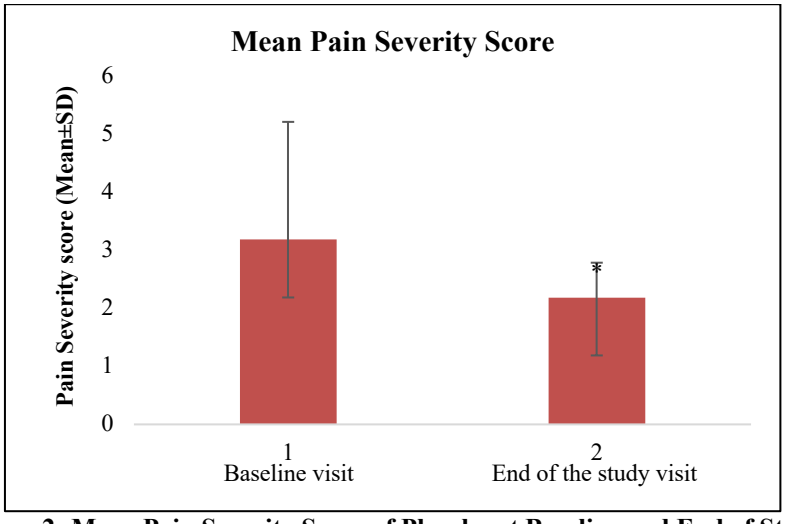

Figure 2: Mean Pain Severity Score of Placebo at Baseline and End of Study

Values are presented as Mean ± SD. Error bars indicate SD. Statistical significance was assessed using a paired t-test where p=0.0193* (p is <0.005)

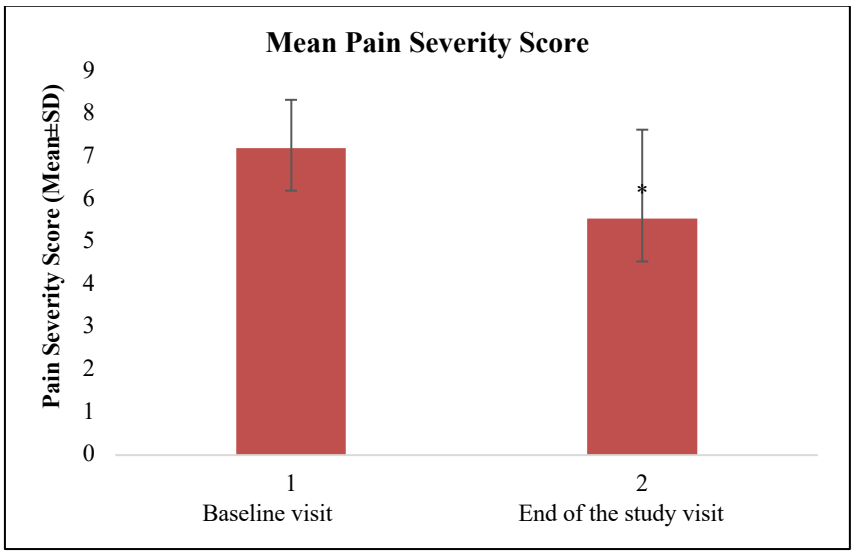

Figure 3: Mean Pain Severity Score of IP at Baseline and End of Study

Values are presented as Mean ± SD. Error bars indicate SD. Statistical significance was assessed using a paired t-test where p=0.0000145* (p is <0.005).

The mean pain severity score in the placebo group decreased from 3.19 ± 2.03 at baseline to 2.19 ± 0.60 at the end of the study, corresponding to a mean reduction of 1.00 units. The reduction was statistically significant (p = 0.0193), indicating improvement following placebo treatment over the 15-day study period. Participants receiving Body Massage Oil demonstrated a significant reduction in mean pain severity score from 7.20 ± 1.13 at baseline to 5.54 ± 2.09 at the end of treatment, representing a mean reduction of 1.66 units. The improvement was highly statistically significant (p = 0.0000145). The IP showed a 66% greater absolute reduction in pain severity compared with placebo.

Pain Intensity Score

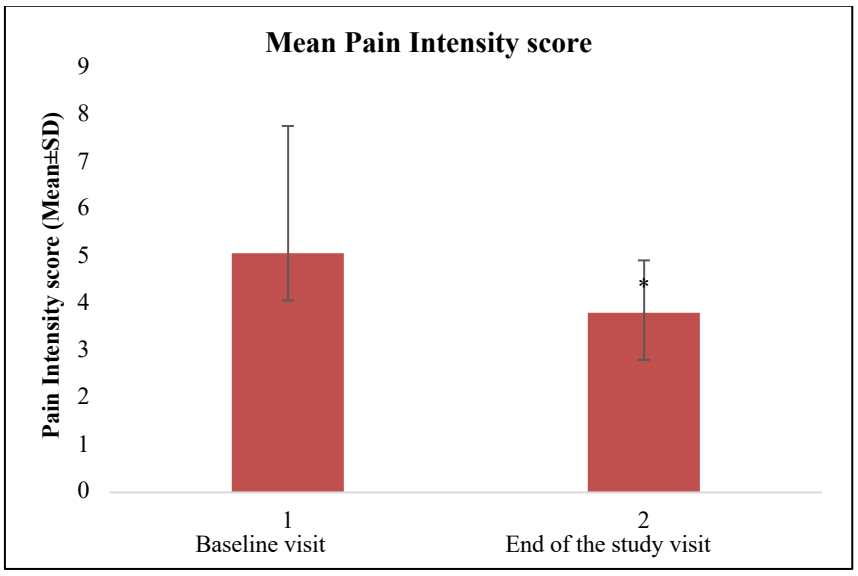

Figure 4: Mean Pain Intensity Score of Placebo at Baseline and End of Study

Values are presented as Mean ± SD. Error bars indicate SD. Statistical significance was assessed using a paired t-test where p=0.0396* (p is <0.005)

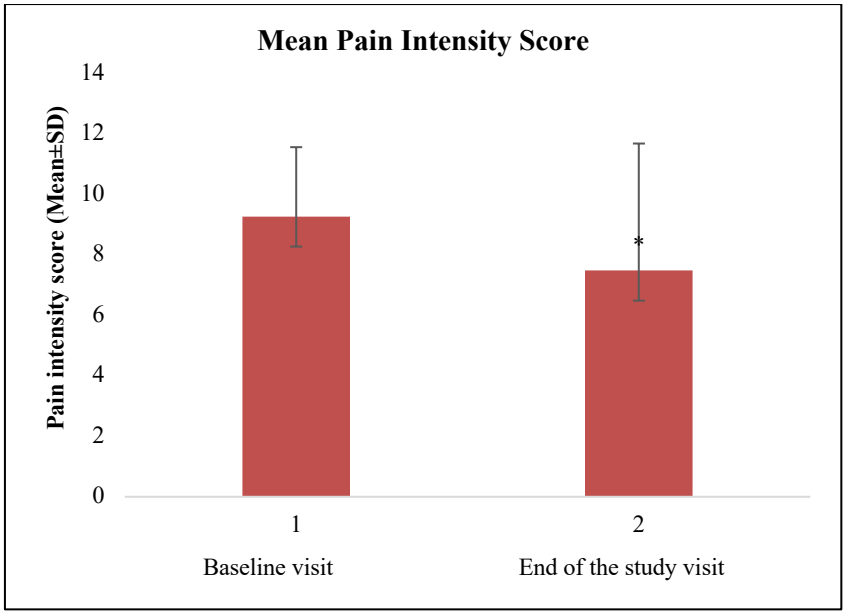

Figure 5: Mean Pain Intensity Score of IP at Baseline and End of Study

Values are presented as Mean ± SD. Error bars indicate SD. Statistical significance was assessed using a paired t-test where p=0.00015* (p is <0.005)

The placebo group demonstrated a reduction in mean pain intensity score from 5.07 ± 2.70 at baseline to 3.81 ± 1.11 at the end of treatment.

The mean reduction was 1.26 units, which reached statistical significance (p = 0.0396). In the Body Massage Oil group, mean pain intensity decreased from 9.28 ± 2.29 at baseline to 7.49 ± 4.20 at study completion, corresponding to a mean reduction of 1.80 units.

The improvement was highly statistically significant (p = 0.00015).IP showed a 42.06% greater absolute reduction in pain intensity compared with placebo.

PEG Score

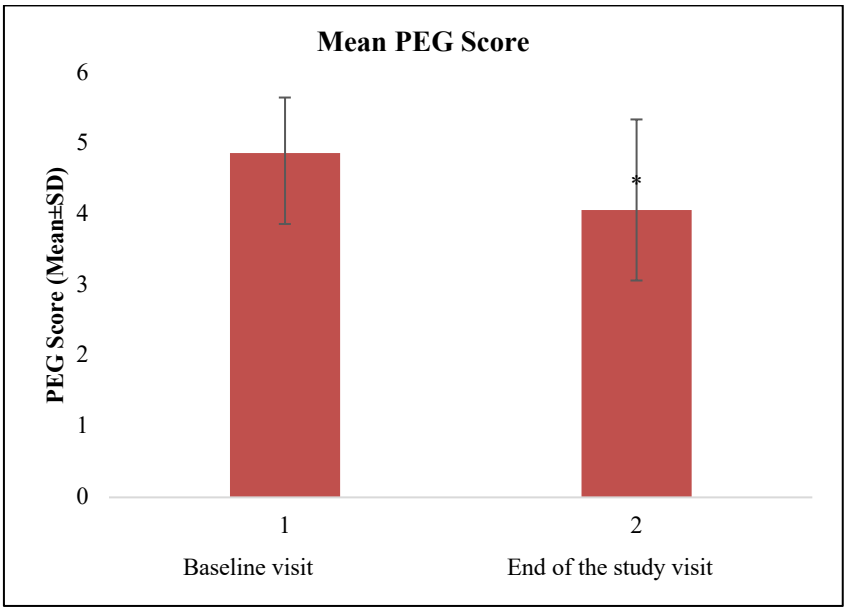

Figure 6: Mean PEG Score of Placebo at Baseline and End of Study

Values are presented as Mean ± SD. Error bars indicate SD. Statistical significance was assessed using a paired t-test where p=0.0194* (p is <0.005)

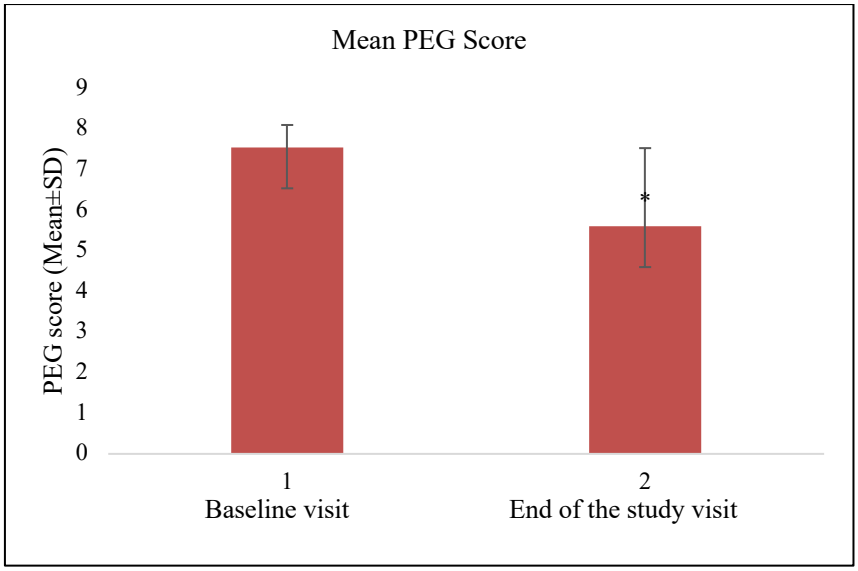

Figure 7: Mean PEG Score of IP at Baseline and End of Study

Values are presented as Mean ± SD. Error bars indicate SD. Statistical significance was assessed using a paired t-test where p=0.000025* (p is <0.005)

The mean PEG score decreased from 4.87 ± 0.79 at baseline to 4.07 ± 1.28 at the end of treatment. The observed mean reduction of 0.80 units was statistically significant (p = 0.0194), suggesting improvement in pain-related interference with daily activities.

Participants treated with Body Massage Oil exhibited a decrease in PEG score from 7.54 ± 0.56 at baseline to 5.60 ± 1.93 following treatment. The mean reduction of 1.93 units was highly statistically significant (p = 0.000025).

IP demonstrated a 56.60% greater relative percentage reduction compared with placebo.

Across all evaluated efficacy endpoints, statistically significant improvements from baseline were observed in both placebo and investigational product groups. Body Massage Oil consistently demonstrated larger numerical reductions in pain severity, pain intensity, and PEG scores together with highly significant within-group p-values.

Discussion: Topical analgesics have gained increasing acceptance because they directly target painful tissues, achieve therapeutic concentrations at the site of inflammation, minimize systemic drug exposure, and reduce the likelihood of adverse reactions commonly associated with oral medications. Massage therapy itself has also demonstrated beneficial effects by improving local circulation, reducing muscle stiffness, enhancing lymphatic drainage, promoting tissue relaxation, and improving patient comfort. Combining topical herbal medicines with therapeutic massage therefore represents a rational strategy for managing musculoskeletal disorders through complementary pharmacological and mechanical mechanisms.

Mechanism of Action of Body Massage Oil: Body Massage Oil penetrates into the skin, works on the soft tissues (the muscles, tendons, and ligaments) to improve muscle tone. The active ingredients from oils reach beneath the deep layers of the skin, possibly stimulate the affected organs. Stimulates blood circulation and assist the lymphatic system thereby improving the elimination of waste throughout the body. Topical massage oils deliver effective drug levels to the affected area while minimizing the amount of drug entering the bloodstream and causing related adverse events. Topically applied oils are usually used for the treatment of musculoskeletal pain, mainly after injuries, soft tissue pain, and rheumatic diseases. Similar to systemic administration, topical applications inhibit the cyclooxygenase 2–dependent synthesis of proinflammatory and proalgesic prostaglandins. This prevents the activation of prostaglandin receptors and the subsequent sensitization of ion channels in peripheral nerves. [9]

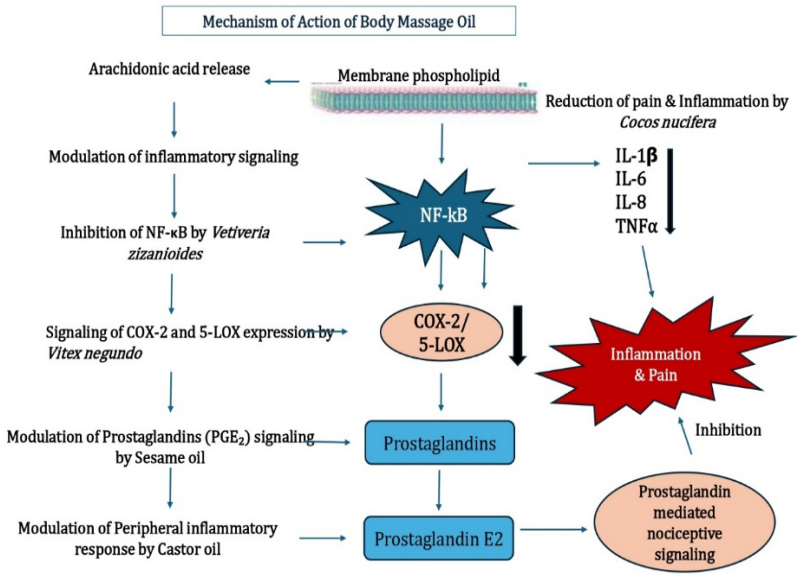

Figure 8: Mechanism of Action of Body Massage Oil in pain

The significant reduction in pain severity observed following treatment with Body Massage Oil may be attributed to the combined anti-inflammatory and analgesic activities of its constituent herbs. Sesame oil (Sesamum indicum) serves as an effective lipid vehicle that enhances dermal penetration while contributing antioxidant and anti-inflammatory properties. Castor oil (Ricinus communis) contains ricinoleic acid, which has demonstrated analgesic and anti-inflammatory effects in experimental models. Likewise, Vitex negundo, Alpinia galanga, Vetiveria zizanioides, and Cocos nucifera possess pharmacologically active phytochemicals capable of modulating inflammatory mediators, oxidative stress, and nociceptive signaling, providing a plausible biological basis for the observed clinical improvements.

As per Ayurveda, Tila taila (Sesame oil) is known to be the best among all oils and acts as base for preparation of various medicated oils. Sesame oil serves not only as the vehicle but also contributes therapeutic activity owing to its rich content of unsaturated fatty acids, lignans, sesamin, sesamolin, sesamol, and tocopherols. Experimental studies have demonstrated that these phytochemicals possess antioxidant, anti-inflammatory, and analgesic properties by modulating prostaglandin synthesis and oxidative stress. The lipid-rich nature of sesame oil also enhances dermal penetration of herbal constituents, facilitating localized therapeutic action. [10]

Eranda (Castor) is widely used in Ayurveda formulations for all kinds of pain, especially sciatica and rheumatoid arthritis both internally and externally. R. communis contains alkaloid ricinine which is responsible for central analgesic activity as per different studies. Ricinoleic acid (RA), a main component of castor oil, exerts remarkable analgesic and anti-inflammatory effects on several models of acute and sub-chronic inflammation. It was compared with capsaicin and was observed that RA produced a similar, non-pungent, anti-inflammatory effect when applied topically. [11]

Nirgundi (Vitex negundo) is traditionally used for inflammation, pain, anxiety and other ailments. The standardized extract of 100 mg/kg caused a comparable reduction in edema with that of diclofenac sodium (25 mg/kg) when evaluated for anti-inflammatory activity by carrageenan-induced rat paw edema method. V. negundo seeds possessed potential therapeutic effect on adjuvant induced arthritis in rats by decreasing the levels of TNF-α, IL-1β and IL-6 and increasing that of IL-10 in serum as well as downregulating the levels of COX-2 and 5-LOX and therefore may be an effective cure for the treatment of human rheumatoid arthritis. [12], [13]

The 80% aqueous acetone extract of the rhizomes of Rasna (Alpinia galanga) was found to inhibit release of beta-hexosaminidase, as a marker of antigen-IgE-mediated degranulation in RBL-2H3 cells. Phitak, T. et al (2009) reported the effects of p-hydroxy cinnamaldehyde from Alpinia galanga acetone extracts on human chondrocytes which can aid in the treatment of osteoarthritis. [14] Preclinical studies indicate that extracts and phytochemical fractions derived from V. zizanioides exhibit significant anti-inflammatory properties. Both essential oils and solvent-based extracts, such as ethanolic and aqueous formulations, have demonstrated the ability to downregulate inflammation in cell culture assays and animal models. These extracts effectively decrease the expression of key inflammatory cytokines and mediators, including tumor necrosis

factor alpha (TNFα), interleukin-1 (IL-1), interleukin-6 (IL-6), cyclooxygenase-2 (COX-2), and nitric oxide (NO), while also inhibiting nuclear factor kappa B (NF-κB), a critical regulator of inflammatory pathways. [15]

Narikela (Cocos nucifera) is classically mentioned as a drug for shoola (pain). An ethanol extract of the husk fiber (40, 60, or 80 mg/kg) showed significant analgesic properties, as indicated by a reduction in the number of writhes and stretches induced in mice by 1.2% acetic acid. The results were similar to those in animals that received aspirin (68 mg/kg), paracetamol (68 mg/kg), or morphine sulfate (1.15 mg/kg). In experimental studies, coconut-derived preparations have demonstrated significant reductions in nociceptive responses and inflammatory changes, further supporting their inclusion in topical formulations intended for pain management. [16]

Functional recovery is an equally important therapeutic objective in musculoskeletal disorders. The significant improvement in PEG scores observed in the present study suggests that pain reduction was accompanied by improved daily functioning and participation in routine activities.

Similar improvements have been reported with topical analgesic therapies, where reduction in pain frequently translates into enhanced functional performance and patient-reported quality of life.

An additional factor that may have contributed to the observed clinical benefit is therapeutic Abhyanga (Oil Massage). Massage can improve local blood flow, reduce muscle stiffness, facilitate lymphatic drainage, and promote relaxation of soft tissues. When combined with a polyherbal formulation possessing anti-inflammatory and analgesic properties, these mechanical effects may act synergistically to improve clinical outcomes.

Conclusion

Topical application of the Body Massage Oil in various mild to moderate musculoskeletal inflammation for 15 days resulted in significant improvements. Decrease in pain severity, pain intensity, and pain-related functional impairment, were reflected by reductions in PEG scores. The formulation was well tolerated throughout the study period, with no major treatment-related safety concerns reported.

Body Massage Oil is safe and effective with massage allowing the essence of oils to be absorbed in the skin layer to provide effective complementary therapy for the management of musculoskeletal pain.

Although both placebo and investigational product groups demonstrated significant improvements from baseline, Body Massage Oil consistently exhibited greater numerical reductions in all efficacy parameters. Nevertheless, the observed improvements, together with the favorable safety profile, support the therapeutic potential of Body Massage Oil as a complementary topical intervention for musculoskeletal pain management.

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References

1. Tiwari, J., Halder, P., Sharma, D., Saini, U. C., Rajagopal, V., & Kiran, T. (2024). Prevalence and association of musculoskeletal disorders with various risk factors among older Indian adults: Insights from a nationally representati ve survey. PloS one, 19(10), e0299415. https://doi.org/10.1371/journal.pone.0299415
2. Cohen, S. P., Vase, L., & Hooten, W. M. (2021). Chronic pain: an update on burden, best practices, and new advances. Lancet (London, England), 397(10289), 2082–2097. https://doi.org/10.1016/S0140-6736(21)00393-7
3. Adamiak-Giera, U., Rzeczycki, P., Sawczuk, M., Pęciak, O., & Białecka, M. (2026). Topical Pain Management: An Updated Review of Current Evidence and Emerging Strategies. Journal of Clinical Medicine, 15(13), 5311. https://doi.org/10.3390/jcm15135311
4. Agnivesha. Charaka Samhita, Chikitsa Sthana, Vatavyadhi Chikitsa, Adhyaya 28. In: Acharya YT, editor. Varanasi: Chaukhambha Surbharati Prakashan; 2017. p. 617-627
5. Garg, Rajendra & Mangal, Gopesh & Sharma, Dinesh. (2020). AYURVEDA ABHYANGA (MASSAGE) PROCEDURE - A REVIEW. World Journal of Pharmaceutical Research. 2020. 10.20959/wjpr202013-18963.
6. World Medical Association. (2025). World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Participants. October 19, 2024, at the 75th WMA General Assembly in Helsinki, Finland
7. International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use. (2025). ICH harmonised guideline: Guideline for good clinical practice E6(R3).
8. Chow, S. C., Shao, J., Wang, H., & Lokhny gina, Y. (2017). Sample size calculations in clinical research, third edition (pp. 1–511). https://doi.org/10.1201/9781315183084
9. Sisignano, Marco & Rice, Andrew & Geisslinger, Gerd. (2025). Topical Analgesics:

Pharmacology and Clinical Applications. Anesthesiology. 143. 10.1097/ALN.0000000000005579.

10. Bigdeli Shamloo, M. B., Nasiri, M., Dabirian, A., Bakhtiyari, A., Mojab, F., & Alavi Majd, H. (2015). The Effects of Topical Sesame (Sesamum indicum) Oil on Pain Severity and Amount of Received Non-Steroid Anti-Inflammatory Drugs in Patients with Upper or Lower Extremities Trauma. Anesthesiology and pain medicine, 5(3), e25085. https://doi.org/10.5812/aapm.25085v2
11. Vieira, C., Evangelista, S., Cirillo, R., Lippi, A., Maggi, C. A., & Manzini, S. (2000). Effect of ricinoleic acid in acute and subchronic experimental models of inflammation. Mediators of inflammation, 9(5), 223–228. https://doi.org/10.1080/09629350020025737
12. Yosri, M., Mekky, A.E., Elaasser, M.M. et al. In vitro anti-inflammatory potential and in vivo anti-arthritis activities of Ximenia caffra extract on antigen-induced arthritis in rats. Sci Rep 16, 797 (2026). https://doi.org/10.1038/s41598-025-32300-7
13. Kulkarni, R. R., Virkar, A. D., & D'mello, P. (2008). Antioxidant and Antiinflammatory Activity of Vitex negundo. Indian journal of pharmaceutical sciences, 70(6), 838–840. https://doi.org/10.4103/0250-474X.49140
14. Phitak, T., Choocheep, K., Pothacharoen, P., Pompimon, W., Premanode, B., & Kongtawelert, P. (2009). The effects of p-hydroxycinnamaldehyde from Alpinia galanga extracts on human chondrocytes. Phytochemistry, 70(2), 237–243.https://doi.org/10.1016/j.phytochem.2008.11.010
15. Gunasekar, C. J., Majdalawieh, A. F., Abu-Yousef, I. A., & Al Refaai, S. A. (2025). Pharmacological and Therapeutic Potential of Chrysopogon zizanioides (Vetiver): A Comprehensive Review of Its Medicinal Applications and Future Prospects. Biomolecules, 15(9), 1312. https://doi.org/10.3390/biom15091312
16. Lima, E. B., Sousa, C. N., Meneses, L. N., Ximenes, N. C., Santos Júnior, M. A., Vasconcelos, G. S., Lima, N. B., Patrocínio, M. C., Macedo, D., & Vasconcelos, S. M. (2015). Cocos nucifera (L.) (Arecaceae): A phytochemical and pharmacological review. Brazilian journal of medical and biological research = Revista brasileira de pesquisas medicas e biologicas, 48(11), 953–964. https://doi.org/10.1590/1414-431X20154773.