

## Original Article

# Effect of Aromatherapy Massage with Chamomile and Lemongrass Oil on Symptoms and Functional Limitations in Patients with Osteoarthritis of the Knee – A Single-Group Experimental Study

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## ABSTRACT

**Background:** Osteoarthritis of the knee (OAK) is one of the most common musculoskeletal conditions, causing joint degeneration and, as a result, difficulty with daily activities. The objective of this study was to assess the impact of aromatherapy massage using lemongrass and chamomile essential oils on the symptoms and functional limitations of patients with OAK. **Materials and Methods:** In this pre-test and post-test experimental study, 50 patients with OAK underwent aromatherapy (lemongrass and chamomile) massage for 20 minutes per day over 10 days. Pre-test and post-test assessments were performed using a visual analogue scale (VAS) for pain and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Statistical analysis was performed using SPSS, version 16. **Results:** Twenty minutes of aromatherapy (lemongrass and chamomile) massage showed a significant reduction in weight, body mass index, VAS score for pain, and WOMAC scale score in the post-test assessments compared to pre-test assessments in the study group ( $p < 0.001$  for all parameters). **Conclusion:** Aromatherapy massage with lemongrass and chamomile may reduce weight, BMI, pain, and functional limitations in patients with osteoarthritis of the knee. However, due to the lack of a control group, further randomised controlled trials are needed to confirm these findings.

**Key words:** Aromatherapy, Chamomile, Lemongrass, Massage, Osteoarthritis

Osteoarthritis of the knee (OAK) is a chronic, degenerative disorder that causes joint cartilage to deteriorate and osteophytes (bone spurs) to grow at the joint's margin. This causes discomfort, stiffness, oedema, and reduced mobility of the knee joints [1]. Approximately 250 million people worldwide suffer from this degenerative and progressive joint disease [2]. The most typical sign of OAK is pain surrounding the joint. Pain can be acute, mild, continuous, or sporadic (on and off). Pain ranges from moderate to excruciating. In advanced cases of the disease, plain radiographs may reveal osteophytes, a narrowing of the joint space, and changes in the subchondral bone. OAK patients are more likely than healthy individuals to have joint pain, anxiety, depression, and sleeplessness [3]. Conventional treatments for OAK, such as nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroids, and surgery, often provide only symptomatic relief and are associated with adverse effects and high costs [4]. Long-term NSAID use may lead to gastrointestinal and cardiovascular complications, while repeated corticosteroid injections can worsen cartilage

degeneration [5]. Due to these limitations, complementary therapies such as aromatherapy massage are gaining attention as safer and more holistic treatment options [6]. Therefore, there is a growing need to develop interventions that not only improve patients' quality of life but also help reduce healthcare costs.

Aroma massage is a type of massage therapy that uses aroma oils, also known as essential oils, to enhance the therapeutic benefits of massage. These aroma oils are highly concentrated extracts from various parts of plants, such as flowers, leaves, bark, and roots [7]. Studies have demonstrated that aromatherapy reduces aches, fatigue, anxiety, and sleep difficulties [8]. Chamomile is one of the most ancient medicinal herbs known to mankind. The main essential oils used were chamomile and lemongrass along with carrier oil i.e. coconut oil. A previous study suggested that topical application of chamomile oil was found to increase the analgesic activity in patients with OAK and improve their physical function [9]. *Cymbopogon citratus*, Stapf (lemon grass) contains reported phytoconstituents such as flavonoids and phenolic compounds, which consist of luteolin,

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isorientin 2'-O-rhamnoside, quercetin, kaempferol, and apigenin. The plant also possesses various pharmacological activities such as anti-inflammatory, antibacterial, antidiarrheal, antifilarial, antifungal, and anti-amoebic properties [10]. There are few studies documented on aromatherapy for pain management in osteoarthritis of the knees [11,12,13]. Although research offers this sort of information, no particular study has been conducted on the use of chamomile and lemongrass oils in partial massage for the treatment of OAK. The objective of this study was to find the impact of aroma massage (lemongrass and chamomile) on symptoms and functional limitations of patients with OAK.

## MATERIALS AND METHODS

### Study design

The study employed a single-group pre-test and post-test study design. A total of 50 recruited participants underwent aroma massage (lemongrass and chamomile) for 20 minutes a day, daily for 10 days. Assessments were taken before and after 10 days of intervention.

### Participants

A total of 50 participants (32 females, 12 males) aged 50.10±55.4 years with OAK were recruited from the Government Yoga and Naturopathy Medical College and Hospital.

### Inclusion Criteria

- Both male and female participants.
- Aged between 40 and 60 years.
- Diagnosed with osteoarthritis of the knee (OAK) based on clinical and radiological examination.

### Exclusion Criteria

- Individuals with severe functional limitations (e.g., inability to walk independently).
- Presence of open wounds, varicose veins, or other significant dermatological conditions on the knees.
- Known allergies to essential oils or aroma therapy products.
- Individuals unwilling to commit to the 10-day intervention program.
- Participants who have been undergoing aromatherapy treatments for the past month.
- Individuals with morbid obesity, defined as a body mass index (BMI) greater than 40 kg/m<sup>2</sup>.

### Study Settings and Ethical Considerations

The study protocol was approved by the Institutional Ethical Committee, and written informed consent was obtained from each subject.

### Intervention

**Aromatherapy massage:** All the participants underwent aroma oil [Chamomile oil (3 drops) and Lemongrass oil (3 drops) mixed with a carrier oil, i.e., coconut oil (15 ml)] massage for 20 minutes (10 minutes for each knee), daily for 10 days.

### Outcome measures

**Anthropometry:** Height was measured using a stadiometer, weight was measured using a standard weighing scale, and body mass index was calculated using a formula (weight in kg divided by height in meter square).

**Visual analogue scale (VAS) for pain:** It was used to evaluate the patient's overall pain intensity of the knee joints on a scale of 0–10, where 0 indicates no pain and 10 indicates worst pain. Participants were asked to mark a point on the scale to indicate their pain intensity [14].

**Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC):** It is a validated questionnaire for assessing the symptoms and functional limitations of osteoarthritis patients, particularly in the hip or knee joints. It has three subscales: pain (5 items), stiffness (2 items), and physical function (17 items), with a total of 24 items. Each item was evaluated using a Likert scale, with higher scores indicating more severe symptoms or functional restrictions. The WOMAC is widely used in both clinical practice and research to assess the efficacy of OAK treatments and therapies [15].

### Data analysis

Data were checked for normality using the Shapiro-Wilk test. Based on the distribution of the data, paired samples t-test and Wilcoxon signed rank test were used for analysis by Statistical Package for the Social Sciences, version 16.

## RESULTS

Of the 80 subjects assessed for eligibility, 30 did not meet the inclusion criteria and were excluded from the study. A total of 50 subjects were recruited and underwent aroma massage. The demographic variables of the study subjects are provided in Table 1.

Significant improvements were observed in weight, BMI, VAS scores for pain, and WOMAC scores following the intervention ( $p < 0.001$  for all parameters). Plays a major role in OAK the participants reported any adverse effects during the study period. Detailed values for these parameters are shown in Table 2.

**Table 1: Demographic details of the study group**

Parameters	Mean ± Standard Deviation
Age (years)	50.10 ± 5.54
Height (cm)	156.06 ± 6.33
Weight (kg)	71.93 ± 8.47
Body mass index (kg/m <sup>2</sup> )	29.93 ± 3.55
Parameters	Frequency
Gender	Female 76% (n = 28)
	Male 24% (n = 12)

**Note:** All values are presented as mean  $\pm$  standard deviation except gender (values are presented as frequency). cm

represents centimetres, kg represents kilograms, and m represents metres.

**Table 2: Baseline and Post-test data of the study group**

Parameters	Study Group (n=50)		t/z value	p-value
	Baseline	Post-test		
Weight (kg)	72.78 $\pm$ 8.52	71.93 $\pm$ 8.47	$t = 12.083$	$<0.001$
Body Mass Index (kg/m <sup>2</sup> )	29.93 $\pm$ 3.55	29.58 $\pm$ 3.54	$z = 5.713$	$<0.001$
VAS Score	8.20 $\pm$ 1.26	5.00 $\pm$ 1.20	$z = 6.189$	$<0.001$
WOMAC Score	58.15 $\pm$ 8.42	46.84 $\pm$ 7.49	$t = 13.355$	$<0.001$

**Note:** All the values are presented as Mean  $\pm$  Standard deviation. t = Paired samples t-test; z = Wilcoxon Signed Rank Test; VAS = Visual Analogue Scale; WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index. p value  $< 0.001$  indicates statistically significant differences. cm represents centimetres, kg represents kilograms, and m represents metres.

## DISCUSSION

The primary outcome in the clinical trial was the VAS and WOMAC global score. Aromatherapy massage performed for 10 days reduced pain and improved functional status; there was a significant difference between the baseline and the post-assessment. This is the first-ever study conducted to analyze the effectiveness of aroma massage (chamomile and lemongrass oil) in patients with OAK. Osteoarthritis, an inflammatory joint ailment marked by high concentrations of pro-inflammatory cytokines, including TNF- $\alpha$  and IL-1 $\beta$ , is mostly responsible for the degeneration of joint cartilage and accelerates the course of the disease [16]. The active components of chamomile include matricin, chamazulene, alpha-bisabolol, alpha-bisabolol oxides A and B, and other flavonoids that have anti-inflammatory properties. The topical application of chamomile oil has been found to have anti-inflammatory and sedative properties that may help with pain relief and increased range of motion [17].

The apigenin, found in chamomile, has been shown to penetrate deeper into the skin and provide anti-inflammatory actions, notably reducing cyclooxygenase (COX-2), and combating Lipopolysaccharide-induced prostaglandin E(2) release, which plays a major role in OAK [18]. Citral, a significant component found in lemongrass oil, inhibits the synthesis of IL-1 $\beta$  and IL-6. Geraniol, nerol, and carvone are some of the other active components that have been shown to prevent the synthesis of pro-inflammatory cytokines like tumor necrosis factor-alpha (TNF- $\alpha$ ). Reactive oxygen species, which are important in the degenerative process of OAK, are found to be reduced by geraniol, a significant ingredient in lemongrass oil [19]. Massage has been shown to have a significant impact on OAK [20, 21].

It is hypothesised that massage can enhance blood flow, lymph flow, lactate clearance, alter the immunological system, and lessen pain and stiffness in the knee joint. The benefits of relaxation can be adjusted by lowering norepinephrine and cortisol levels. Other possible mechanisms may involve the

upregulation of vascular endothelial growth factor (VEGF), a signal protein that promotes angiogenesis and vasculogenesis, leading to enhanced tissue revascularisation [22]. Aromatherapy massage has been shown to reduce symptoms and functional limitations in patients with osteoarthritis of the knee. This study is the first-ever to analyze the effectiveness of aroma massage using chamomile and lemongrass oils in patients with OAK. The intervention was well tolerated, and no adverse effects were reported by the patients. However, the study had several limitations, including the lack of a control group and its focus on a single group. The sample size was small and not based on prior research, and only the short-term effects were assessed. Therefore, further research with a larger sample size, longer duration, and more advanced methodologies is needed to better understand the effects and underlying mechanisms of this intervention.

## CONCLUSION

Twenty minutes of aromatherapy massage with lemongrass and chamomile reduced pain and functional limitations of patients with OAK. However, the lack of a control group limited the scope of this study's results. Hence, randomized controlled studies with larger sample sizes and long-term follow-ups are recommended to validate the results of the study.

The study was conducted at Government Yoga and Naturopathy Medical College, Chennai, India. The institutional ethics committee approved the study protocol (Ref.No:RES/IEC-GYNMC/2022/140) before the recruitment of the first subject. A written informed consent was obtained from each participant.

The study protocol was explained to all the participants, and written informed consent was obtained from each subject. Data available on request from the authors. We would like to thank Dr. Shanthini and Dr. Oviya for assisting in data collection.

## REFERENCE

1. Zhang Y, Jordan JM. Epidemiology of osteoarthritis. *Clin Geriatr Med.* 2010; 26(3):355–69
2. Mora JC, Przkora R, Cruz-Almeida Y. Knee osteoarthritis: pathophysiology and current treatment modalities. *J Pain Res.* 2018; 11:2189–96
3. Wang ST, Ni GX. Depression in osteoarthritis: current understanding. *Neuropsychiatr Dis Treat.* 2022; 18:375–89
4. Hunter DJ, Bierma-Zeinstra S. Osteoarthritis. *Lancet.* 2019; 393(10182):1745–59
5. Bannuru RR, Osani MC, Vaysbrot EE, *et al.*, OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis. *Osteoarthritis Cartilage.* 2019; 27(11):1578–89
6. Lakhan SE, Sheaffer H, Tepper D. The effectiveness of aromatherapy in reducing pain: a systematic review and meta-analysis. *Pain Res Treat.* 2016; 8158693
7. Ali B, Al-Wabel NA, Shams S, *et al.*, Essential oils used in aromatherapy: a systematic review. *Asian Pac J Trop Biomed.* 2015; 5(6):601–11
8. Cho MY, Min ES, Hur MH, *et al.*, Effects of aromatherapy on the anxiety, vital signs, and sleep quality of percutaneous coronary intervention patients in intensive care units. *Evid Based Complement Alternat Med.* 2013; 381381
9. Miraj S, Alesaeidi S. A systematic review study of therapeutic effects of *Matricaria recutita* chamomile. *Electron Physician.* 2016; 8(9):3024–31
10. Shah G, Shri R, Panchal V, *et al.*, Scientific basis for the therapeutic use of *Cymbopogon citratus* Stapf (lemongrass). *J Adv Pharm Technol Res.* 2011; 2(1):3–8
11. Ganji R. Aromatherapy massage: a promising non-pharmacological adjuvant treatment for osteoarthritis knee pain. *Korean J Pain.* 2019; 32(2):133–4
12. Nasiri A, Mahmodi MA, Nobakht Z. Effect of aromatherapy massage with lavender essential oil on pain in patients with osteoarthritis of the knee: a randomized controlled clinical trial. *Complement Ther Clin Pract.* 2016; 25:75–80
13. Field T. Knee osteoarthritis pain in the elderly can be reduced by massage therapy, yoga and tai chi: a review. *Complement Ther Clin Pract.* 2016; 22:87–92
14. Shetty GB, Moovenanthan A, Anagha N. Effect of electro-acupuncture, massage, mud, and sauna therapies in patient with rheumatoid arthritis. *J Ayurveda Integr Med.* 2015; 6(4):295–9.
15. Bellamy N, Buchanan WW, Goldsmith CH, *et al.*, Validation study of WOMAC: a health status instrument for measuring clinically important patient-relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. *J Rheumatol.* 1988; 15(12):1833–40
16. Raafat N, Gharib AF, Atta DS, *et al.*, Tumor necrosis factor- $\alpha$  molecular assessment of gene expression, genetic variants, and serum level in Egyptian patients with knee osteoarthritis. *Gene Rep.* 2020; 21:100922
17. Sah A, Naseef PP, Kuruniyan MS, *et al.*, A comprehensive study of therapeutic applications of chamomile. *Pharmaceuticals (Basel).* 2022; 15(10):1284
18. Srivastava JK, Shankar E, Gupta S. Chamomile: A herbal medicine of the past with bright future. *Mol Med Rep.* 2010; 3(6):895–901
19. Boukhatem MN, Ferhat MA, Kameli A, *et al.*, Lemongrass (*Cymbopogon citratus*) essential oil as a potent anti-inflammatory and antifungal drug. *Libyan J Med.* 2014; 9(1):25431
20. Qin S, Chi Z, Xiao Y, Zhu D, *et al.*, Effectiveness and safety of massage for knee osteoarthritis: a protocol for systematic review and meta-analysis. *Medicine (Baltimore).* 2020; 99(44):e22853
21. Kabiri F, Hassanpour-Dehkordi A, Dris F. Effects of massage therapy and aromatherapy on fatigue in patients with knee osteoarthritis. *J Herbmed Pharmacol.* 2018; 7(3):141–7
22. Wu Q, Zhao J, Guo W. Efficacy of massage therapy in improving outcomes in knee osteoarthritis: a systematic review and meta-analysis. *Complement Ther Clin Pract.* 2022;46:101522.

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