

**“THE EFFECT OF WARM SESAME OIL MASSAGE FOR KNEE OSTEOARTHRITIS PATIENTS- A RANDOMIS CONTROLLED TRIAL”****Dr. Balamma\*<sup>1</sup>, Dr. Geetha B. Shetty<sup>2</sup>, Dr. Prashanth Shetty<sup>3</sup> and Dr. K. J. Sujataha<sup>4</sup>**<sup>1</sup>BNYS (MD).<sup>2</sup>Professor and Dean Department of Physical Therapeutic Nutrition.<sup>3</sup>Principal of SDM Nature Cure and Yogic Science Hospital, Ujire.<sup>4</sup>Dean and Divison of Natural Therapeutics.**\*Corresponding Author: Dr. Balamma**

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**ABSTRACT**

**Objectives:** Osteoarthritis (OA) of knee is a degenerative and metabolic disorder, often caused by wear and tear on a joint over life time. It is Leading cause of pain and disability globally, and leads to a reduced quality of life. Complementary and alternative medicine (CAM) is most often used to treat musculoskeletal conditions and an increasing chronicity of pain among patients report utilizing these modalities. Warm sesame oil massage used in CAM. **Methods:** A Randomized controlled trial with 60subjects diagnosed with osteoarthritis of knee belonging to age group 35 to 70 years were recruited for the study were randomly allocated into Group I (Intervention group- Naturopathic and yogic treatments along with Warm sesame oil massage). GroupII(Control group – Naturopathic and yogic treatments). Every subject were assessed for pain, disability, assessed through visual analogue scale (VAS) scale, Western Ontario and Mac Master universities scale (WOMAC) scale, Quality of life (QoL) and range of motion baseline following 10 days. **Results:** The results showed significant difference in visual analogue scale (VAS), Western Ontario and Mac Master universities scale (WOMAC), Quality of life (QoL) and range of motion in Group 1. The overall comparison between the groups was done by using Man Whitney U test which showed significant difference in VAS scale (p<0.00). Inrest of the variables there were no statistically significant changes in both the groups. **Conclusion:** The study result suggests that both control and intervention group could be considered as an effective remedy in patients with OA.

**KEYWORDS:** Osteoarthritis of knee, VAS scale, WOMAC scale, warm sesame oil, range of motion, Quality of life (QOL).

**1. INTRODUCTION**

Osteoarthritis (O.A) is the common, chronic degenerative disorder of the joints which affects both weight bearing and non-weight bearing joints but most commonly affected in spine, hips, and knees.<sup>[1,2]</sup> It is often referred to as ‘wear and tear’ of the joints in the body and a very common disorder affecting the joint cartilage.<sup>[3]</sup> The incidence of hand, hip and knee OA increases with age, Globally, OA knee is the eighth leading cause of disability than associated with other joint.<sup>[4,5]</sup> It is a major cause of physical impairment and disability among elderly people and poses a significant economic burden on community. It is considered as a major public health problem.<sup>[6]</sup> Quadriceps strength deficits have also been reported in 20%–70% of patients with knee OA.<sup>[7]</sup> It affects mostof the daily activities like walking, climbing upstairs and any other lower extremity tasks than any other diseases, especially in the elderly.<sup>[8]</sup> It is one of the major causes of impaired function that reduces quality of life (QOL).<sup>[9]</sup> older adults with symptomatic knee osteoarthritis undergo a significant

impact on multiple dimensions of Health- related quality of life (HRQOL).<sup>[10]</sup> The patients with musculoskeletal disorders report among the lowest HRQOL, with knee OA patients reporting lower scores.<sup>[11]</sup> The physical manifestations of knee OA have direct impact on other aspects of patient’s lives such as social interactions, mental functioning, and sleep quality.<sup>[12]</sup> Knee osteoarthritis increases in prevalence in elderly people and more commonly seen in women than in men.<sup>[13]</sup> In the United States the prevalence of symptomatic osteoarthritis of knee in adults of 60 years or older is approximately 10% in male and 13% in female.<sup>[14]</sup> Recently in United States data indicates that half of people with symptomatic knee OA are diagnosed by age 55.<sup>[15]</sup> By 2025, the prevalence of knee OA is expected to increase by 40%, largely due to an aging population and the obesity epidemic.<sup>[16]</sup> COPCORD Stand for community oriented program for control of Rheumatic diseases ‘studies in India, shows that significantly higher prevalence of knee pain is seen in the rural (13.7%) compared with urban (6%) community.<sup>[17,18]</sup> In One third

of general population in older adult shows radiological evidence of knee osteoarthritis and it is strongly age related.<sup>[19]</sup>

OA of knee joint begins with cartilage degeneration and gradually affects periarticular soft tissues and the subchondral bone, producing chronic inflammation with synovitis, osteophytosis, loss of joint space, bone remodeling and leading to severe and irreversible joint destruction.<sup>[20]</sup> Studies have revealed that there are both endogenous and exogenous risk factors for knee osteoarthritis.<sup>[21]</sup>

Topical creams are used as substitute for medications for pain. Due to chronic illness Non-steroidal anti-inflammatory drugs (NSAID) are added since the patient fails to respond. Prolonged use of NSAID causes adverse effects on the body.<sup>[22]</sup> So the patients with osteoarthritis commonly use complementary and alternative medicines (CAM) in place of conventional analgesics.<sup>[23]</sup>

According to the 2002 National Health Interview Survey (NHIS) one-third adults have used some form of CAM. CAM is most often used to treat musculoskeletal conditions and other non-communicable diseases. CAM use is more prevalent among women's or who had one or more existing health conditions.<sup>[24]</sup> Complementary and alternative medicine (CAM) therapies have been popularised and an increasing number of chronic pain patients report utilizing these modalities. They are effective remedies for reducing pain while improving physical and psychological health and well-being.<sup>[24]</sup> A number of complementary and alternative medicinal systems are popular in India and mostly are associated with the treatment of chronic diseases.<sup>[25]</sup> CAM remedies are popular among patients with chronic diseases such as arthritis.<sup>[26]</sup>

Complementary and alternative medicine (CAM) include naturopathy, physical activity, dietary recommendation and herbal plant extracts, physiotherapy, acupuncture which reduce the pain, reduce the risk of complication and improve the quality of life.<sup>[27,28]</sup>

Naturopathy is a rational and evidence based system of medicine imparting treatments with natural elements based on theories of vitality, toxemia and self-healing capacity of the body.<sup>[29]</sup> Naturopathy is a system of man building in harmony with the constructive principles of nature on physical, mental, moral and spiritual planes of being.<sup>[30]</sup> It is one among traditional system of medicine that believes in the body's innate capacity to heal itself. It is a purely drugless approach. It includes diet therapy, mud, mustard therapy, hydrotherapy, massage, acupuncture, chromo therapy, magnet therapy, acupressure and yoga therapy.<sup>[31]</sup> Accordingly application of heat and cold is used to accelerate healing and decrease pain.<sup>[22]</sup>

Massage is the systemic rubbing and manipulation of tissues of the body and is one of the oldest methods to

treat deformities.<sup>[32]</sup> Massage therapy is one of the important treatment, used in naturopathy. It is used to treat pain condition, as it gives relaxation to muscles and soft tissue of the body and provides overall well-being. It includes the presser techniques, rubbing etc. Massage therapy may diminish symptoms and improve the course of OA by increasing local circulation to the affected joint, improving the tone of supportive musculature, enhancing joint flexibility, and relieving pain.<sup>[33,34]</sup> Sesame oil, is a natural product derived from *Sesamum indicum* L., it has been reported to have excellent antioxidative property in various disease models. However, the effect of sesame oil on OA decreasing the joint pain, has never been investigated.<sup>[35]</sup> It is one of the potent anti-inflammatory agent.<sup>[36]</sup> Sesame is an important traditional health food and it has been used to improve nutritional status and prevent various diseases, Sesame seeds are not only rich in oil and protein, but also in lignans (e.g., sesamin and sesamol).<sup>[37]</sup>

So far, to the best of our knowledge, there are no studies done on the application of sesame oil on knee OA patients, Hence the present study aimed at evaluation of efficacy of warm sesame oil massage for patients with OA knee.

## METHODS AND MATERIALS

An approval was obtained from the institutional (SDM college of naturopathy and yogic sciences) ethical committee before starting the study. Signed informed consent was obtained, from each subject by explaining the study objectives, methods, intervention, and all the rights of the subject about the study both in oral and written form.

**Subjects** Sixty subjects with the age ranging from 35 to 70 years were recruited were recruited from SDM (Sri Dharmasthala Manjunatheshwara) Nature Cure Hospital, Dakshina Kannada, and Karnataka for the study.

## Inclusion and Exclusion Criteria

Both males and females, Age 35 to 70 years. Subjects diagnosed as osteoarthritis of knee, according to American College of Rheumatology Diagnostic Criteria for osteoarthritis of knee will be included in this study. Subjects were excluded if they do not meet the inclusion criteria Rheumatoid arthritis, fibromyalgia, recurrent or active pseudo-gout, cancer or other serious medical condition, History of kidney or liver failure, Non –Steroidal Anti-Inflammatory Drugs (NSAID'S), Oral steroids within the last four weeks, Intra –articular hyalouronate injections within the previous 6 months, Arthroscopy of the knee within the previous year, Significant injury to the knee within the previous 6 months, Rash or open wound over the knee.

## INTERVENTION

**Group 1: Intervention group** – Subjects applied warm sesame oil massage (temperature 92<sup>o</sup> to 95<sup>o</sup> Fahrenheit)

for 10 minutes daily for a period of 10 days along with Naturopathy and Yogic intervention.

Group 2: Control group – Subjects was given Naturopathy Yogic intervention.

### ASSESSMENT

Visual analogue scale (VAS) for pain: It is a 10 cm scale (0 indicates no pain and 10 indicate the worst possible pain) used to measure the severity of pain in which subjects will be asked to mark a vertical line to indicate their pain.<sup>[38]</sup>

Patient Global Assessment: Western Ontario and McMaster Universities Secondary Osteoarthritis Index (WOMAC) is widely used in the evaluation of Hip and Knee Osteoarthritis. It is a self-administered questionnaire consisting of 24 items divided into 3 subscales to assess the three dimensions of pain, disability and joint stiffness in knee and hip osteoarthritis.<sup>[39]</sup>

Quality of life (QOL): The S-12 OA – specific health index is a comprehensive and more sensitive measure of patient quality of life in OA.<sup>[40]</sup>

Measurement of range of motion of knee by Goniometry: Knee region range of movement (flexion and extension) will be assessed by using goniometry. The normal Knee range of movement, flexion is 0-130° and extension is 120-0.<sup>[41]</sup>

Statistical Analysis: The pre, post-test data of Group I and Group II were analyzed separately by using paired t-test, and comparative analysis between Group I and Group II were done by using Mann-Whitney U test and Wilcoxon matched-pairs tests.

### RESULTS

The present study was conducted to evaluate the effects of warm sesame oil massage on patients with osteoarthritis. on Visual analogue scale (VAS) for pain, Patient Global Assessment Western Ontario and McMaster Universities Secondary Osteoarthritis index (WOMAC), goniometry (range of motion) and Quality of life (QOL). They were assessed in patients with osteoarthritis of knee for short term duration.

The overall comparison between groups was done by Mann Whitney U test which showed significant result in VAS( $p < 0.00$ ) for pain, Patient Global Assessment Western Ontario and McMaster Universities Secondary Osteoarthritis index (WOMAC), goniometry (range of motion) and Quality of life (QOL) in intervention group( $p < 0.00$ ) statistically significant in all the variables.

### METHODS AND MATERIALS

Results were compared with two groups, group 1(warm sesame oil massage along with Naturopathy and yogic intervention) and group 2(Naturopathy and yogic

intervention) where in data was extracted at both baseline and post intervention. The analysis within the group changes were assessed using Wilcoxon signed rank test for both groups which showed statistically difference in VAS, WOMAC, Goniometry and Quality of life (QOL) ( $p < 0.00$ ) except right and left extension in intervention group( $p < 0.157$ ).

### DISCUSSION

The aim of the study was to assess the effect of warm sesame oil massage on osteoarthritis of knee joint. This was a Randomized controlled trial with a sample size of 60 subjects who were randomly allotted into case and control groups. The assessments were done by Goniometry, WOMAC, SF-12, and VAS. There were no adverse effects reported during or after the intervention. In this current study, following Warm sesame oil massage there was a significant decrease in VAS, WOMAC, Goniometric measures, SF-12 when compared to control group where only Naturopathy and yoga was given as intervention.

In present study, both the groups, Group 1- Intervention group- Naturopathic and Yogic treatments along with Warm sesame oil massage) and Group 2 (Control group – Naturopathic and Yogic treatments) showed a significant difference with respect to pain severity, disability index, range of motion and Quality of life. However, except VAS scale there was no other variables statistically significant difference when compared between the two groups.<sup>[42]</sup>

There is significant decrease on VAS scores for pain in sesame oil massage group, sesame oil has been recommended to possess excellent analgesic activities in different forms of administration (topical or oral) in animal models. In some human studies showed that topical administration of sesame oil on knee may be effective on pain relief of patients with knee osteoarthritis, sesame oil decreased pain significantly in the 6<sup>th</sup> and 9<sup>th</sup> days of the intervention.<sup>[28]</sup> Effectiveness of intervention is most of the times dependent on life style.

modification along with physical therapy's in the conducted study CAM along with local warm sesame oil massage results more effective in the management osteoarthritis of knee, results concludes the same. Sesame Oil is also known for its anti-inflammatory properties, and helps reduce arthritis pain swelling of joints and strengthens the bones. Sesame oil is one the potent herbal medicine which showed one of the potent medication in treatment of arthritis it is supported by most of the preclinical and clinical studies.

In the study warm sesame oil massage has more effective in the reduction of pain.<sup>[121,122]</sup> Sesame oil may decrease OA-associated joint pain by inhibiting muscular oxidative stress. OA-associated joint pain can be found within one week.<sup>[104]</sup>

Yoga and naturopathy treatment protocol are also potent by releases cellular stress and clears free radicles reliving hormones like GABA which also shows helps in prevention of degeneration and reduction symptoms of knee osteoarthritis Yoga is beneficial in the management of non-specific low back pain, relieving pain in rheumatoid arthritis, and improving balance and gait (in women with musculoskeletal problems), Regular use of underwater massage, a hydrotherapy modality, improves neuromuscular coordination, and relieves muscle soreness. The probable mechanism suggested is that underwater massage increases the release of proteins from muscle tissue into the blood and enhances the maintenance of neuromuscular performance capacity. Mud pack treatment improves the pain and functional status of patients with knee osteoarthritis, whether applied directly or coated with nylon.

A monitored treatment protocol of naturopathy and yoga can benefit a large number of musculoskeletal disorders. An ideal treatment protocol in naturopathy is correcting the lifestyle, implementing therapeutic fasting followed by diet modifications and using modalities like hydrotherapy, mud therapy, massage, physiotherapy, yoga and exercise therapy.<sup>[115]</sup>

In present study analysis within the group indicates there is significant difference in range of motion in both groups, except right and left extension in Warm sesame oil massage group. Thermal stimulation increases the extensibility of collagen-rich tissues, such as tendons, fasciae and articular capsules, which may improve the range of motion of joints.<sup>[119]</sup> Relief as did occur after the sesame oil massage was of short duration, and the rapid return of skin temperature to its initial level also indicates that only temporary effects are produced.<sup>[43]</sup>

The results of this study showed significant beneficial effect of a traditional topical formulation of chamomile flower oil on the use of analgesic by patients with knee OA. In addition, chamomile oil showed some beneficial effects on pain, stiffness and physical activity of the patients.<sup>[44]</sup>

Increase in temperature leads to a state of analgesia and sedation in the injured area by acting on free nerve endings. Nerve fibers are stimulated, blocking the transmission of pain with a counter irritant effect.<sup>[45]</sup>

A randomized and controlled study conducted by Brosseau L et al to determine the effectiveness of thermotherapy in the treatment of OA of the knee. The result showed reduction in pain, edema, and improvement of flexion or range of motion (ROM) and function. There was a statistically significant improvement, but no clinical benefit in improving knee flexion ROM (8% relative difference) and functional status (11% relative difference).<sup>[46]</sup>

In general, the physiological effects of heat are vasodilatation -Accelerates the transport of nutrients and the removal of the residuum by increasing blood flow to the injured area of the body. It reduces the accumulation of venous blood in the region. Decrease in blood viscosity which helps in accelerating the transport of leucocyte and antibody to the injured area, increased capillary permeability, acceleration of cell metabolism, muscle relaxation, acceleration of inflammation, pain reduction by relaxing muscles, sedative effect, and reducing the viscosity of the synovial fluid to decrease joint stiffness.<sup>[47]</sup>

Common mechanism of Local application of heat reduces peripheral nerve conduction velocities, increase peripheral endorphin production, and raise the pain threshold. As suggested by the gate control theory which was developed by Mazak and Wall, thermal stimuli may block pain transmission by acting as peripheral stimuli. Superficial heat exerts its therapeutic effects by providing analgesia, hyperemia, and changing local or systemic temperature and reducing the muscle tone.<sup>[48]</sup>

Topical heat treatment applied directly on the skin increases both deep tissue temperature and blood flow. A 1°C increase in tissue temperature is associated with a 10% to 15% increase in local tissue metabolism. This increase in metabolism aids in healing process by increasing both catabolic and anabolic reactions needed to degrade and remove metabolic by-products of tissue damage and provides homeostasis for tissue repair.<sup>[49]</sup>

Thermoreceptors, are temperature-sensitive nerve endings, are activated by changes in skin temperature. These receptors initiate nerve signals that block nociception within the spinal cord. Topical modalities applied with physical support activate another type of specialized nerve endings called proprioceptors. Proprioceptors detect physical changes in tissue pressure and movement. Proprioceptor activity also inhibits the transmission of nociceptive signals to the brain. The activation of these receptors within the spinal cord reduces muscle tone, relaxes painful muscles, and enhances tissue blood flow.<sup>[50]</sup>

The study was able to prove the hypothesis that use warm sesame oil massage along with naturopathy and yogic intervention and naturopathy and yogic intervention for a short term duration of 10 days is effective in the treatment of osteoarthritis of knee. Although both the treatment modalities are effective sesame oil massage along with naturopathy and yogic intervention showed significant reduction in pain scale and there was much improvement seen in right and left extension in sesame oil massage and naturopathy and yogic intervention compared to naturopathy and yogic intervention group.

**Table 1: Represents descriptive analysis of group 1 (warm sesame oil massage).**

VARIABLE	MEAN± SD	MEAN± SD	P – VALUE
	PRE	POST	
VAS	7.47±1.38	4.77±1.25	0.00*
WOMAC	71.10±11.26	58.40±10.28	0.00*
GONIOMETRY RIGHT FLEXION	79.97±8.8	83.87±9.14	0.00*
GONIOMETRY RIGHT EXTENSION	18.00±4.47	15.53±3.80	0.00*
GONIOMETRY LEFT FLEXION	79.60±7.40	84.23±7.56	0.00*
GONIOMETRY LEFT EXTENSION	17.80±4.43	15.00±3.72	0.00*
QUALITY OF LIFE	11.23±1.19	13.00±.910	0.00*

\*P&lt;0.05.

\*Represent significant, means they are non-normal.

VAS=Visual Analogue scale, Womac =Western Ontario and McMaster Universities, Range of motion and Quality of life, SD=Standard deviation. Within group

analysis suggest a significant reduction in Pain, Disability, Range of motion and Quality of life (p<0.05)

**Table no 2: Represents descriptive analysis of group 2 (Isolated naturopathic and Yogaintervention group).**

VARIABLES	MEAN±SD	MEAN±SD	P VALUE
	PRE	POST	
VAS	7.43±1.45	5.63±1.37	0.00*
WOMAC	64.17±8.25	56.00±8.42	0.00*
GONIOMETRY RIGHT FLEXION	81.83±8.45	85.07±8.51	0.00*
GONIOMETRY RIGHT EXTENSION	15.33±5.07	14.67±5.07	0.157
GONIOMETRY LEFT FLEXION	81.97±6.68	85.07±7.20	0.00*
GONIOMETRY LEFT EXTENSION	15.33±5.074	14.67±5.07	0.157
QOL	11.47±1.432	12.80±1.09	0.00*

\*P&lt;0.05.

\*Represent significant, means they are non-normal.

VAS=Visual Analogue scale, Womac=Western Ontario and McMaster Universities, Range of motion and Quality of life, SD=Standard deviation. Within group

analysis suggest a significant reduction in pain, disability, right and left flexion and tug test (p<0.05)

**Table 3: Comparison of Post Values of Case and Control Group.**

VARIABLES	GROUP 1 (warm sesame oil massage) Sample Median (SD)	GROUP 2 (isolated naturopathic and yogaintervention) Sample Median(SD)	Mann- Whitney U test value	P-value
VAS	5.00(1.25)	6.00(1.37)	275	.007*
WOMAC	58.00(10.28)	55.00(8.42)	365.5	.210
RIGHT FLEXION	85.00(9.14)	85.00(8.51)	422	.677
RIGHT EXTENSION	15.00(3.80)	10.00(5.07)	406.	.490
LEFT FLEXION	85.00(7.56)	85.00(7.20)	421.5	.671
LEFT EXTENSION	15.00(3.72)	10.00(5.07)	420	.638
QOL	12.00(1.43)	11.00(1.19)	404.5	.488

**CONCLUSION**

The results of our study indicated that warm sesame oil massage on Osteoarthritis may reduce the pain, stiffness, range of motion, and improves quality of life. The study

revealed that warm sesame oil massage reduced the pain score from 7.47 to 4.77, Range of motion Goniometry right extension from 18.00 to 15.53, Goniometry left extension 17.80 to 15.00 WOMAC from 71.10 to 58.40

and quality of life from 11.23 to 13.00 with significant improvement [ $p < 0.05$ ] in pain, swelling and quality of life.

The study results indicates that group1 the Warm sesame oil massage along with Naturopathic and Yogic therapy showed improvement in VAS, WOMAC, ROM and QOL, which suggests that Warm sesame oil massage can be considered as effective intervention in patients with osteoarthritis of knee. for the management of pain and stiffness. Warm sesame oil massage can be utilized by the practitioner in hospital set up whereas Warm sesame oil massage can be utilized as primary care in home by the subjects.

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