

# Effect of Ginger Oil Massage on Joint Pain among Elderly Inmates of Old Age Home: A Quasi-experimental Study

MENGUPHRENUO MEPFHUO<sup>1</sup>, PRABHA LIS THOMAS<sup>2</sup>



## ABSTRACT

**Introduction:** Joint pain is widespread among elderly and is usually accompanied by stiffness that increases with daily activities. Ginger has been found to have similar properties to Non Steroidal Antii-inflammatory Drugs (NSAIDs) in reducing pain and inflammation associated with musculoskeletal conditions.

**Aim:** To investigate the effect of ginger oil massage on joint pain in elderly inmates in old age homes.

**Materials and Methods:** The study adopted a quasi-experimental one-group pretest post-test design and the study was conducted in the old age home Bengaluru, Karnataka, India, from October 2020 to April 2021. Purposive sampling technique was used to select 30 inmates of an old age home located in Bangalore and having joint pain with a score of >1 on the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale. The demographic proforma and the WOMAC were used to collect the data. A skin test was performed, to check for any sensitivity reactions and massage using ginger essential oil diluted in coconut oil was

administered on the knee joint on alternate days, for six sessions extending over a period of two weeks. The post-test was assessed after third and final (6<sup>th</sup>) session of massage. Repeated Measures (RM) Analysis of Variance (ANOVA) was computed to determine the difference in pre and post-test WOMAC scores and a significance level of  $p < 0.05$  and a confidence interval of 95% was considered to indicate a statistically significant difference.

**Results:** The mean age of the elderly was  $69.500 \pm 7.505$  years with a range 61-82 years. Repeated measure ANOVA demonstrated a significant difference in the second ( $13.10 \pm 5.38$ ) and first post-test WOMAC scores ( $14.10 \pm 6.19$ ) compared to the mean pretest WOMAC score ( $37.97 \pm 12.83$ ) ( $F = 121.14$ ,  $p < 0.001$ ), indicating that ginger oil massage was effective in reducing joint pain among the elderly.

**Conclusion:** Ginger oil massage resulted in the reduction of knee pain and joint stiffness among elderly and therefore, can be used as an alternative therapy for the elderly with joint pain.

**Keywords:** Arthralgia, Functional status, Musculoskeletal pain, Phytotherapy, *Zingiber officinale*

## INTRODUCTION

Health is an asset without par and old age is a gift. However, not everyone is lucky enough to age well confidently due to the fact that health gradually deteriorates with advancing age. Old age is not a disease in itself, but the elderly are susceptible to long-term illnesses that can develop slowly over time, such as diabetes, cancer, musculoskeletal problems, respiratory and cardiovascular disorders, mental illnesses and others [1,2].

Joint pain is widespread among the elderly and is typically associated with osteoarthritis, a common degenerative joint disorder characterised by inflammation, stiffness and pain in the joint which eventually will lead to decline in functional status and inability to perform simple activities of daily living [3]. As age increases, joint movement becomes stiffer and less flexible because of reduction in synovial fluid and thinning of cartilage [4]. A study conducted in rural Tamil Nadu, reported that 47.6% of the elderly suffer from chronic pain of whom 64.5% had knee joint pain and 21.7% had low back pain [5]. In the elderly, a strong relationship exists between musculoskeletal pain, arthritis and a lack of physical activity, which often results in functional decline, frailty, loss of well-being and independence [2]. One among the most common factor associated with joint pain and disability among elderly is knee osteoarthritis which causes degeneration of cartilage, stiffness and pain around the joint and limited range of motion leading to functional disability. Functional mobility is essential for performing activities of daily living and joint pain with stiffness can be a significant contributing factor for decreased quality of life among elderly [2,6]. Hence, appropriate interventions to reduce joint pain and stiffness are vital to enhance the functional status among elderly. The existing treatment strategies are focused on decreasing pain and discomfort, maintaining joint

stability and avoiding loss of function. Pharmacological therapies available for osteoarthritis include NSAIDs and analgesics, which are mainly used for relief of symptoms and no drugs have been identified to delay or reverse the progression of disease [6,7].

Some of the non pharmacological methods adopted to cope with pain include active or passive exercises, acupuncture, hot or cold compresses, etc. Massage with or without essential oils are also one of such methods people use to cope with pain [8]. The use of ginger had its origins in traditional herbal medicine to relieve painful joints for over 1000 years in India (Ayurveda) [9]. Ginger is found to have analgesic and anti-inflammatory qualities through inhibition of cyclooxygenase and lipoxygenase pathways and prevention of arachidonic acid metabolism [10] and its use orally or on topical application has been found to alleviate pain and reduce inflammation brought on by Osteoarthritis [11-13].

Oral ginger delivery for 26 days during a preclinical investigation on rats with arthritis demonstrated a decrease in paw and joint swelling associated with arthritis [12]. Another study found that 12 weeks of topical application of ginger extract with active component, 6-gingerol in Nanostructure Lipid Carrier (NLC) alleviated osteoarthritic knee joint pain and improved the quality of life by reducing problematic symptoms [13]. In addition, a double-blinded clinical trial revealed that 250 mg ginger capsules were equally efficient at reducing pain in dysmenorrhic women as the NSAIDs, Mefenemic acid 250 mg and Ibuprofen 400 mg [14]. Anti-inflammatory property of ginger is mainly attributed to its inhibitory action on prostaglandin and leukotriene synthesis [15]. Since research related to the topical use of ginger on joint pain has been found to be limited and 80% of people around the world rely on herbal products to cure some disorders [16], the present study aimed to evaluate the efficacy of

ginger oil massage in reducing joint pain which can be used as a secure alternative to NSAIDs. As synthetic compounds derived from chemical industries are known for their side effects and thus to limit any such setbacks, the current study intends to utilise and promote ginger essential oil as an effective complementary or alternative therapy for relieving knee joint pain.

**Hypotheses:** The null hypothesis (H0) was that there will be no significant difference between the pre and post-test WOMAC scores of elderly inmates after ginger oil massage and the alternate hypothesis (H1) was that there will be significant difference between the pre and post-test WOMAC scores of elderly inmates after ginger oil massage.

## MATERIALS AND METHODS

The present study adopted a quasi-experimental one-group pretest post-test experimental study design and was carried out in an old age home in Bengaluru, Karnataka, India and the duration of the study was from October 2020 to April 2021. Ethical clearance to conduct the study was granted by the institutional Ethical Committee of Krupanidhi College of Nursing with ethical clearance number-KCNIEC/2019/11 and a formal written administrative approval was acquired from the in-charge of the old age home. The purpose of the study was explained and written consent was obtained. Then, a total of 30 subjects who satisfied the inclusion and exclusion criteria were chosen using the purposive sampling technique.

**Inclusion criteria:** The inclusion criteria were the inmates of the selected old age home, who were willing to participate; mentally competent to comprehend the instructions and having joint pain with a score of >1 on any domains of the WOMAC scale.

**Exclusion criteria:** The exclusion criteria were elderly inmates who were; having a metal implant, injury to the joint, or fracture, with skin infection or open wound near the joints, having allergic reactions to natural essential oils and diagnosed with cancer and/or blood clotting disorders such as haemophilia or undergoing steroid injection treatment.

### Study Procedure

A skin test was then performed with the ginger essential oil to check for any sensitivity reactions. The ginger essential oil, manufactured by Vaibhav Perfumery, in January 2020, with a best-by date of January 2025 was used for the study. It was extracted through steam distillation and was 100% derived from *Zingiber officinale* (ginger). The study was conducted from October 2020 to April 2021.

**Intervention:** Maintaining privacy, the intervention massage using the ginger oil mixed with carrier oil (6 drops (3%) of ginger essential oil in 10 mL coconut carrier oil) was administered for 10 minutes on each knee. A total of 5 mL of oil was utilised for each joint and the steps of the massage consisted of effleurage for one minute, patting the knee for one minute, petrissage for three minutes and deep friction with circular rubbing of the knee for five minutes [17]. Altogether six sessions of massage were administered on alternate days for a duration of two weeks. The subjects were allowed to take their standard medication during the study period, with the exception of pain medication, which was not required or administered at any point during the study period, ensuring the results obtained were not influenced by any external factors.

Pretest data was collected using the demographic proforma to assess the sample characteristics and the WOMAC scale was used for assessing knee joint pain and physical disability. The Likert version of WOMAC was used, which rates three dimensions- pain, stiffness and physical function- on a scale of 0 to 4, which corresponds to: None (0), Mild (1), Moderate (2), Severe (3) and Extreme (4). The total score obtained for 24 items were categorised in to four levels of pain; mild (1-24), moderate (25-48), severe (49-72) and extreme (73-96) [18]. Reliability of WOMAC tool for the current study was established by using Spearman Brown's prophesy formula which

generated a value of  $r=0.974$  and for the tool's internal consistency, Cronbach's Alpha was computed and was found to be 0.9732. Eight nursing experts and one orthopaedic expert determined the tool's content validity.

## STATISTICAL ANALYSIS

The post-test was assessed after third and final (6<sup>th</sup>) session of massage using the same WOMAC scale. The data were then compiled and analysed using Statistical Package for the Social Sciences (SPSS) 22.0 statistical software package. Repeated measures ANOVA was used to determine the effectiveness of ginger oil on joint pain and Chi-square test and Fisher's-test were applied to ascertain the association between the demographic variables and the level of joint pain on the pretest and post-test, with a significance level of  $p<0.05$  and a confidence interval of 95% being considered to indicate a statistically significant association.

## RESULTS

The mean age of the elderly was  $69.500\pm 7.505$  years with a range 61-82 years [Table/Fig-1]. Majority (70%) of the subjects were females; widowed (43.30%) and 96.70% of the subjects consumed a mixed diet. Only 26.67% of subjects had a habit of performing regular exercise while the majority of the subjects (76.67%) had normal Body Mass Index (BMI) {classified as per Centres for Disease Control and Prevention's (CDC) classification} [Table/Fig-2].

Variable	Mean	Standard deviation	Range
Age (in years)	69.5	7.505	61-82

[Table/Fig-1]: Mean and standard deviation of age (in years) of elderly subjects (N=30).

Demographic data	Frequency (n)	Percentage (%)
<b>Gender</b>		
Male	9	30
Female	21	70
<b>Marital status</b>		
Married	9	30
Unmarried	8	26.70
Widowed	13	43.30
Divorced/separated	0	0
<b>Dietary habits</b>		
Vegetarian	1	3.30%
Mixed diet	29	96.70%
<b>Habit of doing exercise</b>		
Regular	8	26.67
Irregular	16	53.33
None	6	20
<b>Body mass index (kg/m<sup>2</sup>)</b>		
<18.5 (underweight)	1	3.33
18.5-24.9 (normal)	23	76.67
25.0-29.9 (overweight)	6	20

[Table/Fig-2]: Percentage distribution of elderly based on demographic variables (N=30).

A greater proportion of subjects (83.33%) had bilateral knee pain equal proportion (36.67%) of subjects reported a history of knee pain for 3-5 years and more than five years. The data also showed that 46.67% of subjects were not receiving any treatment or therapy for joint pain, while 26.67% of subjects were taking Tablet Diclofenac and 20% were using topical relief creams and 6.6% reported using both on need basis. Majority, (56.67%) of the subjects had no co-morbidities, while the remaining subjects had co-morbidities such as arthritis (13.33), hypertension (16.66%), diabetes (6.67%) and hypertension with diabetes (6.67%) [Table/Fig-3].

Variables	Frequency	Percentage
<b>Site of knee pain</b>		
Unilateral	5	16.67
Bilateral	25	83.33
<b>Duration of knee pain</b>		
<1 year	2	6.66
1-3.0 years	6	20
3.1-5.0 years	11	36.67
>5 years	11	36.67
<b>Current treatment for joint pain</b>		
Oral pain medication	8	26.67
Topical pain killers/relief creams	6	20
Both oral and topical cream	2	6.66
None	14	46.67
<b>Presence of co-morbid diseases</b>		
Hypertension	5	16.66
Arthritis	4	13
Diabetes	2	6.67
Hypertension and diabetes	2	6.67
None	17	56.67

[Table/Fig-3]: Percentage distribution of elderly according to the site of knee pain, duration, current treatment for joint pain and presence of co-morbid diseases (N=30).

Frequency and percentage distribution of elderly subjects based on the levels of joint pain is shown in [Table/Fig-4].

**Effectiveness of ginger oil on joint pain:** The first post-test measure of outcome variable was conducted after third session of massage therapy and second post-test was done after the final (6<sup>th</sup>) session of massage. The percentage of subjects having severe pain was reduced to 0 in both the 1<sup>st</sup> and 2<sup>nd</sup> post-test from 23.33% in the pretest; moderate pain was also reduced from 66.67% in pretest to 63.3% and then 3.3% in the first and second post-test, respectively. The analysis also revealed a gradual reduction in the mean WOMAC score from 37.97±12.83 to 14.10±6.19 on first post-test and to 13.10±5.38 on second post-test and this difference was statistically significant (RM ANOVA, p=0.001) proving that ginger oil massage was effective in reducing knee pain [Table/Fig-5,6].

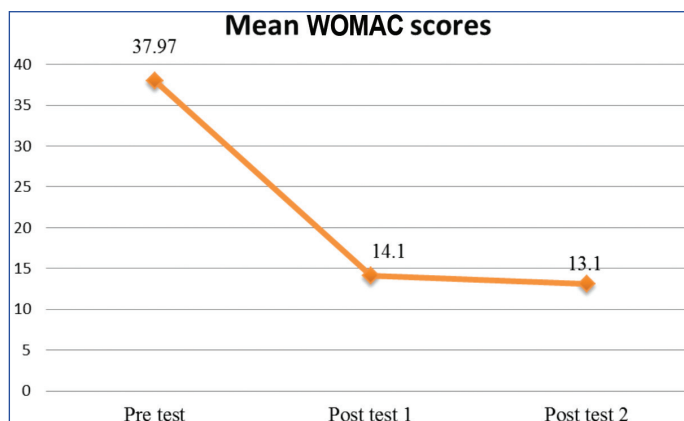
Levels of joint pain	Pretest		1 <sup>st</sup> post-test		2 <sup>nd</sup> post-test	
	Frequency	%	Frequency	%	Frequency	%
Mild	3	10.00	11	36.7	29	96.7
Moderate	20	66.67	19	63.3	1	3.3
Severe	7	23.33	0	0	0	0

[Table/Fig-4]: Frequency and percentage distribution of elderly subjects based on the levels of joint pain (N=30).

Variables	Mean±SD	F-value	Mean squares	df	p-value	Inference
Pretest	37.97±12.83	121.14	5944.84	2	0.001	Significant
Post-test 1	14.10±6.19					
Post-test 2	13.10±5.38					

[Table/Fig-5]: Comparison of mean pretest and post-test WOMAC scores (RM ANOVA) (N=30).

With regard to the domains of WOMAC scale, the mean scores of the three domains; pain, stiffness and functional difficulty scores decreased from the pretest through the 2<sup>nd</sup> post-test. The obtained p-value for pain (0.001), stiffness (0.001) and functional difficulty (0.001) were all less than 0.05, rejecting the null hypothesis, suggesting that ginger oil massage was effective in minimising knee pain [Table/Fig-7]. Using Chi-square and Fisher's-exact test (when the cell frequency was less than 5), the association between the demographic variables and the pretest and post-test joint pain



[Table/Fig-6]: Comparison of mean WOMAC scores on the pretest, 1<sup>st</sup> post-test and 2<sup>nd</sup> post-test.

scores as measured by the WOMAC scale was computed, but no significant associations were identified between age, gender and habit of doing exercise (p>0.05) [Table/Fig-8].

Domain	Pretest	Post-test 1	Post-test 2	F-value	df	p-value	Inference
	Mean±SD	Mean±SD	Mean±SD				
Pain	7.13±3.56	2.17±1.15	2.03±1.06	42.79	2	0.001	S
Stiffness	3.47±2.21	1.07±0.91	0.77±0.82	54.49	1.18	0.001	S
Functional difficulty	27.4±8.81	10.86±5.39	10.3±4.9	127.59	1.04	0.001	S

[Table/Fig-7]: Comparison of domain wise mean pretest and post-test WOMAC scores (N=30). S: Significant

S. No.	Variables	Post-test score		Chi-square/Fischer's-exact value	p-value	Inference
		<median	>median			
1	<b>Age in years</b>					
	<70 year	10	8	0.089	0.765	N.S
	>70 year	6	6			
2	<b>Gender</b>					
	Male	6	3	0.918	0.44	N.S
	Female	10	11			
3	<b>Exercise</b>					
	Regular	4	4	4.805	0.084	N.S
	Irregular	11	5			
	None	1	5			

[Table/Fig-8]: Association of post-test WOMAC scores with demographic and clinical variables (N=30). NS: Not significant

## DISCUSSION

According to the current study's findings, it was revealed that the majority (93.33%) of the subjects were in the early older age group range of 60-71-year-old while, a smaller proportion, 6.67% were aged between 72-82 years indicating a notable age distribution among the participants. This result is congruous with a study of socio-demographic and health characteristics of residents of nursing homes in Belgaum, Karnataka, which reported that the majority of the subjects were between 61-70-year-old [19]. It was also revealed in this study that the majority of the subjects (70%) were females. This finding is supported by a cross-sectional study that looked at the prevalence of knee osteoarthritis in India, which found that women (31.6%) were more likely than men (28.1%) to have the condition [20].

The current study observed that the majority (53.33%) of the subjects were engaged in irregular exercises. This report is consistent with a cross-sectional study conducted in India to measure the prevalence of common physical health problems among the elderly and explore

their association with specific socio-demographic characteristics, in which majority of the subjects (52%) were engaged in irregular exercises [21]. Thus, this finding highlights the importance of planned and scheduled physical exercises for the elderly which may help them improve physical fitness.

Chronic knee pain is a significant contributor to functional limitations and disability in older adults. A cohort study conducted in Pune, to identify factors that predict functional disability among elderly adults, reported that only 55.5% of the subjects were able to squat [21]. The current study also observed that 23.3% of the subjects were not able to squat. As a result, it is crucial to initiate early treatment as joint pain has a significant impact on older adult's ability to age healthily.

An exploratory mixed-method study conducted to evaluate chronic musculoskeletal pain among the elderly in Tamil Nadu reported that the majority of the subjects were on pain medications for the management of their musculoskeletal pain [5]. However, in the present study only 26.67% of the subjects were taking oral analgesics (tablet Diclofenac) as-needed basis to alleviate body aches, rather than as a regular regimen while the majority of the subjects (46.67) were not taking any measures for relieving their joint pain.

Regarding the WOMAC scale, the present study's findings showed that the percentage of subjects reporting severe pain was reduced to 0 in both the 1<sup>st</sup> and 2<sup>nd</sup> post-tests from 23.3% in the pretest, moderate pain also decreased from 66.7% in the pretest to 63% and 3.3% in the 1<sup>st</sup> and 2<sup>nd</sup> post-tests, respectively; thus, demonstrating the efficiency of ginger oil massage in reducing knee joint pain. The domain-wise comparison of the WOMAC scale in the pre and post-tests also revealed that the mean pain, stiffness and functional difficulty were all reduced in the first and second post-tests. This outcome is congruent with the study conducted in Hong Kong evaluating the efficacy of ginger and orange essential oil massage for elderly people experiencing knee pain where significant changes in the mean scores were seen between the post-tests within the intervention group in the three domains, although the between-group comparisons with the control and placebo groups did not show these differences after four weeks of massage [17].

The present study observed a significant difference ( $p < 0.001$ ) in the mean pretest with the 1<sup>st</sup> and 2<sup>nd</sup> post-test WOMAC scores of the elderly inmates, indicating the effectiveness of ginger oil massage in reducing joint pain. Similar findings were reported in studies conducted in Hong Kong, Turkey and Coimbatore, India, where all of these studies reported the effectiveness of ginger oil massage in reducing joint pain [17,22,23]. This finding indicates the usefulness of ginger as an anti-inflammatory and analgesic agent for relieving knee pain and stiffness among elderly. Many animal studies demonstrated that different compounds of ginger possess anti-inflammatory and anti-oxidative properties leading to a reduction in chronic inflammatory symptoms, especially pain [11].

From the past, ginger was used as an inflammatory agent with its properties mainly attributed to its secondary metabolites, the gingerols. The essential oil extract from ginger is also proved to have anti-inflammatory properties and the combined effect of gingerols and essential oil has resulted in an enhanced anti-arthritic and joint protective effect of ginger [24]. The present study also confirms the effect of ginger oil on reducing joint pain and stiffness among elderly.

Massage using ginger oil infused in carrier oil (coconut oil) can be safely administered to the elderly to relieve joint pain following a skin test with ginger oil alone. The subjects were cooperative throughout the study and many expressed great reliefs from their pain. Also, there were no reports of side-effects from the subjects. Further randomised controlled trials on larger samples and meta-analytical

studies related to use of essential oils as non pharmacological agents for management of pain can validate the current findings.

### Limitation(s)

The study was conducted in a single setting and could not be blinded due to the difficulty of obtaining a placebo. Randomisation of samples was not possible due to the limited number of elderly inmates. Effect of confounding variables such as age, overall health status, physical activity level and psychological factors on joint pain was not measured. The study was conducted only for two weeks because of which the long-term effect of ginger oil could not be identified.

### CONCLUSION(S)

The study has shown the effectiveness of ginger oil massage in reducing joint pain and stiffness among elderly inmates. Massage with ginger oil can be a non toxic, simple alternative therapy for the elderly with joint pain and also can help to reduce the detrimental effects of polypharmacy.

### REFERENCES

- [1] Katta A, Gopalakrishnan S, Ganeshkumar P, Christopher A, Rajit K, Suresh M. Morbidity pattern and nutritional status of elderly population in rural Tamil Nadu. *J Ind Acad Geriatr.* 2011;7:159-62.
- [2] World Health Organization. World report on ageing and health. World Health Organization; 2015 Oct 22.
- [3] Mary DA, Bharathi AR. Knee joint pain and daily living activities among elderly people with different knee osteoarthritis in selected rural area in Chennai. *J Res Med Dent Sci.* 2022;10(1):324-28.
- [4] Saud Gary SL, Chin KY, Tan JK, Aminuddin A, Makpol S. Preventative and therapeutic potential of tocotrienols on musculoskeletal diseases in ageing. *Frontiers in Pharmacology.* 2023;14:1290721.
- [5] Kirubakaran S, Dongre AR. Chronic musculoskeletal pain among elderly in rural Tamil Nadu: Mixed-method study. *Journal of Family Medicine and Primary Care.* 2019;8(1):77-85.
- [6] Geng R, Li J, Yu C, Zhang C, Chen F, Chen J, et al. Knee osteoarthritis: Current status and research progress in treatment. *Experimental and Therapeutic Medicine.* 2023;26(4):01-01.
- [7] Maqbool M, Fekadu G, Jiang X, Bekele F, Tolossa T, Turi E, et al. An up to date on clinical prospects and management of osteoarthritis. *Annals of Medicine and Surgery.* 2021;72:103077.
- [8] Erol S, Ertunc M, Ozturk T. The effect of a hand massage on pain and depression in the older people living in a nursing home: Pilot study. *Journal of Psychiatric Nursing/Psikiyatri Hemsireleri Dernegi.* 2014;5(2):92-97.
- [9] Therklson T. Ginger and Osteoarthritis, In Qian Chen (Eds.). *Osteoarthritis - Diagnosis, Treatment and Surgery* (pp. 157-168). InTech, 2012. Available from: <http://www.intechopen.com/books/osteoarthritis-diagnosis-treatment-and-surgery/ginger-and-osteoarthritis>.
- [10] Paramdeep GI. Efficacy and tolerability of ginger (*Zingiber officinale*) in patients of osteoarthritis of knee. *Indian J Physiol Pharmacol.* 2013;57(2):177-83.
- [11] Rondanelli M, Fossari F, Vecchio V, Gasparri C, Peroni G, Spadaccini D, et al. Clinical trials on pain lowering effect of ginger: A narrative review. *Phytotherapy Research.* 2020;34(11):2843-56.
- [12] Sharma JN, Srivastava KC, Gan EK. Suppressive effects of eugenol and ginger oil on arthritic rats. *Pharmacology.* 1994;49(5):314-18.
- [13] Taneepanichskul S, Niempoog S. Improving of knee osteoarthritic symptom by the local application of ginger extract nanoparticles: A preliminary report with short term follow-up. *J Med Assoc Thai.* 2015;98(9):871-77.
- [14] Ozgoli G, Goli M, Moattar F. Comparison of effects of ginger, mefenamic acid, and ibuprofen on pain in women with primary dysmenorrhea. *The Journal of Alternative and Complementary Medicine.* 2009;15(2):129-32.
- [15] Ozkur M, Benlier N, Takan I, Vasileiou C, Georgakilas AG, Pavlopoulou A, et al. Ginger for healthy ageing: A systematic review on current evidence of its antioxidant, anti-inflammatory, and anticancer properties. *Oxidative Medicine and Cellular Longevity.* 2022;2022(1):4748447.
- [16] World Health Organization. Integrating traditional medicine in health care. 30 January 2023. Available from: <https://www.who.int/southeastasia/news/feature-stories/detail/integrating-traditional-medicine>. Accessed on 9 August 2024.
- [17] Yip YB, Tam AC. An experimental study on the effectiveness of massage with aromatic ginger and orange essential oil for moderate-to-severe knee pain among the elderly in Hong Kong. *Complementary Therapies in Medicine.* 2008;16(3):131-38.
- [18] Bellamy N, Buchanan WW, Goldsmith CH, Campbell J, Stitt LW. 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. *The Journal of Rheumatology.* 1988;15(12):1833-40.
- [19] Viveki RG, Halappanavar AB, Joshi AV, Pujar K, Patil S. Sociodemographic and health profile of inmates of old age homes in and around Belgaum city, Karnataka. *Journal of the Indian Medical Association.* 2013;111(10):682-85.

- [20] Pal CP, Singh P, Chaturvedi S, Pruthi KK, Vij A. Epidemiology of knee osteoarthritis in India and related factors. *Indian Journal of Orthopaedics*. 2016;50(5):518-22.
- [21] Nagarkar A, Kashikar Y. Predictors of functional disability with focus on activities of daily living: A community based follow-up study in older adults in India. *Archives of Gerontology and Geriatrics*. 2017;69:151-55.
- [22] Farrokhi S, Chen YF, Piva SR, Fitzgerald GK, Jeong JH, Kwok CK. The influence of knee pain location on symptoms, functional status, and knee-related quality of life in older adults with chronic knee pain: Data from the osteoarthritis initiative. *The Clinical Journal of Pain*. 2016;32(6):463-70.
- [23] Tosun B, Ünal N, Yiğit D, Can N, Aslan Ö, Tunay S. Effects of self-knee massage with ginger oil in patients with osteoarthritis: An experimental study. *Research and Theory for Nursing Practice*. 2017;31(4):379-92.
- [24] Funk JL, Frye JB, Oyarzo JN, Chen J, Zhang H, Timmermann BN. Anti-inflammatory effects of the essential oils of ginger (*Zingiber officinale* Roscoe) in experimental rheumatoid arthritis. *Pharma Nutrition*. 2016;4(3):123-31.

**PARTICULARS OF CONTRIBUTORS:**

1. Postgraduate Student, Department of Medical Surgical Nursing, Krupanidhi College of Nursing, Bengaluru, Karnataka, India.
2. Professor, Department of Medical Surgical Nursing, Krupanidhi College of Nursing, Bengaluru, Karnataka, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**

Prabha Lis Thomas,  
Professor, Department of Medical Surgical Nursing, Krupanidhi College of Nursing,  
Bengaluru-560087, Karnataka, India.  
E-mail: prabha.krupacon@gmail.com

**PLAGIARISM CHECKING METHODS:** <sup>[Jain H et al.]</sup>

- Plagiarism X-checker: Apr 23, 2024
- Manual Googling: Oct 03, 2024
- iThenticate Software: Oct 05, 2024 (8%)

ETYMOLOGY: Author Origin

EMENDATIONS: 7

**AUTHOR DECLARATION:**

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. No

Date of Submission: **Apr 22, 2024**Date of Peer Review: **May 18, 2024**Date of Acceptance: **Oct 08, 2024**Date of Publishing: **Dec 01, 2024**