World Journal of Pharmaceutical Science and Research

www.wjpsronline.com

Research Article

ISSN: 2583-6579
SJIF Impact Factor: 6.916
Year - 2026
Volume: 5; Issue: 4
Page: 585-595

# CAMPHOR OIL FOR KNEE PAIN RELIEF IN POSTMENOPAUSAL WOMEN: A STUDY IN COIMBATORE, INDIA

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***Article Received: 23 February 2026*** | | ***Article Revised: 16 March 2026*** | | ***Article Accepted: 5 April 2026***

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**DOI:** https://doi.org/10.5281/zenodo.19593106

**How to cite this Article:** Jenitha S., Menaka V., Lingaraj Chitra (2026) CAMPHOR OIL FOR KNEE PAIN RELIEF IN POSTMENOPAUSAL WOMEN: A STUDY IN COIMBATORE, INDIA. World Journal of Pharmaceutical Science and Research, 5(4), 585-595.



## ABSTRACT

**Background:** Knee joint pain (arthralgia) is a widespread concern for women experiencing menopause. This investigation aimed to evaluate the therapeutic efficacy of topical Camphor Oil in alleviating knee joint discomfort among a group of menopausal women residing in a specific rural area of Coimbatore. **Methodology:** The study utilized a quantitative, evaluative research design, specifically a one-group pretest-posttest pre-experimental approach. Imogene King's Goal Attainment Theory provided the guiding conceptual framework. Participants were recruited in Semmanichettipalayam using a non-probability convenience sampling technique. Data were collected using a demographic survey and the Numerical Pain Intensity Scale. Expert validation ensured the content validity of both the data collection tool and the camphor oil intervention. **Results:** The mean difference score in the experimental group was 5.40 and the calculated, t-test + = 40.854 was found to be statistically significant at $p<0.001$ level which depicted clearly that, there was a significant decrease in the level of Knee Joint Pain after application camphor oil in the experimental group of post-menopausal women whereas mean pain score during the pretest was 4.03 out of a maximum score of 9, corresponding to a mean percentage of 40.33%, with a standard deviation of 2.53. After the intervention, the mean pain score decreased to 1.50, with a mean percentage of 15.00% and a standard deviation of 1.94. The difference in mean percentage between the pretest and posttest was 25.33%, indicating a notable decline in pain levels. The calculated paired 't' value was 15.983, which is highly significant at the 0.01 level ($p < 0.01$). **Conclusion:** The findings unequivocally demonstrate that applying camphor oil is an effective and beneficial intervention for significantly reducing the severity of knee joint pain in post-menopausal women.

**KEYWORDS:** Camphor oil, Knee joint pain, Postmenopausal women, Arthralgia.

## INTRODUCTION

Women play a crucial role in society, balancing responsibilities in family, career, and social life. Their health undergoes significant changes throughout different life stages, with menopause being one of the most critical transitions. Menopause is a natural biological process that marks the end of a woman's reproductive years, typically occurring between the ages of 46 and 55. This phase is characterized by the cessation of menstruation and is accompanied by various physiological and psychological changes due to declining estrogen levels **(Santoro et al., 2019)**.

The menopausal transition comprises three stages: Perimenopause, which precedes menopause and is marked by hormonal fluctuations leading to irregular menstrual cycles and various symptoms; Menopause, defined as the absence of menstruation for 12 consecutive months; and Postmenopause, the period following menopause characterized by consistently low estrogen levels. The severity and duration of symptoms vary among individuals throughout these stages **(World Health Organization, 2024)**.

**The Rising Burden of Musculoskeletal and Joint Pain in Menopausal Women**: Musculoskeletal complaints, particularly joint pain and backache, are highly prevalent during the menopausal transition and postmenopausal years, posing a significant global health concern. Cross-sectional studies across different regions have consistently highlighted this burden, with overall menopausal symptom prevalence reaching as high as 96.6% in rural India, where physical symptoms were the most dominant category at 93.2%. Backache was noted to have a particularly high prevalence of 62.3% in this population **(Natarajan et al., 2024)**. Other studies reinforce the frequency of joint-related symptoms: A study in India found the prevalence of musculoskeletal pain among postmenopausal women to be 56%, with back pain 57% and knee pain 72% being the most prevalent regional sites **(Kulkarni et al., 2020)**. Similarly, a study in Iran reported that back pain and joint pain were the most prevalent symptoms 48.7%, followed by muscle pains, 44.0% **(Sorayya et al., 2019)**. The overall prevalence of Musculoskeletal Pain (MSP) among perimenopausal women has been reported as 71% in a systematic review, which concluded that postmenopausal women were at a higher risk of moderate/severe MSP compared to their premenopausal or perimenopausal counterparts **(Chang bo Lu et al., 2020)**.

Furthermore, a longitudinal study showed that reports of 'Aches and stiff joints' were the most commonly reported symptom, with reporting increasing over time during the menopausal transition **(Szoeke et al., 2019)**.

**Menopause as a Key Risk Factor for Osteoarthritis and Rheumatoid Arthritis:** The decline in estrogen associated with menopause is strongly linked to the onset and progression of joint diseases, making menopausal status a critical risk factor. Observational data show that out of 150 postmenopausal women in an urban Indian city, a moderate risk of developing knee osteoarthritis (OA) was present in most women, with a mean prevalence of 59.35% **(Riya Patel et al., 2024)**. This risk is further highlighted in cases of early menopause, where 82 out of 145 patients with premature menopause developed knee OA within one year **(MD Ekram, 2020)**. Beyond OA, post-menopausal women also face a statistically higher risk of developing chronic inflammatory conditions. A systematic review and meta-analysis found that post-menopausal women had a higher risk of developing rheumatoid arthritis (RA) compared to pre-menopausal women, with an estimated odds ratio of 1.35 **(Namavari et al., 2024)**. Given this strong association, it has been concluded that women's OA onset and progression are intrinsically linked to menopause, underscoring the need for proactive management. Management strategies to help menopausal arthritis patients and slow progression include

changes in diet and lifestyle, regular exercise, medication, and orthobiologics, all aimed at reducing symptoms, increasing bone mineral density, and reducing bone loss and radiological abnormalities **(Pithadia et al., 2023)**.

Camphor oil (derived from Ricinus communis), a traditional remedy prized for its anti-inflammatory, analgesic, and circulatory-enhancing effects, is a promising natural treatment for Knee Joint Pain (KJP). Its active component, ricinoleic acid, offers potent anti-inflammatory action. When applied topically, the oil is thought to improve circulation, reduce swelling, and alleviate pain in deep tissues. Despite its widespread use in Complementary and Alternative Medicine CAM for musculoskeletal issues, there is a distinct lack of specific clinical evidence evaluating its efficacy for KJP in postmenopausal women.

Current research strongly supports the efficacy of camphor oil application in significantly reducing joint pain among menopausal women and older adults. Multiple quasi-experimental and pre-experimental studies consistently found that topical application of camphor oil or camphor-containing preparations leads to a statistically significant decrease in pain severity. For instance, studies by **(Deepika et al., 2024)** and **(Sabitha Anto et al., 2024)**, both using quasi-experimental designs with n=60 menopausal women, concluded a significant reduction in joint pain, with one study reporting a mean difference score of 5.40 with $t=40.854$ $p<0.001$. Similarly, **(Jenifer et al., 2020)** and **(Beautily et al., 2020)** observed significant reductions in joint pain severity among menopausal women and geriatrics, with mean pre-test scores of 6.74 dropping to post-test scores of 3.86 in one study, $t=21.59$. Furthermore, a comparative study by **(Remya Mohan et al., 2019)** demonstrated that warm mustard oil with camphor was more effective in pain relief than warm mustard oil alone, and a randomized controlled study on knee osteoarthritis by **(Döner et al., 2024)** found that aromatherapy massage with essential oils (BEO group) was more effective in improving pain and functionality $p< 0.001$ compared to placebo and control groups, highlighting the therapeutic potential of topical, plant-based interventions.

The researchers have chosen this study based on the growing interest in non-pharmacological pain management strategies, particularly in menopausal care. Many menopausal women in both rural and urban areas seek alternative remedies due to the high cost, adverse effects, or unavailability of conventional treatments. Traditional practices, such as the application of camphor oil, have been widely used in Indian households; however, empirical evidence supporting their efficacy remains scarce.

This study aims to provide scientific validation of camphor oil as a therapeutic intervention, offering a natural, non-invasive, and affordable approach to managing Knee Joint Pain. By conducting this research, the investigator seeks to bridge the gap between traditional remedies and evidence-based practice, ultimately improving the quality of life for menopausal women experiencing musculoskeletal discomfort.

## METHODS

This study aims to assess the effectiveness of Camphor Oil application on Knee Joint Pain among Menopausal Women in a selected rural area, Coimbatore. The sample size of the study includes 60 Menopausal Women from the selected rural area, Coimbatore. Non probability convenience sampling technique was adopted for selecting samples for the study. The setting was selected through non non-probability convenience sampling technique because of the availability of samples, economy of time, money, access, and feasibility of the study.

The criteria for sample selection included menopausal women aged 46 to 55 years who were willing to participate and presented with Knee Joint Pain; those excluded were menopausal women currently taking medications or on any other alternative therapy for knee joint pain, those allergic to camphor oil, or those not available during the data collection periods.

The present study received formal Ethical Clearance from the Ashwin Hospital Institutional Ethical Committee. The research protocol underwent a thorough review and was officially approved. This certification confirms that the study adheres to all necessary ethical guidelines and that the Institutional Ethical Committee has no objection to the conduct of this research work.

**Demographic data**

A structured interview schedule was used to collect demographic data. This section consists of demographic variables such as Age, marital status, type of family, education, occupation, family monthly income, duration of Knee Joint Pain, and nature of work.

**Numerical Pain Intensity Scale to assess the pain**

The Numerical Pain Intensity Scale was used to assess the pain, and the scoring was done according to the severity of the pain. Table 1 presents the scoring procedure for assessing pain.

**Preparation and administration of Camphor oil**

To prepare camphor oil for joint application in menopausal women, combine 375 grams of camphor with 1500 ml of coconut oil. Start by breaking the camphor into smaller fragments to help it dissolve more easily. Pour the coconut oil into a clean stainless-steel pan and add the camphor.

Heat the mixture gently on a low flame, stirring continuously until the camphor fully melts into the oil, creating a clear and fragrant solution. It is essential to avoid high heat during this process, as camphor is flammable. After the camphor has dissolved completely, allow the oil to cool down naturally. Once cooled, store the oil in a clean, airtight, preferably dark-colored glass bottle to maintain its potency. This prepared oil is used to massage painful joints especially the knees of menopausal women. 3ml of oil will be used for the massage should last for 10 to 15 minutes and be done twice a day, ideally in the morning and evening, to help reduce joint pain, stiffness, and discomfort that may occur during menopause. It should not be applied to broken or irritated skin, and a small patch test is advised before regular use to rule out allergic reactions.

**Table 1: Scoring procedure for assessing pain.**

| **Level of pain** | **Score** |
|---|---|
| No pain | 0 |
| Mild pain | 1 -3 |
| Moderate pain | 4-6 |
| Severe pain | 7-9 |
| **Worst pain** | **10** |

**Validity and Reliability:** Validity of the tool was established by consultation with guides and experts. The tool was validated by five experts in the field of nursing and one from the field of medicine. The reliability of the tool will be checked and established by using inter-rater method.

**Pilot Study:** The pilot study was conducted with 10% of the total samples. The purpose is to determine the feasibility of conducting a study & design on plan for statistical analysis. Pilot study was conducted in Pogalur village, Coimbatore. A total of 10% of samples were selected by using a non-probability convenience sampling technique that fulfilled the inclusion criteria. A pretest was done to assess the level of knee joint pain. On the 6 consecutive days, twice a day was administered. On the 7th day, the Posttest level of knee joint pain was assessed. The findings of the pilot study revealed that the study was feasible and practicable to conduct the main study.

**Data Collection Procedure:** The patients who fulfilled the inclusion criteria were selected non a non-probability convenience sampling technique. Their general information was collected by a structured interview schedule. The pretest was done using a numerical pain intensity scale to assess the pain. The investigator will apply the camphor oil on the Knee joint and check for any allergic reaction. If an allergic reaction is found, then the joint is washed with soap and water; otherwise, it is continued for 6 consecutive days twice a day with a break of 8 hours, preferably in the morning and evening. On the 7th day, posttest assessment of pain was assessed by using the same numerical pain intensity scale.

**Plan for Data Analysis:** Data was analyzed using descriptive and inferential statistics. Descriptive statistics were used to assess the pain, and inferential statistics were used to evaluate the effectiveness of camphor oil application on Knee Joint Pain. The association between the pain and the selected demographic variables was assessed by the chi-square test.

## RESULTS

This section deals with the analysis and interpretation of collected data to assess the Effectiveness of Camphor Oil Application on the reduction of Knee Joint Pain among Menopausal Women in the selected rural area, Coimbatore. The collected data were tabulated, organized, and analyzed by using inferential and descriptive statistics.

**Table 2: Frequency Distribution of demographic variables of Menopausal Women (N=60)**

| S.No | Demographic Variables | Criteria | Frequency | Percentage (%) |
|---|---|---|---|---|
| 1 | Age | 46-50 years | 27 | 45.0 |
| | | 51-55 years | 33 | 55.0 |
| 2 | Gender | Married | 59 | 98.3 |
| | | Unmarried | 1 | 1.7 |
| 3 | Type of family | Nuclear | 21 | 35.0 |
| | | Joint | 21 | 35.0 |
| | | Extended | 18 | 30.0 |
| 4 | Education | Illiterate | 13 | 21.7 |
| | | Primary school | 11 | 18.3 |
| | | Secondary school | 15 | 25.0 |
| | | Higher secondary school | 17 | 28.3 |
| | | Graduate and above | 4 | 6.7 |
| 5 | Occupation | Housewife / Retired | 24 | 40.0 |
| | | Self employee | 16 | 26.7 |
| | | Private employee | 10 | 16.7 |
| | | Daily wages | 8 | 13.3 |
| | | Government employee | 2 | 3.3 |
| 6 | Family monthly income | < Rs.5000 | 8 | 13.3 |
| | | Rs.5001-10000 | 16 | 26.7 |
| | | >Rs.10000 | 36 | 60.0 |
| 7 | Duration of pain | 0-1 year | 13 | 21.7 |

| | | | | |
|---|---|---|---|---|
| | | 2-3 years | 33 | 55.0 |
| | | 4-5 years | 12 | 20.0 |
| | | Above 5 years | 2 | 3.3 |
| 8 | Nature of work | Sedentary work | 28 | 46.7 |
| | | Moderate work | 19 | 31.7 |
| | | Heavy work | 13 | 21.7 |

Table 2 shows the frequency distribution of demographic variables of Menopausal Women. Regarding the Age of the menopausal women, the majority of the participants were between 51-55 years of age, accounting for 55% (n=33), while 45% (n=27) were in the 46-50 years age group. In Gender, Most participants were married (98.3%, n=59), and only 1.7% (n=1) were unmarried. Regarding the Type of Family, an equal number of participants belonged to nuclear (35%, n=21) and joint families (35%, n=21). The remaining 30% (n=18) lived in extended families.

In Education, a variety of educational levels were noted. 28.3% (n=17) had completed higher secondary school, followed by secondary education (25%, n=15). 21.7% (n=13) of participants were illiterate, and 18.3% (n=11) had primary education. A small proportion, 6.7% (n=4), were graduates or above. Occupation of the menopausal women reveals that the highest proportion of participants were housewives or retired (40%, n=24), followed by self-employed individuals (26.7%, n=16). Others included private employees (16.7%, n=10), daily wage earners (13.3%, n=8), and government employees (3.3%, n=2).

Regarding the Family Monthly Income, a significant majority of participants (60%, n=36) reported a monthly income above Rs. 10,000. 26.7% (n=16) had an income between Rs. 5,001–10,000, while 13.3% (n=8) earned less than Rs. 5,000 per month. Regarding the Duration of Pain, over half of the participants (55%, n=33) reported experiencing pain for 2–3 years, while 21.7% (n=13) had pain for less than a year. 20% (n=12) had pain for 4–5 years, and 3.3% (n=2) for more than 5 years. Regarding the Nature of Work, the largest group of participants (46.7%, n=28) performed sedentary work, followed by moderate work (31.7%, n=19). A smaller percentage (21.7%, n=13) was engaged in heavy physical labor.

**Data on pretest and posttest levels of Knee Joint Pain among Menopausal Women:** Data on pretest and posttest levels of Knee Joint Pain among Menopausal Women is presented in Table 3. Table 3 shows the Frequency and percentage-wise distribution of pretest and post-test levels of Knee Joint Pain among Menopausal Women. During the pretest, a majority of the participants (48.3%) experienced mild pain, while 28.3% reported moderate pain and 23.3% suffered from severe pain. Notably, none of the participants reported being pain-free at baseline. However, following the intervention, there was a significant reduction in pain severity. Nearly half of the participants (46.7%) reported no pain in the posttest, indicating a marked improvement. Additionally, the proportion of participants with mild and moderate pain reduced to 30.0% and 23.3%, respectively, and importantly, no participants reported severe pain after the intervention. These findings suggest that the intervention had a positive impact on pain reduction, with a clear shift from higher to lower levels of pain severity. The complete absence of severe pain in the posttest further supports the effectiveness of the implemented strategy in managing and alleviating pain among the study population.

**Table 3: Frequency and percentage-wise distribution of pretest and posttest levels of Knee Joint Pain among Menopausal Women (N=60).**

| S. No | Level of Severity Rating | Pretest Pain Rating | | Posttest Pain Rating | |
|---|---|---|---|---|---|
| | | Frequency | Percentage (%) | Frequency | Percentage (%) |
| 1 | No pain (0) | 0 | 0.0 | 28 | 46.7 |
| 2 | Mild pain (1-3) | 29 | 48.3 | 18 | 30.0 |
| 3 | Moderate pain (4-6) | 17 | 28.3 | 14 | 23.3 |
| 4 | Severe pain (7-10) | 14 | 23.3 | 0 | 0.0 |
| **Total** | | **60** | **100.0** | **60** | **100.0** |

**Data on the effectiveness of Camphor Oil Application on Knee Joint Pain among Menopausal Women:** Table 4 shows the Mean, standard deviation, and mean difference on the level of pain among Menopausal women. The statistical analysis using the paired 't' test revealed a significant reduction in the level of pain following the intervention. The mean pain score during the pretest was 4.03 out of a maximum score of 9, corresponding to a mean percentage of 40.33%, with a standard deviation of 2.53. After the intervention, the mean pain score decreased to 1.50, with a mean percentage of 15.00% and a standard deviation of 1.94. The difference in mean percentage between the pretest and posttest was 25.33%, indicating a notable decline in pain levels. The calculated paired 't' value was 15.983, which is highly significant at the 0.01 level ($p < 0.01$). Hence, the research hypothesis H1 is retained at the $p \leq 0.001$ level. This statistically significant result confirms that the intervention was effective in reducing pain among the participants. The substantial decrease in both the mean score and the standard deviation from pretest to posttest further supports the consistency and impact of the intervention in managing pain.

**Data on the association between the pretest level of Knee Joint Pain among menopausal women and their selected demographic variables:** Table 4 presents the chi-square test results for the pre-test score on Knee Joint Pain among menopausal women in relation to their selected demographic variables. It reveals that Family Monthly Income has a significant association with the pretest level of Knee Joint Pain among menopausal women. Hence, the research hypothesis H2 is retained at the $p \leq 0.001$ level.

**Table 4: Chi-square test on pre-test score on Knee Joint Pain among Menopausal Women with their selected demographic variables (N=60)**

| S. No | Demographic variable | Category | Pretest Pain Rating | | | | | | $\chi 2$ value |
|---|---|---|---|---|---|---|---|---|---|
| | | | Mild | | Moderate | | Severe | | |
| | | | No | % | No | % | No | % | |
| | | | 29 | 100 | 17 | 100 | 14 | 100 | |
| 1 | Age | 46-50 years | 12 | 41.4% | 9 | 52.9% | 6 | 42.9% | 0.613 |
| | | 51-55 years | 17 | 58.6% | 8 | 47.1% | 8 | 57.1% | Df = 2 |
| | | | | | | | | | (P=7.36) |
| | | | | | | | | | NS |
| 2 | Gender | Married | 29 | 100.0% | 17 | 100.0% | 13 | 92.9% | 3.341 |
| | | Unmarried | 0 | 0.0% | 0 | 0.0% | 1 | 7.1% | Df = 2 |
| | | | | | | | | | (P=.188) |
| | | | | | | | | | NS |
| 3 | Type of family | Nuclear | 11 | 37.9% | 3 | 17.6% | 7 | 50.0% | 7.251 |
| | | Joint | 12 | 41.4% | 5 | 29.4% | 4 | 28.6% | Df = 4 |
| | | Extended | 6 | 20.7% | 9 | 52.9% | 3 | 21.4% | (P=.123) |
| | | | | | | | | | NS |
| 4 | Education | Illiterate | 4 | 13.8% | 6 | 35.3% | 3 | 21.4% | 11.757 |
| | | Primary school | 7 | 24.1% | 2 | 11.8% | 2 | 14.3% | Df = 8 |
| | | Secondary school | 4 | 13.8% | 5 | 29.4% | 6 | 42.9% | (P=.162) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Higher secondary school | 10 | 34.5% | 4 | 23.5% | 3 | 21.4% | NS |
| | | Graduate above | 4 | 13.8% | 0 | 0.0% | 0 | 0.0% | |
| 5 | Occupation | Housewife/ Retired | 10 | 34.5% | 8 | 47.1% | 6 | 42.9% | 8.12 |
| | | Self employee | 9 | 31.0% | 3 | 17.6% | 4 | 28.6% | Df = 8 |
| | | Private employee | 4 | 13.8% | 2 | 11.8% | 4 | 28.6% | (P=.422) |
| | | Daily wages | 4 | 13.8% | 4 | 23.5% | 0 | 0.0% | NS |
| | | Government employee | 2 | 6.9% | 0 | 0.0% | 0 | 0.0% | |
| 6 | Family monthly income | < Rs.5000 | 2 | 6.9% | 4 | 23.5% | 2 | 14.3% | 17.342 |
| | | Rs.5001-10000 | 6 | 20.7% | 1 | 5.9% | 9 | 64.3% | Df = 4 |
| | | >Rs.10000 | 21 | 72.4% | 12 | 70.6% | 3 | 21.4% | (P=.002) |
| | | | | | | | | | S |
| 7 | Duration of pain | 0-1 year | 6 | 20.7% | 3 | 17.6% | 4 | 28.6% | 9.052 |
| | | 2-3 years | 15 | 51.7% | 13 | 76.5% | 5 | 35.7% | Df = 6 |
| | | 4-5 years | 7 | 24.1% | 0 | 0.0% | 5 | 35.7% | (P=.171) |
| | | Above 5 years | 1 | 3.4% | 1 | 5.9% | 0 | 0.0% | NS |
| 8 | Nature of work | Sedentary work | 16 | 55.2% | 8 | 47.1% | 4 | 28.6% | 3.023 |
| | | Moderate work | 7 | 24.1% | 6 | 35.3% | 6 | 42.9% | Df = 4 |
| | | Heavy work | 6 | 20.7% | 3 | 17.6% | 4 | 28.6% | (P=.554) |
| | | | | | | | | | NS |

**DISCUSSION**

This section presents the results in relation to the study's objective. This study was conducted to assess the effectiveness of Camphor oil Application on Knee Joint Pain among menopausal women.

**To find out the level of Knee Joint Pain among Menopausal Women:** During the pretest, a majority of the participants (48.3%) experienced mild pain, while 28.3% reported moderate pain and 23.3% suffered from severe pain. Notably, none of the participants reported being pain-free at baseline. However, following the intervention, there was a significant reduction in pain severity. Nearly half of the participants (46.7%) reported no pain in the posttest, indicating a marked improvement. Additionally, the proportion of participants with mild and moderate pain reduced to 30.0% and 23.3%, respectively, and importantly, no participants reported severe pain after the intervention. These findings suggest that the intervention had a positive impact on pain reduction, with a clear shift from higher to lower levels of pain severity. The complete absence of severe pain in the posttest further supports the effectiveness of the implemented strategy in managing and alleviating pain among the study population.

**This result was supported by Deepika. D et.al.,** (2024) have conducted a study on the effectiveness of Camphor Oil Application on the Reduction of Knee Joint Pain among Post Menopausal Women in a Selected Rural Area. The quasi-experimental research design was chosen to conduct the study with 60 samples matched with the inclusion criteria. Samples were allocated into the experimental group (n=30) and control group (n=30) by convenience sampling technique. A pretest was done by using a numerical pain scale for both the experimental and control groups. The experimental group received Camphor Oil Application twice a day for 3 days. For the control group, the usual routine was followed. On the 3rd day, the study participants were reassessed for the level of Knee Joint Pain by using the same tool. The study results concluded that the mean difference score in the experimental group was 5.40, and the calculated t-test += 40.854 was found to be statistically significant at $p<0.001$ level, which clearly depicted that there was a significant decrease in the level of Knee Joint Pain after application of camphor oil in the experimental group of post menopausal women.

**To assess the effectiveness of Camphor Oil Application on the reduction of Knee Joint Pain among Menopausal Women:** The statistical analysis using the paired 't' test revealed a significant reduction in the level of pain following the intervention. The mean pain score during the pretest was 4.03 out of a maximum score of 9, corresponding to a mean percentage of 40.33%, with a standard deviation of 2.53. After the intervention, the mean pain score decreased to 1.50, with a mean percentage of 15.00% and a standard deviation of 1.94. The difference in mean percentage between the pretest and posttest was 25.33%, indicating a notable decline in pain levels. The calculated paired 't' value was 15.983, which is highly significant at the 0.01 level ($p < 0.01$). Hence, the research hypothesis $H_1$ is retained at the $p \leq 0.001$ level. This statistically significant result confirms that the intervention was effective in reducing pain among the participants. The substantial decrease in both the mean score and the standard deviation from pretest to posttest further supports the consistency and impact of the intervention in managing pain.

**This result was supported by Sabitha Anto et.al., 2024,** has conducted a study to assess the Effectiveness of Camphor Oil Application in the Reduction of Knee Joint Pain among Menopausal Women at the Selected Rural Area, Panagudi. The research design selected for the study was one non randomized control group design. A purposive sampling technique was followed to obtain a sample of 60 menopausal women who satisfied the inclusion criteria and were included in the study. Pre-assessment on the level of knee joint Pain was assessed. Camphor oil application was given by the researcher for a period of 6 days. The posttest was done using the numerical pain intensity scale at the end of the intervention. The ethical aspect of this study was maintained. Result and conclusion: The data were analyzed using descriptive and inferential statistics. The paired 't' test value in the experimental group is 14.109 at $p > 0.05$, and the paired 't' test value inthe control group is 2.05 at $p > 0.05$. The unpaired 't' test value is 3.52 at $p > 0.05$. This finding showed that there was a significant reduction in the level of knee joint Pain among menopausal women who received camphor oil application.

**To associate the pretest level of Knee Joint Pain among Menopausal Women with their selected demographic variables:** Chi-square test on pre-test score on Knee Joint Pain among Menopausal Women with their selected demographic variables reveals that Family Monthly Income has a significant association with the pretest level of Knee Joint Pain among menopausal women. Hence the research hypothesis H2 is retained at $p \leq 0.001$ level.

This result was supported by **Beautily et.al., 2020** has conducted a study on the Effectiveness of camphor oil application on arthritis among geriatrics at Kondancheri rural area. Experimental Research Approach, a convenient sampling technique was used to assess, select the sample and post-test and pre-test experimental research design the effectiveness of camphor oil application on arthritis among geriatrics by using structured questionnaires. Result showed that among 50 samples in pretest 1 (2%) Geriatrics had mild pain, 21(42%) had moderate pain, and 28 (56%) had severe pain. During the posttest 22 (44%) Geriatrics had mild pain, 24(48%) Geriatrics had moderate pain, and 4 (8%) Geriatrics had severe pain. The mean pretest score on the severity of Knee Joint Pain was 6.74, and that of the posttest was 3.86. The calculated 't' value was 21.59 at 49 degrees of freedom was significant at 0.05 level. It showed that demographic variables were significantly associated with the level of Knee Joint Pain.

## CONCLUSION

The present study was done to evaluate the effectiveness of Camphor oil application on Knee Joint Pain among Menopausal women. The findings of the study revealed that Camphor oil application was effective in a significant

reduction of the level of Knee Joint Pain among menopausal women. There was a significant association between the pretest level of Knee Joint Pain and selected demographic variables of menopausal women.

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