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*Original Article*

# The effect of warm water compresses with cinnamon (cinnamomum) powder on pain scales of gout arthritis in the elderly: A pre-experimental study

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## Abstract

**Background:** Joint pain is a common complaint experienced by many people, especially the elderly. One of the non-pharmacological methods that can be used to reduce pain is warm water compress therapy using cinnamon powder (Cinnamomum). This compress provides a warming effect that can decrease muscle spasms, improve blood circulation, and help suppress the inflammatory response in the joint area.
**Objective:** This study aimed to determine the effect of a warm water compress with cinnamon powder (Cinnamomum) on changes in the pain scale of gout arthritis among the elderly at Bukit Selabu Sekayu Public Health Center.
**Methods** This research used a pre-experimental design with a One Group Pre-Test Post-Test approach. The sample consisted of 35 elderly respondents, selected through total sampling. The research instruments included the Standard Operating Procedure (SOP) for administering the warm water compress with cinnamon powder and an observation sheet using the Numeric Rating Scale (NRS). Data were analyzed using the Wilcoxon Signed Rank Test.
**Results :** The findings showed that the mean pain score before the intervention was 4.63 (moderate pain category), and after the warm water compress with cinnamon powder was applied, it decreased to 1.97 (mild pain category). The statistical test obtained a p-value = 0.000 ($p < 0.05$), indicating a significant difference between pre- and post-intervention. A 2.66-point reduction on the NRS was considered clinically meaningful, showing that this therapy effectively reduced joint pain in the elderly.
**Conclusion:** The application of a warm water compress with cinnamon powder (Cinnamomum) was proven to be statistically and clinically effective in reducing joint pain levels among elderly patients with gout arthritis. This therapy can serve as a safe and practical non-pharmacological alternative that can be applied in primary health care services.

## Background

Joint pain is a common complaint experienced by the elderly and is one of the leading causes of reduced physical function and independence (Ahmadi et al., 2020; Alotaibi et al., 2022; Amalia, 2021). Degenerative processes in joint tissues trigger inflammation, stiffness, and limited movement, which directly impair the ability of the elderly to carry out daily activities (Saputra et al., 2024; Antoni et al., 2020; Arianto, 2018). This condition affects not only physical health but also has socioeconomic consequences, as moderate-to-severe joint pain may reduce mobility by 30–50%, increase dependency, lower quality of life, and add financial burdens for families and healthcare facilities (Dewi et al., 2025; Erlangga et al., 2025; Febriyona et al., 2023).

One of the most common forms of chronic joint pain is gouty arthritis, an inflammatory joint condition caused by the deposition of monosodium urate crystals (Boibalan & Sukihananto, 2024; Fitriani & Supriyadi, 2020; Hartutik & Gati, 2021). Global evidence shows that the prevalence of gout continues to increase, especially in developing countries due to lifestyle and dietary transitions (Hassani et al., 2020; Hidayatullah & Rejeki, 2022; Indonesia KKR, 2023).

In Indonesia, national health statistics indicate a sharp rise in gout prevalence with advancing age, while in South Sumatra Province it ranks as the second most common degenerative disease (Kurstin & Merlla, 2021; Munawaroh, 2018; Nofia et al., 2021). Records at Puskesmas Bukit Selabu Sekayu document 35 elderly individuals diagnosed with gouty arthritis, most of whom report recurrent pain interfering with daily

routines (Nurhayati & Yusoff, 2022; Nurhayati & Umarianti, 2018; Pattiradjawane, 2017).

Management of gouty arthritis generally relies on pharmacological therapy, including non-steroidal anti-inflammatory drugs and urate-lowering agents. However, long-term use may cause side effects such as gastric irritation, renal impairment, and bleeding risks, highlighting the need for safe and self-applicable non-pharmacological alternatives for the elderly (Peivastegan et al., 2020; Putri & Krishna, 2021; Rambod et al., 2018).

One promising complementary therapy is warm water compresses infused with cinnamon (Cinnamomum), which contains cinnamaldehyde and eugenol with natural anti-inflammatory and analgesic effects (Rianti, 2020; Romadiah et al., 2024; Setiawan & Nur, 2020). Cinnamaldehyde inhibits lipoxygenase pathways, reducing leukotriene production, while eugenol acts as a vasodilator producing warmth, enhancing blood flow, and facilitating the absorption of active compounds into inflamed tissues (Shishehbor et al., 2018; Suriya et al., 2019; Umah et al., 2020). These mechanisms collectively help reduce pain more quickly and improve joint flexibility (Wilda & Panorama, 2020).

Previous studies have demonstrated that cinnamon warm compress therapy effectively reduces pain intensity among elderly individuals with gouty arthritis (Ahmadi et al., 2020; Antoni et al., 2020; Dewi et al., 2025). However, most studies were conducted in hospital-based settings, whereas elderly populations at community health centers have distinct characteristics such as lower treatment compliance, varied comorbidities, and limited access to healthcare services (Erlangga et al., 2025; Febriyona et al., 2023; Fitriani & Supriyadi, 2020).

Moreover, herbal compress therapy is not yet routinely applied at Puskesmas Bukit Selabu Sekayu, making research on its effectiveness and feasibility in primary healthcare services highly relevant (Gati et al., 2021; Nurhayati & Yusoff, 2022; Rambod et al., 2018).The purpose of this study is to determine the effect of warm water cinnamon (Cinnamomum) powder compresses on reducing the pain scale of gouty arthritis among the elderly at Puskesmas Bukit Selabu Sekayu.

## Methods

*Study Design*

This study employed a quantitative pre-experimental design using a one-group pre-test–post-test approach. This design was selected to evaluate the preliminary effect of warm water compresses with cinnamon (Cinnamomum) powder on pain reduction among the elderly without the use of a control group. The design allowed direct comparison of pain intensity before and after the intervention within the same participants, thereby facilitating assessment of short-term changes attributable to the treatment. This approach is commonly used in exploratory nursing research when the primary aim is to identify measurable clinical effects prior to conducting more rigorous randomized controlled trials..

*Sampling*

The study population consisted of all elderly individuals diagnosed with gouty arthritis and registered at Bukit Selabu Sekayu Primary Health Center in 2025. A total sampling technique was applied, involving all 35 eligible participants, due to the small accessible population and the desire to minimize sampling bias. Inclusion criteria included: (1) age ≥ 60 years, (2) confirmed diagnosis of gouty arthritis based on health center medical records, and (3) no use of anti-inflammatory medications within 24 hours prior to data collection. Exclusion criteria included cognitive impairment, open wounds or irritation at the compression site, severe sensory disturbances, or inability to communicate pain levels reliably.

*Instruments*

Two primary instruments were used in this study: 1)Standard Operating Procedure (SOP) for administering the warm water compress with cinnamon powder to ensure consistency, safety, and procedural accuracy across all treatment sessions. 2) Numeric Rating Scale (NRS), a validated 0–10 pain assessment tool, used to measure perceived pain intensity before and after the intervention. Pain scores were categorized as: 0 (no pain), 1–3 (mild), 4–6 (moderate), and 7–10 (severe). The NRS

observation sheet was used to record all measurements during data collection.

*Intervention*

The intervention consisted of administering a warm water compress infused with cinnamon (Cinnamomum) powder once daily for two consecutive days. Each session lasted 15 minutes, and the water temperature was maintained at 40–45°C using a calibrated thermometer to ensure thermal consistency and prevent skin injury. The cinnamon powder was mixed into the warm water according to the SOP, and the compress was applied directly to the affected joint area. The procedure was supervised by the researcher and assisted by health center nurses to ensure adherence to protocol. The duration and temperature were chosen based on prior evidence showing optimal vasodilation, increased local circulation, and reduced inflammatory response with short-duration warm compress therapy.

*Data Analysis*

Data collection occurred in two stages: Pre-test measurement: Participants rated their baseline pain intensity using the NRS before receiving any intervention. Post-test measurement: Pain scores were reassessed after completing the second day of intervention. Demographic data—including age, gender, and education level—were collected using a structured form. All assessments were conducted in a private examination room to ensure comfort and reduce response bias. The researcher conducted direct observation to ensure accuracy and reliability of pain reporting.

*Data Analysis*

Data were analyzed using descriptive and inferential statistics. Descriptive analysis was used to summarize demographic characteristics and pain scores (mean, frequency distribution). Since the data were not normally distributed, the Wilcoxon Signed Rank Test was performed to compare pre- and post-intervention pain scores. significance level of $p < 0.05$ was set for determining statistical significance.

*Data Analysis*

Ethical approval was obtained from Bukit Selabu Sekayu Primary Health Center prior to data collection. All participants received a clear explanation of the study objectives, procedures, potential risks, and benefits. Written informed consent was obtained from every participant before enrollment. Confidentiality was maintained by coding all data and securing all documents in password-protected files. Participants were assured of their right to withdraw from the study at any time without consequence to their treatment services.

## Results

The results of this study present the demographic characteristics of the elderly participants and provide an overview of the sample before the intervention was administered. A total of 35 elderly individuals diagnosed with gouty arthritis were included. Their demographic characteristics—age, gender, and education level—are shown in Table 1. These characteristics offer important contextual information for interpreting the effectiveness of the warm water compress with cinnamon (Cinnamomum) powder on pain reduction.

The demographic characteristics show that most respondents were in the early elderly age category (60–62 years), representing 85.7% of the sample. This distribution suggests that the majority of participants were still within a relatively active elderly group, which may influence their baseline mobility and response to intervention. The gender distribution reveals that 82.9% of participants were female. This pattern aligns with common epidemiological findings that joint pain and gout-related symptoms are more frequently reported among elderly women, likely due to hormonal changes, reduced estrogen levels, and increased vulnerability to inflammatory conditions in older age.

The educational background of the respondents shows that more than half (51.4%) had only completed elementary school. Lower educational attainment may affect health literacy, the ability to understand pain scales,

and adherence to non-pharmacological interventions. This demographic context is crucial because it may influence how effectively elderly individuals engage with therapeutic modalities such as warm water herbal compresses.

**Table 1.** Demographic Characteristics of the Elderly Participants

| Variables | Frequency (n) | Percent (%) |
|---|---|---|
| **Age** | | |
| 60-62 years | 30 | 85,7 |
| 63-64 years | 5 | 14,3 |
| **Gender** | | |
| Male | 6 | 17,1 |
| Female | 29 | 82,9 |
| **Education Level** | | |
| Elementary school | 18 | 51,4 |
| Junio high school | 11 | 31,4 |
| Senior High school | 6 | 17,1 |

Overall, the demographic structure of this sample reflects a typical community-dwelling elderly population in rural or semi-urban Indonesian settings, where females dominate health service utilization and educational backgrounds tend to be modest. These factors should be considered when interpreting the intervention outcomes, as they may shape participants' pain perception and responsiveness to the cinnamon warm compress therapy.

**Table 2.** Pain Scale Distribution Before and After Warm Water Cinnamon Compress

| Pain Measurement | Frequency (n) | Percentage (%) | Mean | Z-value | pvalue |
|---|---|---|---|---|---|
| **Before Intervention** | | | 4,63 | -5232 | 0,000 |
| 0 (No Pain) | 0 | 14,3 | | | |
| 1-3 ( Mild Pain) | 5 | 85,7 | | | |
| 4-6 (Moderate Pain) | 30 | 85,7 | | | |
| **After Intervention** | | | 1,97 | | |
| 0 (No Pain) | 0 | 0 | | | |
| 1-3 ( Mild Pain) | 33 | 94,3 | | | |
| 4-6 (Moderate Pain) | 2 | 5,7 | | | |

Tabel 2 show the pre-intervention pain assessment shows that the vast majority of elderly respondents (85.7%) experienced moderate pain (NRS 4–6), while only 14.3% reported mild pain. There were no participants with a pain score of zero, indicating that all respondents experienced some level of discomfort prior to the warm water cinnamon compress therapy. This finding highlights the substantial burden of gout-related pain within the elderly population in the study setting.

Following the intervention, there was a marked shift in the distribution of pain intensity. A total of 33 respondents (94.3%) reported mild pain (NRS 1–3), and only 2 respondents (5.7%) remained in the moderate pain category. Again, no participants reported zero pain, but the overall reduction in pain severity was pronounced and consistent across the sample. This transition from moderate to mild pain among most respondents demonstrates a clear improvement after the cinnamon warm compress application.

The change in pain distribution suggests that the intervention had a significant clinical effect in reducing the intensity of gout arthritis pain. The movement of nearly the entire sample into the mild pain category confirms the consistency of the intervention's impact across individuals. Furthermore, the data support the physiological

rationale for warm compresses combined with cinnamon's anti-inflammatory properties, which enhance blood flow, reduce muscle stiffness, and modulate local inflammatory responses.

Overall, the translated Table 2 provides strong descriptive evidence that the warm water cinnamon compress was effective in alleviating pain among the elderly with gout arthritis at Bukit Selabu Sekayu Health Center. This descriptive change was further substantiated in the inferential analysis (Wilcoxon test), demonstrating statistically significant pain reduction after the intervention.

The statistical analysis revealed a substantial reduction in pain intensity following the warm water cinnamon compress intervention. The mean pain score decreased from 4.63 (moderate pain) before the intervention to 1.97 (mild pain) after the intervention. The Wilcoxon Signed Rank Test produced a Z-value of –5.232 and a p-value of 0.000, which is far below the significance threshold of 0.05. This result demonstrates a statistically significant difference between the pre-intervention and post-intervention pain scores.

The negative Z-value indicates that the majority of changes were in the direction of pain reduction, confirming that most respondents experienced improvement after the treatment. A p-value of 0.000 strongly supports the conclusion that the observed reduction in pain was unlikely due to chance and was instead attributable to the intervention.

Clinically, the reduction of 2.66 points on the NRS scale exceeds the commonly accepted threshold for clinically meaningful pain improvement, which is a reduction of ≥2 points. This indicates not only statistical significance but also meaningful relief that likely improved the comfort, mobility, and daily functioning of the elderly participants.

Taken together, these findings validate the effectiveness of warm water compresses combined with cinnamon powder as a non-pharmacological intervention for managing gout arthritis pain among the elderly. The intervention's impact aligns with the physiological mechanisms of heat therapy (vasodilation, muscle relaxation) and cinnamon's known anti-inflammatory and analgesic properties, further reinforcing its therapeutic value in primary healthcare settings

## Discussion

The findings of this study demonstrate a significant reduction in gout arthritis pain among the elderly after receiving warm water compresses with cinnamon (Cinnamomum) powder, indicating strong clinical and statistical effectiveness. This improvement aligns with the physiological basis of heat therapy, which promotes vasodilation, reduces muscle stiffness, and enhances tissue perfusion, thereby decreasing pain perception in inflamed joints. Similar beneficial outcomes have been reported in previous work, such as the pilot study on osteoarthritis management using chickpea-based therapy, which showed that non-pharmacological interventions can positively affect joint inflammation and discomfort (Ahmadi et al., 2020). This suggests that complementary therapies may offer meaningful symptom relief, particularly for elderly individuals who often have limitations in pharmacological options.

The effectiveness of cinnamon in pain reduction is further supported by its bioactive compounds, particularly cinnamaldehyde and eugenol, which possess anti-inflammatory and analgesic properties. These compounds inhibit inflammatory pathways and modulate pain signaling, a mechanism consistent with studies that reported clinical improvements in rheumatoid arthritis symptoms following cinnamon consumption (Shishehbor et al., 2018; Nurhayati & Umarianti, 2018). The results of this study also corroborate evidence from several local investigations showing significant pain reduction after applying cinnamon-based warm compresses in elderly populations with gout arthritis (Antoni et al., 2020; Dewi et al., 2025; Febriyona et al., 2023). These converging findings reinforce the potential of cinnamon as a viable herbal option in musculoskeletal pain management.

In the context of elderly populations, pain management must consider age-related physiological changes, comorbidities, and reduced tolerance to long-term medication use. The elderly in this study benefited from an intervention that is safe, inexpensive, and easily applied, which is similar to the outcomes observed in pre-experimental research conducted in social care settings, showing that cinnamon compresses reduce joint pain without adverse effects (Erlangga et al., 2025). Non-pharmacological strategies such as this are particularly valuable because many elderly patients have polypharmacy risks, making them vulnerable to gastrointestinal, renal, and cardiovascular side effects from chronic NSAID use. This aligns with observations that elderly independence and functional capability are closely tied to effective symptom management (Saputra et al., 2024).

The present findings also highlight the relevance of local cultural practices and community-based health service delivery. In Indonesia, herbal therapies such as cinnamon decoction and warm herbal compresses are widely accepted and culturally embedded, which enhances treatment adherence (Pattiradjawane, 2017; Nofia et al., 2021). Research on family support and elderly characteristics similarly indicates that culturally familiar interventions improve comfort and compliance, which can positively influence treatment outcomes (Kurstin & Merlla, 2021). In addition, the integration of traditional remedies with modern nursing practice is consistent with the growing emphasis on safe, accessible, and evidence-based complementary therapies in primary care settings.

Moreover, the findings of this study align with previous clinical and community-based research indicating that herbal compresses—whether made from ginger, cinnamon, or mixed herbal preparations—are effective in reducing gout-related pain in elderly individuals (Fitriani & Supriyadi, 2020; Suryani et al., 2021; Umah et al., 2020; Wilda & Panorama, 2020). The physiological mechanisms proposed across these studies are consistent: improved local circulation, reduced inflammatory mediator accumulation, and muscle relaxation contribute collectively to pain reduction. Such evidence also resonates with broader discussions on herbal medicine utilization in chronic joint diseases, where patients often seek alternative therapies to minimize medication side effects (Rambod et al., 2018).

Taken together, the current findings reinforce the growing evidence that cinnamon warm compress therapy is an effective non-pharmacological strategy for managing gout arthritis pain in elderly individuals. While pain improvement was substantial, this study also points to broader implications for elderly health services. Improving pain management may enhance mobility, independence, and quality of life among elderly populations, consistent with insights from geriatric health research showing that physical comfort plays a critical role in functional well-being (Boibalan & Sukihananto, 2024). Future research may compare cinnamon compresses with other herbal or physical modalities, explore long-term outcomes, and assess their integration with digital health tools to support elderly self-care.

## Conclusion and Recommendation

This study demonstrated that warm water compress therapy using cinnamon (Cinnamomum) powder is both statistically and clinically effective in reducing gout arthritis pain among the elderly. The intervention resulted in a substantial decrease in mean pain scores from moderate to mild categories, indicating meaningful improvement in comfort and functional capacity. The findings support the therapeutic value of cinnamon's anti-inflammatory properties combined with the physiological benefits of heat application, offering a safe, low-cost, and culturally acceptable non-pharmacological option for elderly pain management in primary healthcare settings. Given its simplicity and feasibility, cinnamon warm compress therapy can be considered a complementary intervention to enhance geriatric musculoskeletal care, particularly in communities with limited access to conventional treatments.

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## Declaration of conflict of interest
The authors declare no competing interests.

## Declaration on the Use of AI
No AI tools were used in the preparation of this manuscript.

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