



The Effect of Foot Soaking Therapy with Ginger Water on the Level of Pain in Gout Arthritis Patients at the Central City Health Center

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ABSTRACT

Gout arthritis triggers acute pain that interferes with mobility. At the Central City Health Center, there were 459 cases with a tendency for patients to avoid chemical drugs. Warm ginger water foot soaking therapy comes as a nonpharmacological alternative that takes advantage of the thermal and phytochemical effects of ginger. This Quasi-Experimental quantitative research with Non-Equivalent Control Group Design involved 36 respondents who were selected by purposive sampling. Respondents were divided into intervention groups (warm ginger water) and control (warm water). The pain scale was measured using the Numeric Rating Scale (NRS) and analyzed using the Wilcoxon and Mann-Whitney tests. The majority of respondents were men (56%) with an age range of 41-50 years (44%). Both groups showed a significant reduction in pain after the intervention ($p=0.000$). Although the decline in the ginger group was slightly higher, the intergroup test showed no significant difference in effectiveness ($p=0.318$). Soaking your feet in warm ginger water and regular warm water are equally effective in relieving gout arthritis pain. This therapy is recommended as a safe and economical independent pain management for the community.

INTRODUCTION

One of the non-communicable diseases that deserves attention is gout arthritis. Gout arthritis or often referred to as gout by the community is a disorder that occurs due to purines, a metabolic disorder characterized by hyperuricemia and recurrent acute synovitis attacks (Zainiyah et al., 2021). Gout is a condition in which uric acid levels increase in the blood. This condition is a reflection of changes in purine metabolism that cause an increase in uric acid levels in the blood. Arthritis and gout are joint diseases that are widely found in health care facilities and contribute greatly to the burden of degenerative diseases (Mahmudi et al., 2024).

Gout is classified as one of the degenerative diseases because of the high number of complications caused. This condition can trigger various serious health problems, including kidney failure, the formation of kidney stones, and other disorders that are still significant problems in society (Astrilian & Yuniartika, 2024). Increased uric acid levels can cause damage to the body. This condition occurs when the results of purine metabolism, namely uric acid, cannot be excreted optimally through the kidneys, resulting in an accumulation in the blood that causes a progressive increase in uric acid concentration (Supriyatin et al., 2021).

The World Health Organization (WHO) in 2023 stated that the incidence of gout in the world reached 335 million people and experienced an increase of around 1370 or 33.3% of people suffering from gout. The prevalence of gout in Indonesia is increasing, SKI data in 2023 records the prevalence of gout in Indonesia based on diagnosis or symptoms of 12.9%, and when viewed from age characteristics of 25.7%, with the

highest prevalence found in the age group ≥ 75 years old (54.8%). Women also suffer more (8.5%) compared to men (6.2%) (Ministry of Health of the Republic of Indonesia, 2023).

Data from the Gorontalo Provincial Health Office in 2025 collected from all health centers in the province recorded 4,635 cases with a distribution of hospitalization cases of 68 cases (1.47%), while outpatient dominates with 4,567 cases (98.53%). Of the total outpatient cases, 66.38% were arthritis, followed by gout arthritis at 11.17%, gout at 6.45%, and unspecified arthritis at 11.03%. Based on official data obtained from the Gorontalo City Health Office in 2025, the total number of gout arthritis cases recorded in five health centers in the Gorontalo City area reached 2,559 cases.

Based on data from the Central City Health Center until August 2025, the number of gout cases was recorded at 459 cases. Of these, 77 cases were reported with the main complaint in the form of joint pain that interferes with daily activities. Based on the results of interviews with patients at the health center, three out of five patients said that they were reluctant to take pain medication because they were worried about the side effects that might be caused. They also said that the level of pain felt was not too severe, so according to him there was no need to take pain medication. This phenomenon emphasizes the need for a non-pharmacological therapy approach that is safe, easy to apply, and able to help reduce the intensity of pain in gout arthritis patients.

The high proportion of gout cases also shows that joint disease is still the dominant problem that requires special attention in health services. This figure gives an idea that gout arthritis is still one of the major health problems in the area and requires serious attention from various parties (Oktaviani, 2023). The high number of cases indicates that there are risk factors that have not been fully controlled in the community, such as consumption patterns of foods high in purines, lack of physical activity, and limited awareness to carry out routine health checks (Faqih et al., 2023).

There are a number of factors that contribute to the incidence of gout, such as lack of control over the consumption of foods high in purines, such as vegetables, nuts, meat, offal to sardines Tyas et al (2025). Purines are substances that make up nucleic acids, including the group of amino acids, elements that form proteins. The purines contained in nucleic acids will be reduced to mononucleotides, then hydrolyzed into nucleosides that can be directly absorbed by the body. Some of them will be broken down again into purines and pyrimidines which will then be oxidized into uric acid (Irot et al., 2022).

The phenomenon of increased uric acid levels in the blood or hyperuricemia can trigger the occurrence of gout, an inflammatory condition characterized by acute pain, especially in the joints. This condition occurs due to the accumulation of monosodium crystals in the veins that settle in joint and soft tissue tissues (Sinta, 2024). Factors such as uncontrolled diet, lack of knowledge about the importance of routine health checkups, and limited information related to the causes of gout also affect the high incidence of gout in the community (Yasin et al., 2023).

Gout can be experienced by anyone, including teenagers to the elderly (Andriani & Fatmawati, 2023). Some people with gout problems often ignore the signs and symptoms that arise. One of the main symptoms that often appear in people with gout is pain caused by acid buildup in the joints (Nugroho et al., 2022). Pain is an unpleasant sensory and emotional phenomenon due to subjective tissue malfunctions. Sensory complaints are usually expressed such as pain, sciatica, pain, and so on so that it can be considered a pain modality. For some people, pain can interfere with comfort and physical activity (Wati et al., 2022).

Complaints or pain symptoms in gout sufferers can be overcome by two methods, namely pharmacologically and non-pharmacologically. The pharmacological method is the act of administering analgesics as a pain reducer, while the nonpharmacological method is defined as a form of treatment that does not involve the use of drugs, but rather utilizes other methods outside of pharmacotherapy to help reduce symptoms or improve a person's health condition such as relaxation, meditation, music therapy and others (Fajri et al., 2022). One of the nonpharmacological therapies that is often used to reduce pain symptoms in gout sufferers is hydrotherapy soaking feet in warm water (Toto & Nababan, 2023).

Warm water immersion hydrotherapy as one of the non-pharmacological therapies is considered superior to pharmacological therapy in reducing pain levels because it can reduce dependence on drugs, minimize side effects, and provide a natural relaxation and comfort effect (Fajri et al., 2022). Soaking the feet with warm water is also not too difficult for everyone to do, the cost required is not too large, and it does not cause harmful side effects (Prasetya, 2021). The hydrotherapy mechanism using warm water works through the transfer of heat into the body, which then causes the dilation of blood vessels thereby improving circulation and helping to relieve muscle tension (Dewi & Khayati, 2021).

Hydrotherapy is generally combined with the use of herbal plants, such as ginger or lemongrass, to increase the effectiveness of therapy because the combination of water heat and herbal bioactive content can provide relaxing, anti-inflammatory, and accelerated recovery effects (Rosima et al., 2023). One type of medicinal plant that can be combined in warm water foot soaking therapy is ginger. There are three types of ginger that are commonly known by the public, namely emprit ginger, elephant ginger, and red ginger. However, the type of ginger that is often used for therapeutic purposes is red ginger because it has a higher level of essential oils than other gingers (Sani & Fitriyani, 2021).

Red ginger has the most significant benefits when compared to other types of ginger because the gingerol compounds contained in it have been tested to be effective as evidenced by hypotensive activity (Masniah et al., 2021). The gingerol content contained in red ginger in the form of non-volatile oil can cause a warm sensation on the skin when used topically. Therefore, red ginger decoction used in clinically tested foot soaking therapy can have the effect of improving blood circulation and increasing muscle relaxation (Griselda & Akhmad, 2023)

Recently, many studies have been conducted and discussed the effect of soaking feet with warm ginger water on reducing the pain scale in people with gout arthritis. For example, research by Zainiyah et al (2021), Haksara (2022) and Rohmantika & Chandra (2022) which consistently showed a decrease in pain levels in gout sufferers after being given a foot soaking intervention with warm ginger water. The three concluded that the therapy provided was effective in reducing joint pain that is often experienced by gout sufferers. The intervention has been shown to be effective because the active ingredient in ginger, such as gingerol, has anti-inflammatory and analgesic effects that play a role in reducing inflammation and pain.

However, most of the studies were specifically focused on the elderly group, so the findings could not be generalized thoroughly to other age groups. Therefore, further research is still needed to determine the effectiveness of soaking feet with warm ginger water in a more diverse age group, so that the results obtained can provide a more comprehensive picture and can be generalized widely.

RESEARCH METHODS

This research has been carried out in the working area of the Central City Health Center, Gorontalo City Regency, Gorontalo Province on October 22 – November 15, 2025. The type of quantitative research uses a Quasi Experimental research design with a Non-Equivalent Control Group Design approach (pre-test post-test with control group). The sampling technique in this study used Purposive Sampling with a sample of 36 respondents. The research instruments used consisted of observation sheets to determine the demographic data of the respondents, Numeric Rating Scale (NRS), SOPs for soaking feet with warm ginger water and SOPs for soaking feet in warm water.

RESEARCH RESULTS

Univariate Analysis

Characteristics of Respondents Based on Demographic Data

Table 1. Characteristics of respondents by age

Age (Years)	Frequency (N)	Percentage (%)
38 - 40	5	14
41 - 50	16	44
51 - 60	8	22
61 - 70	7	19
Total	36	100

Source : Primary Data 2025

Based on the table above, the age distribution of respondents shows that the majority are in the age range of 41-50 years with the highest percentage, which is 44%. On the other hand, the age group that has the lowest proportion is in the age range of 38-40 years, which is 14%.

Table 2. Characteristics of respondents by gender

Gender	Frequency (N)	Percentage (%)
Male	20	56
Women	16	44
Total	36	100

Source : Primary Data 2025

Based on the table above, it can be concluded that the number of male respondents is more than the number of female respondents with a distribution of 20 male (56%) and female 16 (44%) male respondents.

Table 3. Characteristics of respondents based on education

Education	Frequency (N)	Percentage (%)
SD	6	17
Junior High School	11	31
High School	19	53
Total	36	100

Source : Primary Data 2025

Based on the table, it can be seen that the largest group of respondents have a high school education background with a proportion of 53%, while the group with elementary education is the fewer, which is only 17%.

Table 4. Characteristics of respondents by occupation

Jobs	Frequency (N)	Percentage (%)
Farmer	3	8
Merchant	7	19
Self-employed	3	8
IRT	13	36
Online Motorcycle Taxi	5	14
Not working	5	14
Total	36	100

Source : Primary Data, 2025

Based on the table, it can be seen that Housewives (IRT) are the largest group of respondents with a proportion of 36%, while the Farmers and Self-Employed groups are the fewer, each accounting for only 8%.

Table 5. Respondent characteristics based on pain level before therapy

Groups	Quantity	Pain Levels Before				
		Min	Max	Red	Median	Std. Dev
Intervention	18	3	7	4.78	5.00	1.309
Controls	18	3	6	4.44	4.00	1.097

Source : Primary Data, 2025

Based on the table above, respondents in both groups (N=18 per group) had similar levels of initial pain. The intervention group had an average pain rate before therapy of 4.78 and the control group of 4.44.

Table 6. Characteristics of respondents based on pain level after therapy

Groups	Quantity	Pain Levels After				
		Min	Max	Red	Median	Std. Dev
Intervention	18	1	4	2.39	2.00	.979
Controls	18	0	4	2.39	2.39	1.145

Source : Primary Data, 2025

Based on the table, it was seen that there was a significant decrease in pain levels in both groups, the pain level after therapy in the intervention group was 2.39 and in the control group was also 2.39. The average decrease or difference in pain in the intervention group was 2.39 while in the control group it was 2.06. This suggests that the average reduction in pain in the intervention group was slightly greater with higher data variability than in the control group.

Bivariate Analysis

Table 7. Analysis of decreased pain levels before and after the administration of foot soaking therapy with warm ginger water in the intervention group

Groups	Pain Level		<i>p</i>
	<i>Pre-tets</i>	<i>Post-test</i>	
Intervention	<i>Mean±SD</i>	<i>Mean±SD</i>	0.000
	4,78±1,309	2.39±0.979	

Source : Primary Data, 2025

Based on the table above, it shows that the changes in pain in gout patients experienced by respondents in the intervention group of soaking feet with warm ginger water with a total of 18 respondents (100%) obtained an average score of 9.50 and the result of Asymp Sig. (2 Tailed) 0.000 which means that there is an effect in the administration of foot soaking therapy with warm ginger water.

Table 8. Analysis of a reduction in pain levels after soaking in warm water in the control group

Groups	Pain Level		<i>p</i>
	<i>Pre-tets</i>	<i>Post-test</i>	
Controls	<i>Mean±SD</i>	<i>Mean±SD</i>	0.000a
	4.44 ± 1.09	2.39 ± 1.14	

Description: n: sample; p: significance; (*) $p < 0.05$: meaningful difference; a=paired t-test
(Source: Primary Data, 2025)

Table 9. Effect of warm ginger water foot soaking therapy and warm water foot soaking therapy on pain levels in people with gout arthritis

Variable	Intervention (n=18)	Controls (n=18)	<i>p</i>
Pain Level	<i>Mean±SD</i>	<i>Mean±SD</i>	0.318
	2.39±0.979	2.06±0.539	

Description: n: sample, mean: the average value of the group; p: significance; (*) $p > 0.05$: no meaningful difference; a=independent sample t-test
(Source: Primary Data, 2025)

DISCUSSION**Pain Levels Before Foot Soaking Therapy With Ginger Water In Patients With Gout Arthritis**

Based on the results of the descriptive analysis, the level of pain before therapy in both groups showed a relatively comparable initial condition. In the intervention group, the value of pain before therapy was in the range of 3 to 7, indicating that most respondents experienced pain with considerable variation. Meanwhile, in the control group, the initial pain level was in the range of 3 to 6, indicating that respondents experienced pain with more homogeneous variations.

This comparison suggests that although the intervention group had slightly higher average pain, both groups were at similar initial pain levels so it was worth comparing in assessing the effectiveness of therapy. However, the higher mean scores in the intervention group were likely due to differences in pain perception, individual physiological conditions such as age and level of joint inflammation, and variations in the severity of hyperuricemia between respondents that made the intervention group have a more diverse and likely higher pain distribution than the control group.

The manifestations of joint pain experienced by 36 respondents in this study are an implication of the complex interaction between degenerative factors, hormonal profile, and mechanical load of the joints. Based on age characteristics, the onset of pain in the majority of adult and elderly respondents is pathophysiologically related to decreased kidney filtration function and reduced uricase enzyme activity. This condition optimally inhibits uric acid excretion, thereby triggering the accumulation of monosodium uric crystals in the joint space

that stimulate an acute inflammatory response (Liu et al., 2023). This vulnerability is further exacerbated by metabolic changes and degenerative comorbidities prevalent in the elderly age group, which systemically interfere with the regulation of uric acid levels (Wang et al., 2021).

Gender also contributes to pain intensity through hormonal and lifestyle influences. The dominance of male respondents showed a correlation between high serum uric acid levels and exposure to risk factors such as purine consumption and sedentary lifestyles that trigger central obesity (Asghari et al., 2024, Mao et al., 2024). On the other hand, the appearance of pain in post-menopausal female respondents is related to a decrease in levels of the hormone estrogen, which physiologically plays a role in increasing uric acid clearance through the kidneys (Timsans & Palomäki, 2024).

Work is also a determining factor in the occurrence of pain through mechanical stress mechanisms in the joints. Strenuous physical activity in informal work, such as transporting loads or static positions for long periods of time, triggers inflammation of the synovial tissues of joints that have undergone a buildup of vein crystals (Lestari et al., 2021). Meanwhile, the profiles of respondents who are not working tend to be at risk of insulin resistance due to a sedentary lifestyle, which biochemically inhibits the body's uric acid removal (Qin & Hua, 2024). The synergy between age-related decline in biological function, hormonal profiles by gender, and physical stress from daily activities underlies the finding that pre-therapy pain levels in both groups are very diverse.

Effect of Warm Water Foot Soaking Therapy on Pain Level in Gout Arthritis Patients

Based on the table of respondent characteristics based on the level of pain before and after therapy, it was seen that both intervention and control groups experienced a decrease in pain levels after being given therapy. In the intervention group, the value of pain after therapy was in the range of 1–4, suggesting that the therapeutic effect of soaking feet in warm ginger water was able to reduce pain consistently with relatively low variation. Meanwhile, the control group also experienced a decrease in pain with a value range of 0–4, although the data spread was slightly more variable.

The reduction in pain in the intervention group was influenced by the bioactive content of red ginger, such as gingerol, shogaol, and zingerone, which are anti-inflammatory and analgesic through inhibition of the synthesis of prostaglandins and other inflammatory mediators (Ahnafani et al., 2024). Ginger oleoresin produces a warm sensation that increases vasodilation and tissue perfusion, thereby accelerating the removal of pain mediators. Warm ginger water foot soaking therapy works through a combination of the heat and phytochemical effects of ginger, where warm temperatures trigger peripheral vascular vasodilation, increase blood flow, and aid in the elimination of inflammatory mediators and metabolites including veins, resulting in reduced pain (Krisnandari et al., 2022). Local heat also improves tissue flexibility, decreases muscle spasms, and reduces joint stiffness that often appears in gout. The content of gingerol, shogaol, and zingerone in ginger plays a role in inhibiting inflammatory pathways as well as the production of pro-inflammatory prostaglandins and cytokines, while their antioxidant activity helps reduce oxidative stress in inflamed tissues due to monosodium crystals of the veins (Tyas et al., 2025).

The reduction in pain in the control group was consistent with the hydrotherapy theory which states that warm water baths can improve blood circulation, reduce muscle tension, and decrease pain perception through physiological relaxation mechanisms (Mao et al., 2023). The mechanism of action of soaking feet in warm water in gout sufferers mainly functions through the effects of local thermotherapy. Exposure to heat triggers vasodilation of blood vessels thereby increasing blood flow to the inflamed area, helping to accelerate the elimination of inflammatory mediators and metabolites, including the vein crystals that trigger inflammation. Warm temperatures also increase tissue flexibility, reduce joint stiffness, and decrease muscle spasms that often exacerbate pain complaints in gout (Anjani et al., 2025). In addition, heat stimulation can modulate the nervous system through a gate control mechanism that inhibits the transmission of pain signals to the brain. The combination of vasodilation, tissue relaxation, local inflammation reduction, and modulation of pain perception makes soaking feet in warm water effective in relieving pain in gout sufferers (Green et al., 2025).

However, the effectiveness of both therapies was also supported by the characteristics of the respondents, where the majority were in adulthood to old age who were physiologically more responsive to thermotherapy interventions due to decreased tissue elasticity and peripheral perfusion. Gender differences also contribute, given that men generally have higher uric acid levels so the response to therapies that improve peripheral circulation becomes more pronounced. The characteristics of work, both strenuous and sedentary, also affect the level of muscle tension and accumulated joint fatigue, so that therapies that improve tissue relaxation and vasodilation provide more optimal benefits to the group. Therefore, the mechanism of action of foot therapy soaking in warm water and warm ginger water is in harmony with the physiological condition and lifestyle of the respondents, thus contributing to the reduction of pain that occurs.

Effect of Warm Ginger Water Foot Soaking Therapy on Pain Level in Gout Arthritis Patients

Based on the statistical results in the group using the Wilcoxon Test, it showed that both groups experienced a significant reduction in pain pre-post. This can be seen from the change in pain intensity that is quite noticeable in each group. In the intervention group, the initial pain range which was on a scale of 3–7, decreased to a scale of 1–4. A similar phenomenon was also found in the control group, where the pain scale before the intervention ranged from a scale of 3–6 and decreased to a scale of 0–4 after the intervention.

This is in line with the working mechanism of each therapy. In the intervention group, soaking the feet in warm ginger water provided a combination of thermotherapy and active phytochemicals of ginger, where warm temperatures increased vasodilation and tissue perfusion, while gingerol and shogaol compounds played a role in suppressing inflammatory mediators so that pain intensity was reduced (Bangun & Silalahi, 2022). Meanwhile, in the control group, soaking the feet in warm water was also effective in reducing pain through hydrotherapy mechanisms, namely increased peripheral blood flow, muscle relaxation, and modulation of pain sensations through thermal physiological mechanisms (Lilis et al., 2021).

Although both groups experienced significant pain reductions within the group, the results of the Mann–Whitney test showed a P-Value of = 0.318, indicating that there was no significant difference in pain levels between groups after the intervention. This insignificance can be influenced by several factors, including the basic effectiveness of warm water foot soaking therapy which is indeed quite strong as a non-pharmacological modality in improving circulation and reducing muscle tension, so that the additional difference in the effect of ginger's phytochemical content is not too large statistically. In addition, the relatively small sample size can reduce the strength of the test, so that small differences between groups are not detected. The relatively homogeneous characteristics of respondents, both in terms of age, gender, and type of occupation, can also make the physiological response to both types of therapy similar.

However, the intervention group that received a warm ginger water foot soak showed a slightly greater reduction in pain levels than the control group that only received a warm water foot soak, indicating a tendency for additional effects of ginger's anti-inflammatory components. However, the increase in those effects was not large enough to produce a statistically significant difference. Therefore, although warm ginger water therapy has the potential to provide additional benefits through anti-inflammatory mechanisms, the results of this study show that both work effectively reduce pain, but do not differ significantly when compared between groups.

Overall, the mechanism of action of red ginger, which is rich in oleoresins, consists of gingerol, shogaol, zingerone, and its degradation products such as zingerone providing a warm and anti-inflammatory effect that can support pain reduction through increased vasodilation and tissue relaxation (Dramawan & Ningsih, 2022). On the other hand, soaking feet in warm water as a nonpharmacological method also works through increased blood flow and the removal of inflammatory mediators that play a role in the onset of local pain. By considering these two mechanisms, the results of this study show that both soaking feet in warm ginger water and soaking feet in warm water are both able to reduce pain in gout sufferers.

Based on the overall results of the statistical test, no significant differences were found between the two study groups. This is emphasized by the results of the Mann-Whitney U Test which showed the mean rank in the intervention group of 20.00, while the control group was 17.00. Although there was a difference of 3 points in the average rating value which showed a tendency to reduce pain better in the intervention group, the results of the significance analysis showed a value of $p = 0.318$ ($p > 0.05$). Thus, it can be empirically concluded that H_0 is accepted and H_1 is rejected, which indicates that the difference is not strong enough to be stated as a meaningful influence between the two interventions on the pain levels of people with gout.

CONCLUSION

The level of pain experienced by gout arthritis patients at the Central City Health Center before being given foot soaking therapy with ginger water was collectively identified to be in the category of moderate pain, indicating the presence of substantial pain complaints and sufficiently interfering with the functional activities of the respondents.

There was a change in the level of pain experienced by gout arthritis patients at the Central City Health Center after being given ginger water foot soaking therapy. However, the results of the analysis were obtained P Value = .318 which indicates that the decrease in pain levels is not statistically significant, indicating that the changes that occur are not strong enough to prove a meaningful difference.

Ginger water foot soaking therapy has the potential to be considered as a complementary non-pharmacological intervention in the pain management of gout arthritis. However, statistical results show that this intervention has not been shown to be significantly effective in significantly reducing pain, so its effectiveness as a single therapy requires further validation through studies with larger sample counts and stricter control of variables.

ADVICE

For Puskesmas

The Central City Health Center is expected to make the therapy of soaking feet in warm ginger water and soaking feet in warm water as one of the alternative non-pharmacological interventions in efforts to reduce pain in gout arthritis sufferers, as well as consider the application of these therapies as part of the educational and promotive health service programs.

For Gout Arthritis Sufferers

Patients experiencing pain due to gout arthritis are advised to utilize warm ginger water foot soaking therapy and warm water foot soaking therapy as easy-to-do, safe, and economical non-drug pain management methods to help reduce pain levels and increase comfort during daily activities.

For the Next Researcher

Further research is expected to examine more deeply the phytochemical content of red ginger and the physiological mechanisms that play a role in reducing pain, as well as conduct research with a longer duration of intervention and a larger number of samples so that the results obtained are more comprehensive and can be generalized.

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