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The Effect of Salt Hydrotherapy on Foot Pain Intensity in Patients with Gout Arthritis in The Working Area of Karanganyar Community Health Center

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ABSTRACT

Gout arthritis is an inflammatory joint disease caused by uric acid crystal deposition, leading to pain, particularly in the lower extremities, and potentially interfering with daily activities and reducing patients' quality of life. The condition highlights the need for safe, affordable, and accessible non-pharmacological therapies to support pain management in community settings. This study aimed to analyze changes in foot pain intensity after salt hydrotherapy among patients with gout arthritis in the working area of Karanganyar Community Health Center. A pre-experimental study with a one-group pretest-posttest design was conducted involving 17 respondents selected using purposive sampling. Pain intensity was measured using the Numeric Rating Scale before the intervention and after three intervention sessions within one week. The median pain score decreased from 6.00 (IQR 2; range 4–8) before the intervention to 3.00 (IQR 2; range 2–4) after the intervention. Statistical analysis using the Wilcoxon signed-rank test showed a statistically significant difference ($Z = -3.671$; $p < 0.001$), with a large effect size ($r = 0.89$). These findings indicate that salt hydrotherapy was associated with a reduction in foot pain intensity, with a shift in pain category from moderate to mild in the study sample. However, the findings should be interpreted cautiously because the study involved a small sample and no control group.

INTRODUCTION

Gout arthritis is a metabolic and inflammatory joint disorder caused by the deposition of monosodium urate crystals as a consequence of persistent hyperuricemia (Sivera et al., 2022). When serum uric acid levels exceed physiological saturation, urate crystals may precipitate in the joints and trigger inflammatory responses that cause pain, swelling, warmth, and limited mobility. The condition commonly affects peripheral joints, particularly the lower extremities, and may interfere with daily activities and quality of life (Wahab et al., 2024; Cha et al., 2024).

Recent epidemiological evidence indicates that the prevalence of gout arthritis continues to increase globally, paralleling aging populations, dietary transitions, and metabolic comorbidities such as obesity and hypertension (Sanchez-Lozada et al., 2020;Piani et al., 2021). In Indonesia, gout arthritis remains a significant public health concern, particularly among middle aged and elderly populations. Hormonal changes, especially decreased estrogen levels in postmenopausal women, further elevate the risk of hyperuricemia due to reduced renal urate excretion (Billa et al., 2026). These developments underscore that gout arthritis is not merely an episodic joint disease but a chronic metabolic inflammatory disorder requiring comprehensive management strategies.

Pain is the primary clinical manifestation driving patients to seek healthcare. Conceptually, pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage (Raja et al., 2020). In gout arthritis, MSU crystal induced activation of neutrophils and proinflammatory cytokines, particularly interleukin 1β, amplifies nociceptive signaling pathways and produces intense inflammatory pain (Cha et al., 2024). Persistent or recurrent pain negatively impacts sleep quality, mobility, productivity, and psychosocial well being. Therefore, effective pain control is central to improving patients' quality of life.

Current management of gout arthritis includes pharmacological and non pharmacological approaches. Pharmacological therapy such as allopurinol, colchicine, probenecid, and febuxostat aims to reduce serum uric acid levels and control inflammation (Arsal et al., 2025). Although effective, long term pharmacotherapy may be associated with adverse effects and issues of adherence. Consequently, complementary non pharmacological interventions have gained increasing attention. These include dietary modification, fluid intake optimization, weight management, relaxation techniques, and local thermal therapy (Jauhar et al.,

2022). Among these, hydrotherapy using warm water has demonstrated potential in reducing musculoskeletal pain through mechanisms of heat conduction, vasodilation, improved local circulation, and muscle relaxation Ezdha et al., 2023).

Salt hydrotherapy is a complementary intervention that combines warm water immersion with the addition of salt, including Epsom salt in some protocols (Johnson et al., 2023). Previous studies have reported reduced pain after warm water and salt-based soaking among patients with gout arthritis, particularly in elderly populations and institutional or local community settings (Dewi et al., 2020; Rahagia et al., 2020; Syaiful et al., 2025; Vakilinia et al., 2020). However, the specific contribution of the salt component remains less clearly established than the thermal effect of warm water, so the intervention in this study is evaluated as a combined salt hydrotherapy protocol rather than as isolated components.

Despite these advancements, several research gaps remain. First, most previous studies were conducted in elderly populations or institutional care settings, which limits the applicability of the findings to broader community-based primary healthcare contexts. Second, variation in intervention protocols, including temperature, duration, frequency, and salt concentration, has resulted in limited protocol standardization across studies. Third, evidence regarding the implementation of salt hydrotherapy in community nursing practice at the primary healthcare level remains limited, particularly in regional Indonesian settings. Therefore, the unresolved issue is not only whether this intervention is associated with pain reduction, but also whether a structured protocol can be feasibly applied in a community-based primary care setting.

The present study was conducted to examine changes in foot pain intensity after a structured salt hydrotherapy intervention among patients with gout arthritis in the working area of Karanganyar Public Health Center. This study is expected to contribute to the development of complementary nursing interventions that are simple, low-cost, and feasible in primary healthcare services.

Based on the theoretical framework of inflammatory pain and thermotherapy, the study hypothesis was formulated as follows: foot pain intensity measured using the Numeric Rating Scale would be lower after three sessions of salt hydrotherapy administered within one week than before the intervention among patients with gout arthritis in the study setting.

METHODS

Participant characteristics and research design

This study employed a quantitative pre-experimental approach using a one-group pretest-posttest design. The study was conducted in the working area of Karanganyar Public Health Center, Indonesia, from January to December 2025. The target population consisted of 33 patients with gout arthritis registered at the health center, and the final sample included 17 respondents who met the eligibility criteria. Demographic data collected included age, sex, and duration of illness. Clinically relevant baseline variables such as painful joint location, uric acid levels, medication use, comorbidities, and acute attack status were not comprehensively recorded and are therefore acknowledged as limitations of the study. Research permission was obtained from the Nursing Study Program of Universitas ʻAisyiyah Surakarta, the Karanganyar District Health Office, and Karanganyar Public Health Center prior to data collection.

Eligibility and Exclusion Criteria

Participants were eligible if they were receiving treatment based on records from Karanganyar Public Health Center, had been diagnosed with gout arthritis by a physician, experienced foot pain at the time of recruitment, were willing to participate by signing informed consent, and were able to communicate effectively. In this study, the diagnosis of gout arthritis was based on physician documentation in the health center records; however, specific diagnostic criteria, such as laboratory confirmation, uric acid levels, or classification criteria, were not uniformly documented and therefore could not be analyzed further. Participants were excluded if they had decreased consciousness, were in an emergency condition during data collection, had active bleeding or open wounds on the feet, had redness or blistering of the feet, or had known allergies related to the intervention.

Sampling Procedures

A non-probability sampling technique with a purposive sampling approach was applied. Participants were intentionally selected based on specific inclusion and exclusion criteria; therefore, not all members of the population had an equal opportunity to be included. Data collection was conducted through home visits using a door-to-door approach within the health center service area. Potential participants were approached directly, informed about the objectives and procedures of the study, and invited to participate voluntarily. Written informed consent was obtained prior to enrollment. No financial incentives were provided. The research team consisted of the principal investigator and four nursing students who had received prior training and orientation regarding the hydrotherapy procedure and the use of the Numeric Rating Scale for pain assessment.

Sample size, power, and precision

The intended minimum sample size was determined based on Roscoe′s recommendation for simple experimental research, which suggests a range between 10 and 20 participants. An initial sample size of 15 respondents was planned, and a 10% adjustment for possible dropout resulted in a target of 17 participants. The final sample size was 17 respondents. No formal statistical power analysis was performed. Therefore, this study should be interpreted as a preliminary or pilot study, and the findings should not be considered conclusive evidence of intervention effectiveness.

Measures and covariates

The primary outcome variable was foot pain intensity. Pain intensity was measured using the Numeric Rating Scale, a self-report instrument ranging from 0 to 10, where 0 indicates no pain and 10 indicates very severe pain. The scale categorizes pain into mild, moderate, and severe levels. The instrument was adopted from previously validated research and has demonstrated strong psychometric properties, with reported validity coefficients of 0.90 and reliability indicated by a Cronbach alpha of 0.950. Pain assessment was conducted immediately before the intervention as the pretest and after completion of the third hydrotherapy session as the posttest.

The independent variable was salt hydrotherapy. The intervention consisted of immersing the feet in two liters of warm water maintained at a temperature between 40.5 and 43°C and mixed with Epsom salt, equivalent to approximately three teaspoons, for 15 minutes per session. The intervention was administered three times within one week at two-day intervals. The procedure followed a standard operating protocol to ensure consistency. Equipment used included a basin, warm water, Epsom salt, a small towel, and a water thermometer to monitor temperature accuracy.

Demographic data were collected through structured interviews and observation sheets. To enhance measurement quality, research assistants received standardized training prior to data collection to ensure consistent implementation of the intervention and accurate pain assessment.

Data analysis

Data were processed and analyzed using the Statistical Package for the Social Sciences. Data management included editing, coding, transferring, and tabulation. Univariate analysis was conducted to describe respondent characteristics using frequencies and percentages. Because the distribution of pain intensity data was not normal based on the Shapiro-Wilk test for samples fewer than 50 participants, nonparametric analysis was applied. Pain intensity before and after the intervention was summarized using median, interquartile range (IQR), minimum, and maximum values. The Wilcoxon signed-rank test was used to examine differences between pretest and posttest pain scores. Statistical significance was established at a probability value less than 0.05. Effect size was calculated using the formula $r = |Z| / \sqrt{n}$.

Ethical Considerations

This study obtained institutional and administrative permission from Universitas ʻAisyiyah Surakarta, the Karanganyar District Health Office, and Karanganyar Public Health Center before data collection. All participants were informed about the study objectives and procedures and provided written informed consent prior to participation. Anonymity, confidentiality, voluntary participation, beneficence, and non-maleficence were maintained during the study. However, the study did not undergo formal review by an independent research ethics committee, and this should be considered when interpreting the findings.

RESULTS OF STUDY

Responcent Characteristics

A total of 17 respondents participated in this study. Most respondents were aged 46–55 years (35.3%), followed by 56–65 years and >65 years, each accounting for 29.4%. The majority were female (70.6%), and most had experienced gout arthritis for more than six months (64.7%). These findings indicate that the sample was predominantly composed of middle-aged to older adults with a relatively prolonged duration of illness.

The characteristics of respondents in this study included age, sex, and duration of suffering from gout arthritis. This description provides an overview of the study subjects prior to the effectiveness analysis of salt hydrotherapy.

Table 1. Baseline Characteristics of Respondents (N = 17)

Characteristic	Category	n	%
Age	26-35 years	1	5.9
	36-45 years	0	0.0
	46-55 years	6	35.3
	56-65 years	5	29.4
	>65 years	5	29.4
Sex	Male	5	29.4
	Female	12	70.6
Distribution of illness	<6 months	6	35.3
	>6 months	11	64.7

Source: Primary Data (2025)

Pain Intensity Before and After Intervention

Pain intensity was measured using the Numeric Rating Scale before and after the salt hydrotherapy intervention. Before the intervention, the median pain score was 6.00, with an interquartile range (IQR) of 2 and a range of 4 to 8, indicating that respondents generally experienced moderate pain prior to treatment. After the intervention, the median pain score decreased to 3.00, with an interquartile range (IQR) of 2 and a range of 2 to 4, indicating that most respondents experienced mild pain after the intervention. The downward shift in the score range suggests a consistent reduction in pain intensity across the study sample.

Table 2. Pretest and Posttest Foot Pain Scores (N = 17)

Variable	n	Median	IQR	Minimum	Maximum
Pretest pains core	17	6.00	2	4	8
Posttest pain score	17	3.00	2	3	4

Source: Primary Data (2025)

Analysis of Differences in Pain Intensity

Table 3 Wilcoxon Signed-Rank Test Results for Pretest and Posttest Pain Scores (N = 17)

Comparison	n	Median (IQR)	Range	Z	p-value	Efect size (r)
Pretest pain score	17	6.00 (2)	4-8			
Posttest pain score	17	3.00 (3)	3-4	-3.671	<0.001	0.89

Source: Primary Data (2025)

Before hypothesis testing, normality testing was conducted using the Shapiro-Wilk test. The results showed that the pretest data had a significance value of 0.065, while the posttest data had a significance value of 0.004. Because the posttest data were not normally distributed, a nonparametric test was used for further analysis.

To determine whether the reduction in pain intensity was statistically significant, the Wilcoxon signed-rank test was performed. The analysis showed a statistically significant difference between pretest and posttest pain scores ($Z = -3.671$; $p < 0.001$). The calculated effect size was $r = 0.89$, indicating a large effect. These findings indicate that pain intensity after the intervention was lower than before the intervention in the study sample. However, interpretation regarding effectiveness should be made cautiously because

this study used a one-group pretest-posttest design without a control group.

DISCUSSION

This study found a statistically significant reduction in foot pain intensity after the salt hydrotherapy intervention among patients with gout arthritis in the working area of Karanganyar Public Health Center. The median pain score decreased from 6.00 before the intervention to 3.00 after the intervention. The Wilcoxon signed-rank test showed a statistically significant difference between pretest and posttest scores ($Z = -3.671$; $p < 0.001$), and the calculated effect size was large ($r = 0.89$). In the study sample, this reduction was accompanied by a shift in pain category from moderate pain to mild pain. However, because this study used a one-group pretest-posttest design without a control group, these findings should be interpreted as an observed reduction after the intervention rather than conclusive evidence of a causal effect.

A possible explanation for the observed reduction in pain intensity is the thermal effect of warm water immersion. Warm hydrotherapy may promote peripheral vasodilation, improve local circulation, reduce muscle tension, and provide a relaxing sensory stimulus that may help lessen pain perception (Aktaş et al., 2025). The addition of Epsom salt may also have contributed to the intervention experience. Previous literature has suggested that magnesium sulfate may support muscle relaxation and may be associated with reduced discomfort in musculoskeletal conditions (Tarsitano et al., 2024). Nevertheless, the present study was not designed to separate the specific effect of warm water from the contribution of the salt component. Therefore, these mechanisms should be interpreted as plausible explanations based on prior literature rather than direct findings established by this study (Dewi et al., 2020; Ezdha et al., 2023; Jauhar et al., 2022).

The demographic characteristics of respondents provide additional context for interpreting the findings. Most respondents were aged 46–55 years, the majority were female, and most had experienced gout arthritis for more than six months. These characteristics are broadly consistent with previous literature indicating that gout arthritis is commonly found in middle-aged and older adults and may be influenced by hormonal and chronic metabolic factors (Eun et al., 2021; Ragab et al., 2017). At the same time, these data should be interpreted cautiously because several clinically relevant baseline variables, such as painful joint location, medication use, uric acid levels, acute attack status, and comorbidities, were not comprehensively documented in this study. As a result, the present findings are limited in their ability to explain which patient factors may have influenced the magnitude of pain reduction.

The present findings are generally consistent with previous studies that reported reduced pain after warm water or salt-based soaking among patients with gout arthritis. Rahagia et al. (2020) reported that warm Epsom salt hydrotherapy was associated with reduced pain among older adults with gout, while Dewi et al. (2020) found that warm water and salt immersion was helpful in decreasing arthritis pain scores in an elderly care setting. Similarly, Vakilinia et al. (2020) described the application of warm salt water soaking as a simple complementary approach for pain reduction. Compared with these earlier investigations, the current study adds evidence from a community-based primary healthcare setting, because the intervention was implemented through home visits in the working area of Karanganyar Public Health Center. This context is important for community nursing practice, where practical, low-cost, and home-based supportive interventions are often needed.

Although the reduction in median pain score appears clinically relevant, this study did not formally assess the minimal clinically important difference. Therefore, the reduction observed in this study should be interpreted primarily as a statistically significant reduction in pain intensity rather than definitive evidence of clinical significance. The change from a median score of 6.00 to 3.00 suggests improvement in the study sample, but further research is needed to determine whether this change consistently reflects clinically meaningful benefit across broader patient populations.

From a practical perspective, salt hydrotherapy may offer several advantages in community and primary healthcare settings. The intervention is simple, inexpensive, and relatively easy to perform at home with minimal equipment. For patients with chronic joint discomfort, such an approach may serve as a complementary strategy alongside pharmacological treatment and routine clinical care. In nursing practice, especially in settings with limited resources, interventions that are easy to teach and feasible to perform independently may help support symptom management and patient comfort. However, this potential practical value should still be interpreted carefully because the present study did not compare salt hydrotherapy with another intervention or with usual care alone.

Several limitations should be acknowledged. First, the study used a one-group pretest-posttest design without a control group, which limits causal interpretation. Second, the sample size was small and no formal power analysis was conducted, so the findings should be interpreted as preliminary. Third, clinically relevant variables such as medication use, acute gout attack status, uric acid levels, comorbidities, and painful joint location were not comprehensively documented. Fourth, because the intervention was delivered through home visits, researcher attention and interaction may have influenced participant responses. Fifth, pain in gout arthritis may fluctuate naturally over time, including during the one-week intervention period. Finally, this study did not undergo formal review by an independent research ethics committee, which should also be acknowledged as a methodological limitation.

Future studies are recommended to use larger and more diverse samples, include control or comparison groups, document clinical baseline variables more comprehensively, and apply longer follow-up periods. Future research should also clarify the intervention protocol more precisely, including the exact amount of salt used, so that the procedure can be replicated more reliably. In addition, obtaining prospective ethics review and incorporating objective measures such as serum uric acid levels or other clinical indicators would strengthen the evidence base regarding the role of salt hydrotherapy in community nursing practice.

CONCLUSIONS AND RECOMMENDATION

This study found a reduction in foot pain intensity after salt hydrotherapy among patients with gout arthritis in the working area of Karanganyar Public Health Center. In the study sample, pain scores decreased significantly after the intervention, with a shift from moderate pain to mild pain.

These findings suggest that salt hydrotherapy may be considered as a complementary nursing intervention in community and primary healthcare settings.

However, because this study involved a small sample and used a one-group pretest-posttest design without a control group, the findings should be interpreted cautiously and should not be regarded as conclusive evidence of effectiveness. In addition, the absence of formal ethics committee review should be acknowledged as a methodological limitation. The contribution of this study lies primarily in supporting the application of a simple complementary intervention in a community-based setting.

For further research, it is recommended to conduct studies with a larger and more diverse sample to enhance representativeness and generalizability. Future investigations should employ a true experimental design with control groups, include more complete clinical baseline data, and use longer intervention and follow-up periods to evaluate the sustained effects of salt hydrotherapy on pain intensity and functional outcomes among patients with gout arthritis.

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DECLARATION

Ethics Approval and Consent to Participate

This study was conducted after obtaining institutional and administrative permission from Universitas 'Aisyiyah Surakarta, the Karanganyar District Health Office, and Karanganyar Public Health Center. Before data collection, all participants were given clear information regarding the purpose, procedures, benefits, and possible discomforts of the study. Participation was voluntary, and written informed consent was obtained from each participant prior to enrollment. The researchers maintained participants' anonymity and confidentiality throughout the study. Ethical principles, including beneficence and non-maleficence, were applied during the research process. However, this study did not undergo formal review by an independent research ethics committee; therefore, this limitation should be considered when interpreting the findings.

Consent for Publication

Not applicable. This manuscript does not contain any identifiable individual information, images, or personal clinical details. All data are presented in aggregate form, and no participant can be individually identified from the information reported in this article.

Availability of Interest Statement

The data used to support the findings of this study are available from the corresponding author upon reasonable request. The dataset is not publicly available to protect participant confidentiality.

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Authors' Contributions

Aprida conceptualized and designed the study, conducted data collection, performed statistical analysis, interpreted the findings, and prepared the manuscript.

ABOUT THE AUTHORS

Aprida Dian Kartikasari completed her undergraduate education in the Bachelor of Nursing Program at the Faculty of Health Sciences, Universitas 'Aisyiyah Surakarta. Her research focuses on community nursing and complementary non pharmacological interventions, particularly salt hydrotherapy for reducing foot pain intensity among patients with gout arthritis. Her academic interests include chronic disease management, evidence based nursing practice, and community based health promotion strategies aimed at improving patient comfort and quality of life.

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REFERENCES

Aktaş, O., Dönmez, A. A., Kapucu, S., & Çinar, M. (2025). The effect of warm saltwater and warm water baths on pain, fatigue, sleep quality, and functional capacity in patients with rheumatoid arthritis: A randomized controlled study. *BMC Complementary Medicine and Therapies, 25*, Article 302. https://doi.org/10.1186/s12906-025-05050-2

Arsal, U. W., G, S., Arimbi, A., Mukrim, H., & Anggraeni, A. S. D. (2025). Uji efektivitas hidroterapi air hangat terhadap nyeri telapak kaki pada lansia: Studi pre-post di Puskesmas Pekkae. *Jurnal Penelitian Inovatif, 5*(1), 777–782. https://doi.org/10.54082/jupin.1373

Billa, S., Fukui, S., Paudel, M. L., Suzuki, T., Imai, R., Kim, Y., Nakai, T., Tamaki, H., Kishimoto, M., Ørbo, H. S., Tedeschi, S. K., Choi, H. K., Okada, M., & Solomon, D. H. (2026). Longitudinal changes in serum urate levels from premenopause through postmenopause: Interrupted time-series analyses. *Arthritis & Rheumatology, 78*(3), 724–733. https://doi.org/10.1002/art.43406

Cha, Y., Lee, J., Choy, W., Lee, J. S., Lee, H. H., & Chae, D. S. (2024). Pathophysiology and treatment of gout arthritis, including

gout arthritis of the hip joint: A literature review. *Hip & Pelvis, 36*(1), 1–11. https://doi.org/10.5371/hp.2024.36.1.1

Dewi, M., Sovia, S., & Adha, P. D. (2020). Efektivitas terapi rendam air hangat dengan garam terhadap skala nyeri arthritis pada lansia di Panti Sosial Tresna Werdha Budi Luhur Kota Jambi. *Jurnal Ilmiah Universitas Batanghari Jambi, 20*(3), 862. https://doi.org/10.33087/jiubj.v20i3.1070

Eun, Y., Kim, I. Y., Han, K., Lee, K. N., Lee, D. Y., Shin, D. W., Kang, S., Lee, S., Cha, H. S., Koh, E. M., Lee, J., & Kim, H. (2021). Association between female reproductive factors and gout: A nationwide population-based cohort study of 1 million postmenopausal women. *Arthritis Research & Therapy, 23*(1). https://doi.org/10.1186/s13075-021-02701-w

Jauhar, M., Ulisetiani, N., Widiyati Jurusan Keperawatan, S., Ilmu Kesehatan, F., Muhammadiyah Kudus, U., Jurusan Keperawatan, I., & Kesehatan Kementerian Kesehatan Semarang, P. (2022). Studi Literatur: Kompres Air Garam Epsom Hangat Menurunkan Nyeri Sendi Pada Klien Artritis Gout. In *Jurnal Ilmu Keperawatan dan Kebidanan* (Vol. 13, Number 1).

Johnson, R. J., Sanchez Lozada, L. G., Lanaspa, M. A., Piani, F., & Borghi, C. (2023). Uric Acid and Chronic Kidney Disease: Still More to Do. In *Kidney International Reports* (Vol. 8, Number 2, pp. 229–239). Elsevier Inc. https://doi.org/10.1016/j.ekir.2022.11.016

Piani, F., Cicero, A. F. G., & Borghi, C. (2021). Uric acid and hypertension: Prognostic role and guide for treatment. *Journal of Clinical Medicine*, *10*(3), 1–15. https://doi.org/10.3390/jcm10030448

Ragab, G., Elshahaly, M., & Bardin, T. (2017). Gout: An old disease in new perspective – A review. In *Journal of Advanced Research* (Vol. 8, Number 5, pp. 495–511). Elsevier B.V. https://doi.org/10.1016/j.jare.2017.04.008

Rahagia, R., Anggrasari, A. P., & Ardia Pramesti, W. (2020). PENGARUH HIDROTERAPI GARAM EPSOM TERHADAP NYERI PADA LANSIA PENDERITA GOUT. *Jurnal Info Kesehatan*, *10*(2). https://doi.org/10.30643/info%20kesehatan.v10i2.378

Raja, S. N., Carr, D. B., Cohen, M., Finnerup, N. B., Flor, H., Gibson, S., Keefe, F. J., Mogil, J. S., Ringkamp, M., Sluka, K. A., Song, X. J., Stevens, B., Sullivan, M. D., Tutelman, P. R., Ushida, T., & Vader, K. (2020). The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. In *Pain* (Vol. 161, Number 9, pp. 1976–1982). Lippincott Williams and Wilkins. https://doi.org/10.1097/j.pain.0000000000001939

Sanchez-Lozada, L. G., Rodriguez-Iturbe, B., Kelley, E. E., Nakagawa, T., Madero, M., Feig, D. I., Borghi, C., Piani, F., Cara-Fuentes, G., Bjornstad, P., Lanaspa, M. A., & Johnson, R. J. (2020). Uric acid and hypertension: An update with recommendations. In *American Journal of Hypertension* (Vol. 33, Number 7, pp. 583–594). Oxford University Press. https://doi.org/10.1093/ajh/hpaa044

Sivera, F., Andres, M., & Dalbeth, N. (2022). A glance into the future of gout. *Therapeutic Advances in Musculoskeletal Disease, 14*, 1–18. https://doi.org/10.1177/1759720X221114098

Syaiful, S., Sukmawati, S., & Lalu, S. (2025). Effectiveness of salt and ginger water soaking on pain scale in elderly people suffering from gout. *Journal of Public Health and Development*, *23*(1), 259–269. https://doi.org/10.55131/jphd/2025/230120

Tarsitano, M. G., Quinzi, F., Folino, K., Greco, F., Oranges, F. P., Cerulli, C., & Emerenziani, G. P. (2024). Effects of magnesium supplementation on muscle soreness in different type of physical activities: A systematic review. *Journal of Translational Medicine, 22*, Article 629. https://doi.org/10.1186/s12967-024-05434-x

Vakilinia, S. R., Alizadeh Vaghasloo, M., Aliasl, F., Mohammadbeigi, A., Bitarafan, B., Etripoor, G., & Asghari, M. (2020). Evaluation of the efficacy of warm salt water foot-bath on patients with painful diabetic peripheral neuropathy: A randomized clinical trial. *Complementary Therapies in Medicine, 49*, Article 102325. https://doi.org/10.1016/j.ctim.2020.102325

Wahab, I., Jumadewi, A., & Rizki, Z. (2024). Screening test asam urat dan sosialisasi dampak emping melinjo (Gnetum gnemon L.) pada masyarakat Gampong Bak Aghu Kecamatan Seulimeum Kabupaten Aceh Besar. *Jurnal PADE: Pengabdian & Edukasi*, *6*(1), 21. https://doi.org/10.30867/pade.v6i1.1739

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