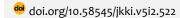Check for updates

The Effectiveness of Warm Lemongrass Compress Combined with Guided Imagery for Alleviating Osteoarthritis Pain in the Elderly: A Study in Pétoran Village, Surakarta

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Abstract

Background: Osteoarthritis is a degenerative joint disease commonly experienced by the elderly, causing chronic pain that can reduce quality of life and hinder daily activities. Non-pharmacological approaches such as warm lemongrass compresses and guided imagery are safe alternatives to help reduce pain without the harmful side effects associated with long-term medication use. **Objective:** This study aims to determine the effectiveness of warm lemongrass compresses and guided imagery techniques in reducing osteoarthritis pain in the elderly in Kampung Petoran RT 02 RW 07, Jebres Village, Jebres District, Surakarta City. **Methods:** This study used descriptive research with a case study conducted on two elderly respondents with osteoarthritis and moderate pain. The intervention was carried out for 2 consecutive days, each lasting 15 minutes. **Results:** Following the intervention, there was a reduction in pain levels from moderate to mild. The first respondent experienced a decrease from a scale of 4 to 2, and the second respondent from a scale of 5 to 3. **Conclusion:** Warm lemongrass compresses and guided imagery effectively reduce osteoarthritis pain in the elderly and can be recommended as a non-pharmacological therapy in geriatric nursing.

Keywords: Osteoarthritis, Elderly, Pain, Warm Lemongrass Compresses, Guided Imagery

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I. BACKGROUND

Old age, or the elderly stage, refers to individuals aged 60 years and above, representing the final phase of the human life cycle (Umaht et al., 2021). This population undergoes a natural and progressive aging process, which follows earlier stages of development—childhood, adolescence, and adulthood. Aging is often described as a degenerative phenomenon, characterized by gradual physiological, cognitive, emotional, social, and functional changes that impact overall health and well-being (Ulfa et al., 2024). As a

consequence, older adults are particularly susceptible to chronic and degenerative conditions, among which osteoarthritis (OA) is one of the most prevalent.

Osteoarthritis is the most common form of arthritis and predominantly affects individuals over the age of 50. It is a degenerative joint disease resulting from the progressive breakdown of articular cartilage, the protective tissue that cushions the bones' ends within synovial joints. With aging and repetitive mechanical stress, this cartilage deteriorates, leading to bone-on-bone contact, which triggers pain, joint stiffness, swelling, inflammation, and restricted mobility (RSUGM, 2024). The loss of cartilage also affects subchondral bone structure and reduces the viscosity of synovial fluid, impairing its lubricating function and further exacerbating joint dysfunction.

Globally, osteoarthritis is a major public health concern. According to the World Health Organization (WHO, 2023), approximately 528 million people worldwide are affected by OA, with 60% of cases occurring in women and 73% in individuals over the age of 55. In Indonesia, the 2018 Basic Health Research (Riskesdas) reported a national prevalence of 7.3%. The province of Central Java has a relatively high burden, with a prevalence of 6.78%, and within this region, Surakarta reports a prevalence of 4.96% (Karunia et al., 2023). At the local level, data from the Ngoresan Community Health Center in Jebres, Surakarta, indicate that 273 elderly individuals were diagnosed with osteoarthritis in 2024.

The pathophysiology of OA involves increased fibrinogenic activity and decreased fibrinolytic activity, contributing to microvascular thrombosis and lipid deposition in subchondral blood vessels. This process promotes the release of inflammatory mediators such as prostaglandins and interleukins, which stimulate nociceptors and induce pain. Additionally, the formation of osteophytes (bone spurs) and reduced joint flexibility further limit mobility and contribute to chronic discomfort (Risqi et al., 2021).

Pain management in elderly patients with osteoarthritis requires a balanced and holistic approach. Pharmacological interventions, such as nonsteroidal anti-inflammatory drugs (NSAIDs) and analgesics, are commonly used but pose significant risks in older adults, including gastrointestinal bleeding, peptic ulcers, renal impairment, and cardiovascular complications, especially with long-term use. Therefore, non-pharmacological

strategies are increasingly recommended as safer, accessible, and effective adjuncts or alternatives to medication.

One promising non-pharmacological intervention is the combination of warm lemongrass compresses and guided imagery. Lemongrass (Cymbopogon citratus) contains essential oils such as citral and myrcene that possess anti-inflammatory, analgesic, and vasodilatory properties. When applied as a warm compress, it enhances local blood circulation, reduces muscle tension, and alleviates joint pain (Meilia et al., 2023). Guided imagery, a cognitive-behavioral technique, involves directing mental focus toward calming, positive, and relaxing visualizations—such as peaceful natural environments—accompanied by deep breathing. This method activates the parasympathetic nervous system, reduces stress-induced muscle tension, and modulates pain perception (Kholifah, 2021). Research by Karunia et al. (2023) demonstrated a significant effect of combined lemongrass compress and guided imagery therapy on reducing pain intensity in osteoarthritis patients. Similarly, Indimeilia et al. (2023) found that 15-minute daily sessions of warm lemongrass compress over two consecutive days effectively reduced pain levels.

A preliminary assessment at the Ngoresan Community Health Center in 2024 revealed 493 visits by elderly individuals with osteoarthritis, with 273 confirmed cases. Six resided in RT 02 RW 07, Petoran Village, Jebres. Interviews with these individuals indicated that four experienced severe pain (numerical rating scale 7–9), manifesting as difficulty or inability to walk, while two reported moderate pain (scale 4–6), particularly during physical activity. Notably, these patients had limited awareness of non-pharmacological pain management options. Although some had previously visited the health center, they relied solely on self-medication from pharmacies and were unfamiliar with the use of warm lemongrass compresses or guided imagery.

Given the high prevalence of osteoarthritis, the significant burden of pain, and the underutilization of safe non-pharmacological therapies in this community, the researcher is motivated to conduct a study entitled: "The Application of Warm Lemongrass Compresses Combined with Guided Imagery in Alleviating Osteoarthritis Pain Among Elderly Individuals in Petoran Village, RT 02 RW 07, Jebres Subdistrict, Surakarta City." This study aims to evaluate the effectiveness of this integrative, culturally

appropriate intervention in improving pain management and quality of life for elderly patients with osteoarthritis.

2. METHODS

This study employed a descriptive case study design to evaluate the effectiveness of a combined non-pharmacological intervention "warm lemongrass compress and guided imagery" in managing osteoarthritis pain among elderly individuals. The research was conducted with two participants diagnosed with osteoarthritis and experiencing moderate pain, residing in Kampung Petoran, RT 02 RW 07, Kelurahan Jebres, Kecamatan Jebres, Surakarta City.

The study subjects were selected based on predefined inclusion and exclusion criteria. Inclusion criteria were: (1) a clinical diagnosis of osteoarthritis; (2) a reported pain intensity of 4–6 on the Numeric Rating Scale (NRS), indicating moderate pain; (3) the ability to communicate effectively; (4) willingness to participate in the study; and (5) no intake of analgesic medication within one hour prior to the intervention. The exclusion criterion was the presence of severe to extreme pain (NRS 7–10), which might confound the assessment of intervention efficacy.

The intervention was administered in the participants' homes to ensure a familiar and comfortable environment, thereby enhancing relaxation and therapeutic response. Data collection and intervention delivery took place over two consecutive days, from April 25 to April 26, 2025.

Each session lasted approximately 15 minutes and was conducted twice daily (morning and afternoon). The intervention consisted of two components: 1). Warm Lemongrass Compress: Fresh lemongrass was boiled, and the warm leaves were wrapped in a clean cloth and applied to the affected knee joint. The warmth and bioactive compounds in lemongrass (e.g., citral) are believed to promote vasodilation, improve local blood circulation, and reduce inflammation and pain. 2). Guided Imagery: Following the compress application, participants were guided through a relaxation exercise involving visualization of a peaceful, calming environment (e.g., a serene forest or cool mountain area). The researcher used a soft, soothing voice to lead the imagery session, instructing the participants to focus on deep, slow breathing and positive sensory experiences.

Data were collected using a combination of interviews, direct observation, and standardized pain assessment. Pain intensity was measured before and after each session using the Numeric Rating Scale (NRS), a validated self-report tool where 0 represents "no pain" and 10 represents "worst imaginable pain." The NRS categories are defined as: 0 (no pain), 1–3 (mild pain), 4–6 (moderate pain), 7–9 (severe pain), and 10 (extreme pain). Pre- and post-intervention pain scores were recorded to assess changes in pain levels.

A descriptive analysis was performed to evaluate the progression of pain reduction over the intervention period. Changes in NRS scores were narratively and tabularly presented to illustrate the trend and magnitude of pain relief for each participant.

The study adhered to strict ethical principles in accordance with research guidelines for human subjects. Written informed consent was obtained from all participants after a thorough explanation of the study's purpose, procedures, potential benefits, and their right to withdraw at any time without consequence. To ensure confidentiality, participants were assigned identification codes, and their personal information was not disclosed. All data were used solely for research purposes and stored securely. The intervention was non-invasive and posed minimal risk, with the primary aim of providing therapeutic benefit. The researchers ensured that the participants' well-being and dignity were maintained throughout the study.

3. RESULTS

The study was conducted in Petoran Village, RT 02 RW 07, Jebres Subdistrict, Surakarta City, an area administered by Mr. Narto as the head of the RT. According to local records, the community consists of 182 households (KK), bounded by Gang Langith Kidung to the north, Jl. Asem Kembar to the south, RT 03 RW 07 to the east, and RT 01 RW 07 to the west. During the initial assessment, six elderly individuals were identified as suffering from osteoarthritis; two of them were selected as respondents for this intervention study.

Respondent 1, Mr. N, resides near a railway track in a densely populated neighborhood. His home is generally clean and well-maintained, though it suffers from inadequate ventilation and insufficient natural lighting, contributing to a dim indoor environment. Respondent 2, Mrs. D, lives in a house with adequate ventilation and sufficient lighting; however, the overall cleanliness and

tidiness of her living space require improvement.

The intervention was implemented as scheduled from April 25 to April 26, 2025, over two consecutive days, with two daily sessions of combined warm lemongrass compress and guided imagery therapy administered to both elderly respondents diagnosed with osteoarthritis.

Table 1. Pain Scale Measurement Before Intervention of warm lemongrass compresses and guided imagery:

Respondent	Date	Pain Scale	Category
Mr. N	April 25, 2025	4	Moderate
Mrs. D	April 25, 2025	5	Moderate

As shown in Table 1, both respondents exhibited moderate pain levels prior to the intervention. Mr. N reported a pain intensity of 4 on the Numeric Rating Scale (NRS), while Mrs. D reported a score of 5, indicating a higher degree of discomfort at baseline.

Table 2. Pain Scale Measurement After Intervention of warm lemongrass compresses and guided imagery:

Respondent	Date	Pain Scale	Category
Mr. N	April 26, 2025	2	Mild
Mrs. D	April 26, 2025	3	Mild

Following the two-day intervention, both respondents demonstrated a significant reduction in pain intensity. Mr. N's pain score decreased from 4 to 2, shifting from moderate to mild pain. Mrs. D's score improved from 5 to 3, also categorized as mild pain, indicating a notable alleviation of symptoms.

Table 3. Development of Pain Scale Before and After Intervention of warm lemongrass compresses and guided imagery

Respondent	Date	Pain scale		Category	
		Pre	Post	Pre	Post
Mr. N	April 25 2025	4	3	Moderate	Mild
	April 26 2025	3	2	Mild	Mild
Mr. N	April 25 2025	5	4	Moderate	Moderate
	April 26 2025	4	3	Moderate	Mild

Table 3 presents the daily progression of pain scores. Mr. N's pain level decreased steadily from 4 to 2 over the two days, with a consistent downward trend. Mrs. D also showed improvement, with her pain score declining from 5 to 3, transitioning from moderate to mild pain by the end of the intervention period.

Table 4. Comparison of Pain Scale Before and After Intervention of warm lemongrass compresses and guided imagery

Pre	Post	Pre Category	Post Category	Difference
4	2	Moderate	Mild	2
5	3	Moderate	Mild	2

As shown in Table 4, both respondents experienced a reduction of 2 points in their pain scores after the intervention. Despite differences in baseline pain intensity, the magnitude of improvement was consistent across both cases.

4. DISCUSSION

Pain Characteristics Before the Intervention of Warm Lemongrass Compress and Guided Imagery

Before the intervention, the pain assessment for both respondents revealed distinct characteristics consistent with osteoarthritis. Mr. N reported pain (P) that occurred during movement or positional changes, with a sharp quality (Q), localized in the right knee (R). His pain intensity was rated at 4 on the Numeric Rating Scale (NRS), categorized as moderate pain, and described as intermittent (T). Mrs. D experienced pain upon waking and during physical activity (P), also of sharp quality (Q), located in the left knee (R), with an initial NRS score of 5 (moderate pain) and an intermittent pattern (T).

Osteoarthritis (OA) is the most prevalent degenerative joint disorder affecting adults and older adults globally. It is characterized by the progressive deterioration of articular cartilage, leading to joint pain, stiffness, deformity, and functional limitation, particularly in weight-bearing joints such as the knees, hips, and spine. However, it can also affect the shoulders, fingers, and ankles (Rosadi et al., 2022). In the elderly, age-related decline in chondrocyte function, reduced synovial fluid production, and cumulative mechanical stress contribute to cartilage degradation. Additionally, increased oxidative stress and chronic low-grade inflammation accelerate joint damage, resulting in recurrent and often debilitating pain (Wakale et al., 2023). This persistent pain significantly impairs mobility and daily functioning, diminishing affected individuals' overall quality of life (Nursipa & Brahmantia, 2022).

Risk factors for knee osteoarthritis include occupational activities involving repetitive joint stress. Research by Hera et al. (2022) indicates that jobs requiring frequent kneeling, squatting, lifting heavy loads, or prolonged standing increase the risk of developing OA, particularly in the

knees. During the assessment, Mr. N and Mrs. D reported occupations involving repetitive physical strain—Mr. N frequently lifted heavy water containers, while Mrs. D was a housemaid, performing laundry and ironing on the floor. These activities likely contributed to the development and exacerbation of their joint pain. Furthermore, both respondents demonstrated limited knowledge of non-pharmacological pain management strategies, highlighting a need for accessible and culturally appropriate interventions.

Pain Reduction After the Intervention of Warm Lemongrass Compress and Guided Imagery

After administering warm lemongrass compress and guided imagery therapy—delivered twice daily over two consecutive days—both respondents significantly reduced pain intensity. Mr. N's pain score decreased from 4 to 2, shifting from moderate to mild pain, while Mrs. D's score improved from 5 to 3, also falling within the mild pain category. Both participants reported feeling more relaxed and comfortable during and after the sessions, and they actively followed the researcher's instructions throughout the intervention.

The effectiveness of warm lemongrass compress in alleviating osteoarthritis pain is supported by its pharmacological properties. Lemongrass (Cymbopogon citratus) contains essential oils such as citral and myrcene, which possess anti-inflammatory, analgesic, and vasodilatory effects (Meilia et al., 2023). When applied as a warm compress, it enhances local blood circulation, reduces muscle tension, and modulates inflammatory mediators, thereby decreasing pain perception. The thermogenic effect of the warm compress also promotes tissue relaxation and improves joint flexibility.

Guided imagery, a cognitive-behavioral technique, further contributed to pain relief. As demonstrated in research by Sonhaji et al. (2021), guided imagery can effectively reduce pain from moderate to mild levels. The technique involves directing the patient's focus toward calming, positive mental images—such as peaceful natural environments—accompanied by deep, rhythmic breathing. This process activates the parasympathetic nervous system, reduces muscle tension, and alters pain perception by redirecting attention away from nociceptive stimuli. The integration of progressive muscle relaxation within the guided imagery session likely enhanced its analgesic effect

by promoting physical and mental relaxation.

The researcher observes that the combined therapy yielded clinically meaningful pain reduction despite the short intervention period (two days, four sessions total). This suggests that warm lemongrass compress and guided imagery can be effective, low-cost, and non-invasive adjuncts in managing mild to moderate osteoarthritis pain, particularly in community-based elderly care.

Development of Pain Scale for Both Respondents Before and After Intervention Warm Lemongrass Compress and Guided Imagery

The longitudinal data show a consistent improvement in pain levels for both respondents. Mr. N's pain score decreased from 4 (moderate) to 2 (mild), while Mrs. D's score declined from 5 (moderate) to 3 (mild) over the two-day intervention period. This progression indicates a positive response to the combined therapy.

Pain management in osteoarthritis typically involves a multimodal approach. Pharmacological treatments, such as non-steroidal anti-inflammatory drugs (NSAIDs), are commonly prescribed but carry risks of gastrointestinal, renal, and cardiovascular adverse effects, especially in the elderly (Umaht et al., 2021). Non-pharmacological interventions, while not replacing medication in severe cases, offer safer alternatives and have been shown to complement medical treatment effectively. These include complementary therapies utilizing natural agents—such as ginger, cinnamon, moringa, and lemongrass—and techniques like acupuncture, meditation, relaxation, distraction, and compresses.

Research by Cao et al. (2024) confirms that non-pharmacological therapies are particularly effective for patients with mild to moderate osteoarthritis, improving pain, function, and quality of life. However, their efficacy is limited in cases of severe pain, where pharmacological or surgical interventions remain necessary. Moseng (2024) emphasizes that non-pharmacological approaches should be integrated into a comprehensive, individualized management plan based on pain severity and patient needs.

The observed pain reduction in both respondents is consistent with their initial pain classification as moderate. The researcher posits that the success of the intervention was due to the appropriateness of the therapy for their pain level, as well as their active participation and adherence to the protocol.

Comparative Analysis of Outcomes

The final comparison revealed that Mr. N and Mrs. D experienced an identical reduction of 2 points on the NRS, indicating a consistent therapeutic effect despite differences in baseline pain intensity. This uniform improvement may be attributed to high treatment compliance and the synergistic effect of the combined intervention.

Amin et al. (2025) highlight that patient education and understanding of therapeutic procedures significantly enhance adherence and treatment outcomes. In this study, both participants followed the lemongrass compress application correctly and engaged attentively in the guided imagery sessions. The latter technique modulates pain perception through cognitive distraction and autonomic regulation, allowing patients to exert greater control over their pain experience.

Non-pharmacological pain management encompasses various strategies, broadly categorized into physical, psychological, and distraction-based methods (Hijriana & Yusnita, 2023). Psychological approaches such as guided imagery, relaxation, and meditation help reframe the patient's response to pain, while distraction techniques—like watching television, socializing, or engaging in enjoyable activities— temporarily divert attention from pain signals.

In this case, both respondents participated in refreshing activities such as attending Elderly Posyandu (community health posts), spending time with grandchildren, and watching television. These activities likely served as complementary distractions, reinforcing the effects of the primary intervention.

In conclusion, warm lemongrass compress and guided imagery therapy effectively reduced osteoarthritis pain in both elderly participants. The consistent 2-point reduction in pain scores and reported improvements in comfort and relaxation support integrating this combined non-pharmacological approach into routine care for elderly patients with mild to moderate osteoarthritis. Future studies with larger samples and longer durations are recommended to validate these findings further.

5. CONCLUSION

Based on the implementation and discussion, the study concludes that the warm lemongrass compress and guided imagery interventions effectively reduced pain levels in elderly individuals with osteoarthritis. Before the intervention, both participants experienced moderate

pain, with pain scale scores of 4 and 5, respectively. After undergoing the intervention for two consecutive days, lasting 10–15 minutes each session, both participants reported decreased pain levels, scoring 2 and 3 respectively, which fall under the mild pain category. Over the course of the intervention, there was a noticeable decline in pain intensity, indicating the positive impact of non-pharmacological approaches such as warm lemongrass compresses and guided imagery in alleviating osteoarthritis discomfort.

The results highlight that these interventions are simple, cost-effective, and accessible methods for managing osteoarthritis-related pain among the elderly. The warm lemongrass compress provides physical relief by improving blood circulation and reducing inflammation, while guided imagery contributes to psychological relaxation, helping individuals cope with pain perception more effectively. Given the success observed in this study, it is recommended that elderly individuals suffering from osteoarthritis adopt these techniques as part of their daily self-care routine. Additionally, healthcare providers should promote awareness about the benefits of non-pharmacological therapies within the community to enhance quality of life and reduce dependency on medication.

AUTHOR CONTRIBUTIONS

The author contributes in conceptualization, data collection and analysis Hasna Afranovia Az Zahra, Eska Dwi Prajayanti, and Nur Haryani. Writing and manuscript revisions: Hasna Afranovia Az Zahra.

ACKNOWLEDGMENT

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest in this research.

DATA AVAILABILITY STATEMENT

The data are available from the corresponding author upon reasonable request.

REFERENCES

Amin, S., dianingsih, M. U., & Henny. (2025). Edukasi Mengenai Obat Nyeri Terhadap Pasien Rawat Jalan Di RSUD Khz. Musthafa, Kabupaten

Tasikmalaya. Jurnal Riset Ilmu Kesehatan Umum Dan Farmasi, 3, 1–15.

Cao, S. H., Zan, Q., Wang, B., Fan, X., Chen, Z., & Yan, F. (2024). Efficacy Of Non-Pharmacological Treatments For Knee Osteoarthritis: A Systematic Review And Network Meta-Analysis. Heliyon, 10(17). Https://doi.org/10.1016/j.heliyon.2024.e36682

Hera, R., Ilmawan, M., & Darmawan. (2022). Faktor-Faktor Yang Berhubungan Dengan Kejadian Osteoarthritis Lutut Pada Petani Di Desa Bhakti Mulya Kecamatan Bengkayang. Jurnal Kedokteran Dan Kesehatan.

Hijriana, I., & Yusnita. (2023). Efektivitas Teknik Distraksi Dan Relaksasi Terhadap Tingkat Nyeri Pasien Post Operasi Di Ruang Rawat Inap Bedah Rumah Sakit Umum Daerah Tgk Chik Ditiro Sigli. Journal Of Healthcare Technology And Medicine.

Indimeilia, Nurhasanah, & Febriana, D. (2023). Efektifitas Pemberian Kompres Hangat Rebusan Air Serai Pada Lansia Dengan Osteoarthritis: Suatu Studi Kasus. Jurnal Ilmiah Fakultas Ilmu Keperawatan, vii(1), 1–7.

Karunia, A., Rakhmawati, N., & Fitriyani, N. (2023). Pengaruh Kompres Serai Hangat Dan Guided Imagery Terhadap Skala Nyeri Pasien Osteoarthritis Di Wilayah Kerja Upt Puskesmas Sibela Mojosongo. Universitas Kusuma Husada Surakarta.

Kholifah, U. (2021). Pengaruh Guided Imagery Terhadap Tingkat Kecemasan Dan Nyeri Pada Pasien Cholelithiasis Pre Operasi Di RSI Sultan Agung Semarang. Universitas Islam Sultan Agung Semarang.

Moseng, T., Vliet Vlieland, T. P. M., Battista, S., Beckwée, D., Boyadzhieva, V., conaghan, p. G., costa, d., doherty, m., finney, a. G., georgiev, t., gobbo, m., kennedy, n., kjeken, i., kroon, f. P. B., lohmander, l. S., lund, h., mallen, c. D., pavelka, k., pitsillidou, i. A., … østerås, n. (2024). Eular recommendations for the non-pharmacological core management of hip and knee osteoarthritis: 2023 update. Annals of the rheumatic diseases, 83(6), 730–740.

Https://doi.org/10.1136/ard-2023-225041

Nursipa, S., & Brahmantia, B. (2022). Pengaruh Kompres Jahe (Zingiber Officinale) Terhadap Penurunan Nyeri Sendi Pada Lansia Dengan Osteoarthritis . Healthcare Nursing Journal, 1–6.

Risqi, A. Z., Yuliadarwati, N. M., & Rahmanto, S. (2021). Kombinasi Pemberian Progressive Resistance Exercise Dan Isometric Exercise Terhadap Tingkat Penurunan Nyeri Lutut Pada Kasus Osteoarthritis. Physiotherapy Health Science, 2(2), 54–61.

Rosadi, R., Wardoyo, T. H., Wardojo, S. S. I., & Aulianti, A. (2022). Upaya Meningkatkan Tingkat Pengetahuan Masyarakat Mengenai Penyakit Osteoarthritis Genu Di RSUD Dr. Murjani Sampit; Community-Based Rehabilitation. Empowerment Journal, 2(1), 1–5.

RSUGM, S. (2024). Mengenal Osteoarthritis: Penyakit Sendi Yang Umum Dialami Oleh Orang Lanjut Usia. Rumah Sakit Akademik Universitas Gajah Mada.

Sonhaji, Sawitry, & Siahaya, S. (2021). Penurunan Nyeri Sendi Pada Lansia Dengan Terapi Relaksasi Autogenik Dan Terapi Guided Imagery. Jurnal Ilmiah Keperawatan Stikes Hang Tuah Surabaya, 16(01), 1–8.

Ulfa, A. F., Susilowati, T., & Haryani, N. (2024). Penerapan Hidroterapi Rendam Kaki Air Hangat Terhadap Penurunan Tekanan Darah Pada Lansia Hipertensi di Petoran 02/09 Jebres Surakarta. Indonesian Journal of Public Health, 2(3), 556–566.

Umaht, R. R. K., Mulyana, H., & Purwanti, R. (2021). Terapi Non Farmakologi Berbahan Herbal Untuk Menurunkan Nyeri Rematik: A Literature Riview. Jurnal Keperawatan BSI, 9(2), 183–191.

Wakale, S., Wu, X., Sonar, Y., Sun, A., Fan, X., Crawford, R., & Prasadam, I. (2023). How Are Aging and Osteoarthritis Related? In Aging and Disease (vol. 14, issue 3, pp. 592–604). International Society on Aging and Disease. Https://doi.org/10.14336/ad.2022.0831

WHO. (2023). Osteoartritis. World Health Organization.