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## Therapeutic Benefits of Foot Spa for Elderly with Myalgia: A Case Study

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### ABSTRACT

**Introduction:** Myalgia is defined as pain caused by repeated muscle contractions, resulting in muscle inflammation. One of the symptoms of myalgia is the occurrence of pain in the muscles. A non-pharmacological intervention to address myalgia is foot spa therapy. Foot spa therapy involves soaking the feet in warm water with Epsom salt followed by a massage to improve blood circulation and reduce myalgia. **Objective:** The purpose of this case study is to demonstrate the application of foot spa therapy for elderly individuals with myalgia. **Methods:** This study used a case study method with two subjects experiencing myalgia. The intervention consisted of foot spa therapy conducted six times over two weeks. Each foot spa session included soaking the feet in warm water for 15 minutes, followed by a 20-minute foot massage. Pain levels were assessed using the Numeric Rating Scale (NRS). **Results:** The study found that foot spa therapy effectively reduced pain levels from moderate pain (scale 6-5) to mild pain (scale 3-2). **Conclusion:** Foot spa therapy is effective in reducing myalgia with moderate pain levels. The warm water used in the foot spa contains Epsom salt, which is rich in magnesium sulfate. This mineral is effectively absorbed through the skin, stabilizing muscle contractions by fulfilling the body's mineral requirements. Additionally, the massage component of the foot spa stimulates the release of endorphins, promoting relaxation of muscles and soft tissues in the body.

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## 1. INTRODUCTION

Myalgia refers to muscle pain caused by repetitive muscle contractions that lead to inflammation. Common complaints of myalgia among the elderly include muscle cramps, fatigue, and joint pain (Glaubitx et al., 2019). According to the World Health Organization, the global prevalence of myalgia ranges between 50% and 62%. In Indonesia, the prevalence is approximately 45% to 59% (Nurwulan & others, 2020). Dinas Kesehatan Kota Bandung Profile in 2019 reported that myalgia ranked among the top five most prevalent diseases in the city, with 16,296 cases among men and 38,637 among women, totaling 54,933 cases (4.92%). Preliminary interviews with staff at Panti Werdha Budi Pertiwi revealed that 80% of the elderly residents suffer from myalgia due to their daily activities in the facility.

The gastrocnemius muscle, which bears the greatest load among the lower extremities, is a skeletal muscle made up of bundles of long cylindrical cells known as muscle fibers, encased in connective tissue (Darmawati & Kurniawan, 2021; Shmerling, 2018). Neuromuscular issues can cause pain in the gastrocnemius, particularly among elderly individuals who still perform routine activities (Yutan et al., 2022). Increased intensity of myalgia can interfere with a person's ability to work and perform daily activities, ultimately affecting their quality of life (Kurniawati et al., 2019). Many myalgia patients may experience Duchenne or Becker muscular dystrophy, leading to muscle weakness. Degenerative myopathy associated with myalgia often occurs in the calves, although more than half of patients report pain in multiple locations (Vaghasloo et al., 2020).

Pain in the gastrocnemius muscle is frequently caused by reduced blood flow due to atherosclerosis in the vessels supplying the lower extremities. During increased oxygen demand, inadequate blood supply results in ischemic muscle pain. This pain can worsen and develop into resting pain caused by vasoconstriction, where even normal oxygen requirements are not met (Fitriana et al., 2020; Putri et al., 2024).

Myalgia can be managed through pharmacological and non-pharmacological approaches. Pharmacological interventions include analgesic medications to relieve pain. However, non-pharmacological methods are increasingly favored for managing pain and enhancing comfort. One effective non-pharmacological therapy for alleviating myalgia is foot spa therapy (Sabitha, 2018). This therapy involves soaking the feet in warm water containing Epsom salt, followed by a massage.

Warm water has physiological effects on the body, such as stimulating blood circulation, dilating blood vessels, lowering blood pressure, increasing oxygen and nutrient delivery to tissues, aiding detoxification, and strengthening muscles and joints (Fadlilah et al., 2020; Shafeik et al., 2018). When combined with Epsom salt, which contains magnesium sulfate, the benefits are amplified. Epsom salt can be absorbed through the skin and enters the bloodstream, relaxing muscles and reducing stress, pain, stiffness, and swelling in the joints (Sabitha, 2018).

Massage following a foot soak further enhances relaxation and reduces muscle and nerve tension. It increases blood and oxygen flow to the muscles, eliminates toxins, and stimulates the release of endorphins, reducing pain and promoting relaxation. Techniques such as stroking, rubbing, tapping, and pressing specific body areas are commonly used (Graha & Yuniana, 2021; Muliani et al., 2020).

Research by Sabitha (2018) involving 12 respondents aged 54–57 years showed significant results in reducing joint pain, stiffness, and improving physical function after daily 20-minute foot soaks with Epsom salt. Another research also reported that warm water therapy reduced pain and fatigue while improving muscle endurance among 18 badminton athletes after training (Awal et al., 2018; Ilmi et al., 2018). Furthermore, daily 20-minute foot massages for five days reduced pain from a score of 5 to 3 in elderly patients with rheumatoid arthritis (Kurniawati et al., 2019). Similarly, it is observed a reduction in calf pain scores from 4 to 3 in 10 athletes after foot massages (Awal et al., 2018).

## 2. METHOD

### Study Design

This study employs a descriptive case study method involving elderly patients with myalgia who do not use pain-relief medication. Patients with a history of rheumatoid arthritis, varicose veins, or fractures were excluded from the study. Written informed consent was obtained from the patients. The intervention was conducted six times over three weeks, with a frequency of twice per week. Data were primarily collected through interviews and observations, which were further verified with the nurse responsible for the patients. The intervention was conducted either inside the patient's room or on the front terrace of the room. The environmental conditions during the intervention were highly supportive, providing a calm and comfortable atmosphere. The intervention was carried out in the afternoon after the patients had completed their daily activities.

### Patient Information

The intervention was provided to two patients: Mrs. A, a 60-year-old housewife residing at Panti Werdha in Bandung City, and Mrs. R, a 97-year-old housewife also residing at the same facility. Both patients were diagnosed with myalgia based on medical assessments. The assessment revealed that Mrs. A complained of leg pain, described as aching and cramping, with a pain scale of 5 (on a scale of 1–10), categorized as moderate pain. She appeared to grimace when attempting to stand and reach for her cane. The physical examination findings were as follows: blood pressure (BP): 110/80 mmHg, pulse (P): 90 bpm, temperature (T): 36.0°C. Musculoskeletal system evaluation showed a reduced range of motion and pain in the legs when moved excessively.

Mrs. R complained of soreness in her legs while sitting, with the pain radiating to her lower back. The pain scale was 4 (on a scale of 0–10), also categorized as moderate pain. The patient was previously unaware of her condition. The physical examination findings were as follows: BP: 120/80 mmHg, respiratory rate (RR): 18 breaths/min, P: 90 bpm, T: 36.0°C. The musculoskeletal system evaluation showed no complaints regarding the range of motion, and the patient could perform daily activities independently.

### Clinical Findings

Based on the assessment data, the two patients had different nursing diagnoses. Mrs. A was diagnosed with acute pain, impaired physical mobility, and knowledge deficit, while Mrs. R was diagnosed with acute pain and knowledge deficit. According to the Indonesian Nursing Diagnosis

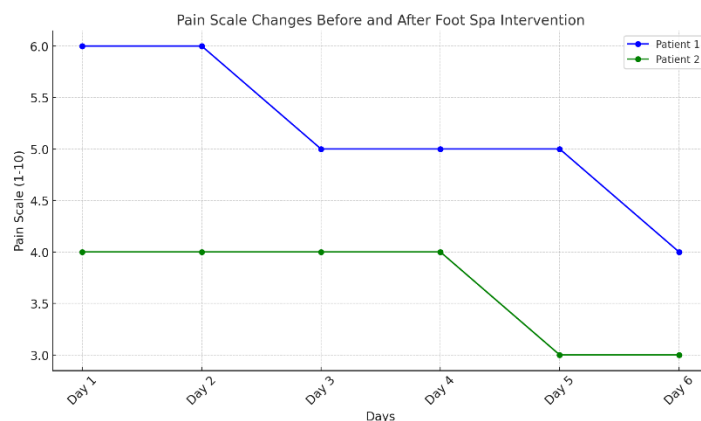
Standards, both patients were diagnosed with acute pain related to a physiological injurious agent (inflammation), as evidenced by pain complaints.

The nursing intervention focused on addressing the acute pain diagnosis. The intervention applied was pain management with a focus on non-pharmacological measures, specifically foot spa therapy. The goal of this intervention was to reduce the patients' pain level to a scale of 1–2. The nursing implementation was conducted based on the planned interventions. The implementation was carried out over six alternate days, with a duration of 35 minutes per session for each patient.

### Therapeutic/Nursing Intervention

The foot spa was carried out in two steps. The first step involved soaking the feet in warm water containing 20 mg (3 teaspoons) of Epsom salt dissolved in 2 liters of water, with the temperature maintained at 40°C. The feet were soaked for 15 minutes. The second step consisted of a foot massage, where a sufficient amount of lotion was applied, followed by thumb movements across the entire foot, circular motions on specific points, and pressing and holding on targeted areas for 15–20 minutes.

### 3. RESULTS



**Figure 1. Pain Scale Changes after Foot Spa Intervention**

The evaluation conducted on both patients focused on their pain levels by monitoring the pain scale before and after the foot spa intervention. As shown in the graph, Patient 1 experienced a reduction in pain scale on Day 1 from 6 (moderate pain) to 5 (moderate pain), Day 2 from 6 (moderate pain) to 5 (moderate pain), Day 3 from 5 (moderate pain) to 4 (moderate pain), Day 4 from 5 (moderate pain) to 4 (moderate pain), Day 5 from 5 (moderate pain) to 4 (moderate pain), and Day 6 from 4 (moderate pain) to 3 (mild pain).

Based on the average calculation, Patient 1 had an average pain scale of 5.1 before the intervention, and after the intervention, the average pain scale was 4.1. Thus, there was a decrease of 1 scale. For Patient 2, before the intervention, the average pain scale was 4, and after the intervention, the average pain scale was 3. Therefore, there was also a decrease of 1 scale. Based on this data, it can be concluded that both patients experienced a reduction in pain levels.

#### 4. DISCUSSION

Patient 1, Mrs. A, is a 60-year-old woman, and Patient 2, Mrs. R, is a 97-year-old woman, both of whom are considered elderly. Myalgia, or muscle pain, often occurs in older adults due to the anatomical changes associated with aging, particularly the gradual decline in muscle mass, strength, and function. As people age, the body undergoes a process of sarcopenia, where muscle fibers become less dense and muscle elasticity decreases, making elderly individuals more susceptible to muscle pain and stiffness (Sabitha, 2018; Sakaguchi et al., 2022). Myalgia itself is an inflammatory condition that can be exacerbated by physical exertion, such as excessive exercise or repetitive heavy lifting.

Myalgia in elderly individuals can also result from prolonged muscle use or improper posture, particularly when engaging in daily activities like cleaning, lifting, or walking. Research by Elsayy & Higgins (2010) identifies excessive physical activity, such as continuous heavy lifting or overexercising, as a primary cause of myalgia. As muscles become fatigued, they are more prone to injury, and when subjected to excessive stress, the muscles may experience oxygen deprivation, triggering an anaerobic process that produces lactic acid. This acid buildup results in the characteristic pain and soreness of myalgia.

In the case of both patients, it was found during assessment that they had similar habits of heavy lifting in daily activities, such as carrying groceries or lifting heavy objects. These habits align with the findings of Sakaguchi et al., (2022), who emphasizes that frequent lifting of heavy objects can strain muscles, causing microtears in the muscle fibers and leading to pain. Such injuries often go unnoticed initially, but they accumulate over time and can cause chronic myalgia, especially in the elderly. Myalgia can also result from muscle tension due to prolonged immobility or incorrect posture, which is common in elderly individuals who may have decreased physical activity levels.

The mechanism underlying myalgia in elderly patients is largely attributed to reduced blood flow to muscles, particularly in those with atherosclerotic conditions, where the blood vessels supplying the lower extremities become narrowed or blocked. Powell et al., (2019) explain that as blood flow decreases, muscles receive insufficient oxygen, particularly when oxygen demand increases during physical activity. Without adequate oxygen, muscles can undergo ischemia, resulting in pain (Darmawati, 2018). For example, in the gastrocnemius muscle, the pain can progress from acute pain during physical activity to chronic pain even at rest, as vasoconstriction further restricts blood flow.

Additionally, studies suggest that muscle pain in the elderly can develop within 24 to 72 hours following physical exertion, a phenomenon known as delayed onset muscle soreness (DOMS). This soreness arises from the breakdown of muscle tissue after strenuous or unfamiliar activities, leading to inflammation and discomfort (Annafi & Mukarromah, 2021; Yutan et al., 2022). The elderly, in particular, are more prone to DOMS due to their reduced muscle mass and slower recovery times. As elderly individuals typically engage in less vigorous physical activity, their muscles are not accustomed to the stress of strenuous movement, making them more vulnerable to muscle strain and soreness.

In the current case study, the pain scale assessment revealed that both Mrs. A and Mrs. R were experiencing moderate pain, with scores of 6 and 5, respectively. According to the numerical

pain scale, both patients fall within the moderate pain range, indicating that their myalgia was significant enough to affect their daily activities. Previous research supports this finding, as moderate myalgia can have a considerable impact on an individual's quality of life, limiting their ability to perform daily tasks and reducing their overall mobility (Nugroho et al., 2020; Nurwulan & others, 2020)

To address the myalgia experienced by both patients, a combination of warm water immersion and massage therapy was implemented. Warm water immersion has been shown to have several therapeutic effects, such as improving blood circulation, relaxing muscles, and alleviating pain. Immersion in warm water is a widely used relaxation technique that promotes the dilation of blood vessels, enhancing circulation and increasing the delivery of oxygen to the muscles (Muliani et al., 2020; Suyanto & Noor, 2022). This improved circulation helps to flush out metabolic waste products, including lactic acid, which are responsible for the muscle soreness and pain associated with myalgia.

The addition of Epsom salt to the warm water further enhances the therapeutic effects of the immersion. Epsom salt is rich in magnesium and sulfate, both of which are absorbed through the skin during the immersion process. Magnesium is particularly beneficial for muscle function, as it helps to regulate muscle contraction and relaxation. Sulfate plays a role in detoxifying the body and reducing inflammation. Combining warm water with Epsom salt can significantly reduce muscle pain by replenishing magnesium levels, which stabilizes muscle contractions and alleviates discomfort (Deshmukh & Ray, 2019; Sabitha, 2018).

Massage therapy, as part of the intervention, also plays a critical role in pain reduction. Massage therapy, particularly when focused on areas of muscle tension, helps release endorphins—natural painkillers produced by the body. Endorphins have a calming effect, promoting relaxation and pain relief (Awal et al., 2018; Ilmi et al., 2018; Muliani et al., 2020). They are also involved in tissue repair, which is crucial for recovering from muscle injury. In the case of Mrs. A and Mrs. R, massage helped to relax the tense muscles, reduce stress, and improve their overall sense of well-being.

The combined effect of warm water immersion, Epsom salt, and massage was observed to be highly effective in reducing the intensity of pain in both patients. The pain scale scores decreased from 6 (moderate pain) and 5 (moderate pain) to 2 (mild pain) for both patients. This reduction in pain intensity highlights the success of this intervention in alleviating myalgia in elderly individuals. The combination of these methods can lead to significant improvements in pain management, mobility, and overall health in elderly patients suffering from muscle pain (Fadlilah et al., 2020; Graha & Yuniana, 2021; Halm & Lindquist, 2022; Ningsih et al., 2022).

In conclusion, the use of warm water immersion with Epsom salt followed by massage therapy is a promising intervention for elderly individuals suffering from myalgia. Previous studies consistently support the therapeutic benefits of these treatments, especially for individuals with reduced muscle mass and strength due to aging. By enhancing circulation, reducing inflammation, and promoting relaxation, this approach can significantly alleviate muscle pain, improve mobility, and enhance the quality of life for elderly patients. Further studies are needed to explore the long-term effects of such interventions and their potential for use in managing chronic muscle pain in the elderly population.

## 5. CONCLUSION

Based on the case study, it was observed that foot spa therapy, administered three times per week, effectively reduced myalgia in both patients, Mrs. A and Mrs. R, who were experiencing moderate pain levels. The therapeutic effects of the foot spa in this case are attributed to its ability to promote vasodilation, which enhances blood circulation. As the blood vessels expand, oxygen delivery to the muscles increases, aiding in the breakdown of lactic acid. This process contributed to a significant reduction in the muscle pain and discomfort experienced by the patients, aligning with the positive outcomes observed in the case study.

## 6. CONFLICT OF INTEREST

The authors state no conflict of interest.

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