

SPADI-Based Assessment of the Effectiveness of INMAS Electropuncture Therapy in Reducing Shoulder Pain

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Abstract: The Shoulder Pain and Disability Index (SPADI) is a measurement tool designed to evaluate the level of pain and functional limitations in patients with shoulder complaints. It consists of two main subscales, namely pain scale and disability scale, both of which are very important in measuring the effectiveness of therapeutic interventions in shoulder pain conditions. On the other hand, INMAS (Integrated Neuromuscular Acupuncture System) electropuncture therapy is a non-pharmacological intervention that uses electrical stimulation at acupuncture points to relieve pain. It combines acupuncture principles with neuromuscular stimulation targeted at the muscles and soft tissues around the shoulder. INMAS electropuncture works by improving blood circulation, reducing inflammation, and activating the release of endorphins, all of which aim to reduce pain sensation and improve mobility. This study aims to analyze the comparison of INMAS Method Electroacupuncture Therapy and Massage Therapy on Shoulder Pain Reduction. This study uses a Randomized Controlled Trial (RCT) design. In this study using 2 intervention groups. The first group performed electroacupuncture therapy INMAS method, the second group performed massage therapy. Each group amounted to 30 respondents. The results showed that there was a statistically significant difference between the two treatments (Massage and INMAS) with a value of Asymp. Sig. (2-tailed) is 0.000, ($p < 0.05$). The statistical results also show that INMAS therapy is more effective in reducing shoulder pain compared to massage therapy (Exact Sig value. (1-tailed) is 0.000, $p < 0.05$). This study concluded from two treatments to reduce shoulder pain with massage therapy and electroacupuncture therapy INMAS method. From the results of the Mann-Whitney test, it was found that electroacupuncture therapy INMAS method was more effective in reducing shoulder pain compared to massage therapy.

Keywords: SPADI assessment, Inmas method acupuncture therapy, Massage therapy, Shoulder pain.

Introduction

The Shoulder Pain and Disability Index (SPADI) is an assessment instrument specifically designed to measure the level of pain and functional limitations due to conditions of the shoulder, both acute and chronic (Abdul-Karim et al., 2023). Developed by Sassi et al. (2024), the SPADI aims to evaluate the impact of

shoulder pain on daily life and to assist in monitoring the progress and effectiveness of therapy in patients with shoulder disorders.

Shoulder pain is a common complaint that affects various age groups, whether in the working population, athletes, or individuals in general (Ansanello et al., 2023; Hodgetts & Walker, 2021). It can stem from a variety of conditions, such as muscle injury, joint inflammation,

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tendonitis, bursitis, and other degenerative conditions. Shoulder pain can interfere with daily activities such as lifting objects, dressing, driving a vehicle, or even sleeping. This discomfort reduces the patient's quality of life, both physically and psychologically, so an accurate measurement of the patient's condition is essential.

By focusing on aspects of pain and disability, the SPADI provides a subjective assessment that reflects the patient's experience, making it easier for healthcare professionals to evaluate the severity of the condition and the effectiveness of the treatment or therapy provided (El Melhat et al., 2025; Failla et al., 2023). The SPADI also allows researchers and healthcare practitioners to conduct studies on the prevalence and management of shoulder pain in various populations.

The SPADI consists of two subscales, namely: Pain Subscale: Measures the intensity of pain felt by the patient in five different situations (Crane et al., 2024). These questions ask about pain intensity at rest, during activity, and at other specific times, thus capturing a more comprehensive picture of pain. Disability Subscale: Measures the functional limitations the patient experiences in eight daily activities, such as lifting objects, carrying items, combing hair, or reaching overhead.

The total SPADI has 13 items with a Likert scale from 0 to 10. The final score is calculated by averaging the scores from both subscales or all items, where higher scores indicate more severe pain and disability.

The SPADI has become popular for several reasons
Reliability and Validity: The SPADI has been shown to have good reliability and validity in measuring shoulder pain and functional limitations, both across different health conditions and different languages or populations. The instrument is reliable in both clinical and research contexts. **Easy to Use:** The SPADI is a simple and quick tool to be filled out by the patient, allowing healthcare professionals to perform rapid assessments in clinical situations (Stewart et al., 2022). **Responsive to Change:** The SPADI is responsive to clinical changes in patients receiving treatment, allowing monitoring of patient progress and evaluation of therapeutic success. **Use of SPADI in Clinical Practice and Research.**

In clinical practice, the SPADI is used to: Assess the initial level of pain and disability in patients with shoulder problems. Monitoring the patient's progress during or after therapy, for example in physiotherapy or drug therapy. Evaluate the effectiveness of various interventions such as physical therapy, electrotherapy or acupuncture.

In research, SPADI is often used as an outcome measure in studies on therapies for shoulder pain or epidemiologic research related to the prevalence of

shoulder disorders. With the data generated from SPADI, researchers can compare the effectiveness of various therapeutic modalities.

Shoulder pain is a common health problem that affects the quality of life of individuals across different age groups (Vega-Fernández et al., 2021). As a complex joint, the shoulder is prone to various types of disorders, such as muscle injury, inflammation, bursitis, and other degenerative conditions. Shoulder pain can restrict movement, interfere with daily activities and, if left untreated, potentially lead to long-term disability. With age and increased physical exertion, shoulder pain complaints are also becoming more common in clinical practice and a serious challenge in the field of rehabilitation. This has led to the development of alternative treatment methods, one of which is INMAS (Integrated Neuromuscular Acupuncture System) electropuncture therapy as a form of non-pharmacological intervention to reduce shoulder pain (Purwanto & Wahyu, 2021; Venkateswari et al., 2024).

Electropuncture therapy is a development of the traditional acupuncture technique that uses electrical stimulation on acupuncture points. In this method, acupuncture needles are placed at specific points on the body, then electrified with a customized intensity. This electrical stimulus provides an additional stimulating effect that is believed to accelerate the body's response to pain relief, improve blood circulation, and stimulate the release of endorphins and other neurotransmitters that function as the body's natural analgesics (Xu et al., 2021).

Shoulder pain is usually associated with inflammation and disorders of the soft tissues around the shoulder joint, such as muscles, ligaments and tendons. Electropuncture therapy works by two main mechanisms: **Pain Signal Modulation:** Electrical stimulation of acupuncture points helps to inhibit pain signal pathways in the central nervous system through activation of neurons in the brainstem and release of endorphins. Endorphins are natural body chemicals that work to suppress the perception of pain, similar to how opioids work, but without the addictive side effects (Zhang et al., 2023). **Reduction of Inflammation:** Electropuncture also stimulates blood circulation in the treated area, which can help reduce inflammation by bringing more nutrients and oxygen to the damaged tissue. This supports a faster healing process and tissue recovery (Liu, 2022).

INMAS (Integrated Neuromuscular Acupuncture System) is a comprehensive approach that combines the principles of electropuncture with neuromodulation and muscle treatment. INMAS focuses on nerve and muscle points that are under tension or damage due to shoulder pain. This approach is done by considering the biomechanical aspects of the shoulder as well as the

neuromuscular condition of the patient, so that it is more targeted and in accordance with the specific needs of the patient (Mahboobani et al., 2021).

The INMAS approach allows patients to gain several additional benefits, including: Improved Mobility: INMAS electropuncture helps to relax tense muscles thereby reducing stiffness in the shoulder joint. Increased Immunity to Pain: With regular stimulation, INMAS electropuncture also stimulates the production of neurotransmitters which can increase the body's tolerance to pain. Long Term Effects: Consistent use of INMAS can have a long-term effect on reducing shoulder pain and improving overall shoulder function.

The electropuncture approach, especially in the form of INMAS, is attracting interest in the medical community due to its minimally invasive and low-risk nature when compared to drugs or surgery. In addition, electropuncture has a very low risk of side effects, making it an option for patients who are not compatible with painkillers or who wish to avoid drug dependency.

In research and clinical practice, electropuncture has proven effective in treating musculoskeletal pain such as back pain (Urits et al., 2021), knee pain, and especially shoulder pain. The use of electropuncture is also in line with modern health trends that prioritize non-pharmacological therapies and natural approaches.

Several studies have shown that electropuncture is highly effective in reducing pain and improving physical function in patients with shoulder pain (Chen et al., 2024). Studies comparing electropuncture with conventional therapies (such as physical therapy or the use of analgesics) show encouraging results in the aspects of: Pain Score Reduction: Patients undergoing INMAS electropuncture therapy showed a significant reduction in pain scores as measured through indices such as the Shoulder Pain and Disability Index (SPADI). Improved Shoulder Function: INMAS electropuncture helps in restoring shoulder muscle and joint function, making daily activities easier for patients.

These studies also support the use of INMAS as a complementary therapy to speed up recovery and reduce patient dependence on analgesic medications. The cumulative effect of electropuncture, especially when done in multiple sessions, helps in prolonging the pain-free period after therapy is completed.

The Shoulder Pain and Disability Index (SPADI) is a measurement tool designed to evaluate the level of pain and functional limitations in patients with shoulder complaints. It consists of two main subscales, the pain scale and the disability scale, both of which are very important in measuring the effectiveness of therapeutic interventions in shoulder pain conditions.

On the other hand, INMAS (Integrated Neuromuscular Acupuncture System) electropuncture

therapy is a non-pharmacological intervention that uses electrical stimulation at acupuncture points to relieve pain. It combines acupuncture principles with neuromuscular stimulation targeted at the muscles and soft tissues around the shoulder. INMAS electropuncture works by improving blood circulation, reducing inflammation, and activating the release of endorphins, all of which aim to reduce pain sensation and improve mobility.

The relationship between SPADI and INMAS electropuncture therapy includes Evaluation of Therapy Effectiveness: SPADI can be used to objectively measure the effectiveness of INMAS electropuncture therapy. The SPADI provides scores that indicate changes in pain and disability levels before and after therapy. This allows medical personnel or therapists to assess how much pain reduction and improvement in shoulder function is achieved after INMAS therapy is performed. Monitoring Patient Progress, As INMAS electropuncture therapy is usually performed over several sessions, the SPADI can help monitor the patient's progress throughout each therapy session. Periodic use of the SPADI helps to ensure that the patient is improving or determine if any adjustments are needed in the therapy protocol. Standardized Evaluation of Therapy. The SPADI provides a consistent standard of evaluation, making it easier for researchers and practitioners to compare the effectiveness of INMAS electropuncture therapy with other therapies in treating shoulder pain. With SPADI, data obtained from electropuncture therapy can be compared with data from other treatment methods, such as physiotherapy or analgesic administration. Optimization of Shoulder Pain Management. The results of SPADI help determine the overall success rate of INMAS electropuncture therapy in reducing shoulder pain. This data is important for making advanced decisions in the patient's treatment plan, for example, whether the therapy needs to be continued, combined with other methods, or further adjusted for optimal results.

Overall, SPADI and INMAS electropuncture therapy play complementary roles in the management of shoulder pain. The SPADI allows for structured and reliable measurement of pain reduction and function improvement, while INMAS electropuncture provides an effective and safe intervention to achieve these goals.

Method

This study uses a Randomized Controlled Trial (RCT) design (Wang et al., 2023). RCT is an experimental research study that is able to evaluate whether the intervention used is really feasible or not, RCT uses random procedures that aim to allocate various research

factors to research subjects. In this study using 2 intervention groups. The first group performed massage therapy, the second group performed electroacupuncture therapy INMAS method (Gadke et al., 2021). The research design as shown in Figure 1.

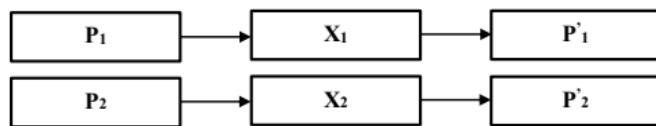


Figure 1. Research design

Description

P1 = Respondents before massage therapy intervention

X1 = Intervention with massage therapy

P'1 = Respondents after massage therapy intervention

P2 = Respondents before the intervention of electroacupuncture therapy INMAS method

X2 = Intervention with electroacupuncture therapy INMAS method

P'2 = Respondents after the intervention of electroacupuncture therapy INMAS method

Each group consisted of 30 respondents and was intervened for 5 times in both the massage therapy group and the INMAS method electroacupuncture therapy group.

Results and Discussion

In our study, we found that the age of respondents who experienced shoulder pain was mostly at the age of more than 50 years, namely 40 respondents (66.67%) (Table 1). The gender of the respondents was mostly female, 38 respondents (63.33%) (table 2). Most respondents' occupation as housewives was 17 respondents (28.33%) (table 3). The most respondents' education is undergraduate, namely 25 respondents (41.67%) (table 4). The average length of complaint was > 3 months, namely 21 respondents (35.0%) (table 5). The most common cause of shoulder pain is prolonged shoulder pain, namely 21 respondents (35.0%) (table 6). The most common shoulder pain disease syndrome was Exogenous Pathogen Invasion, namely 22 respondents (36.67%) (table 7).

Table 1. Distribution of Respondents by Age

Age	n	Percentage (%)
< 30 years	5	8.33
Between 30 to 50 years old	15	25.00
Over 50 years old	40	66.67
Total	60	100.00

Table 2. Distribution of Respondents Based on Gender

Gender	n	Percentage (%)
Male	22	36.67
Female	38	63.33
Total	60	100.00

Table 3. Distribution of Respondents Based on Occupation

Jobs	n	Percentage (%)
PNS	13	21.67
Merchant	7	11.67
Self-employed	8	13.33
Private	10	16.67
Housewife	17	28.33
Health Workers	5	8.33
Total	60	100

Table 4. Distribution of Respondents Based on Education

Education	n	Percentage (%)
SD	4	6.67
SMP	9	15.00
High School / Equivalent	15	25.00
Diploma	7	11.67
Bachelor	25	41.67
Total	60	100.00

Table 5. Distribution of Respondents Based on Duration of Shoulder Pain Complaints

Duration of Complaint	n	Percentage (%)
< 1 month	15	25.00
< 2 months	13	21.67
> 1 month	6	10.00
> 3 months	21	35.00
> 6 months	5	8.33
Total	60	100.00

Table 6. Distribution of Respondents Based on Causes of Shoulder Pain Disease

Causes	n	Percentage (%)
Muscle trauma/fatigue	8	13.33
Exposure to cold winds	10	16.67
Prolonged Shoulder Pain	21	35.00
Fall	5	8.33
Feels sudden	11	18.33
Qi Xue Deficiency	5	8.33
Total	60	100.00

Table 7. Distribution of Respondents Based on Disease Syndrome

Disease Syndrome	n	Percentage (%)
Shaoyang syndrome	6	10.00
Qi Xue Deficiency	3	5.00
Qi Xue Stasis	5	8.33
Exogenous Pathogen Invasion	22	36.67
Yangming Syndrome	7	11.67
Stagnation of QI, Mer, BL, SI	9	15.00
Mer, BL, SI stagnation	3	5.00

Disease Syndrome	n	Percentage (%)
Qi Xue Stagnation	5	8.33

In Figure 2, it can be seen that most of the points are quite close to the horizontal line ($y = 0$), especially in the early part of the data (low observation values). However, some points at the end (high observation values) show considerable deviation from the normal line. This indicates that although there are some data that are close to the normal distribution, overall, the results of the massage therapy treatment are not completely normal. The deviations are larger at the higher observation values, which may mean that there is variability that is not evenly distributed.

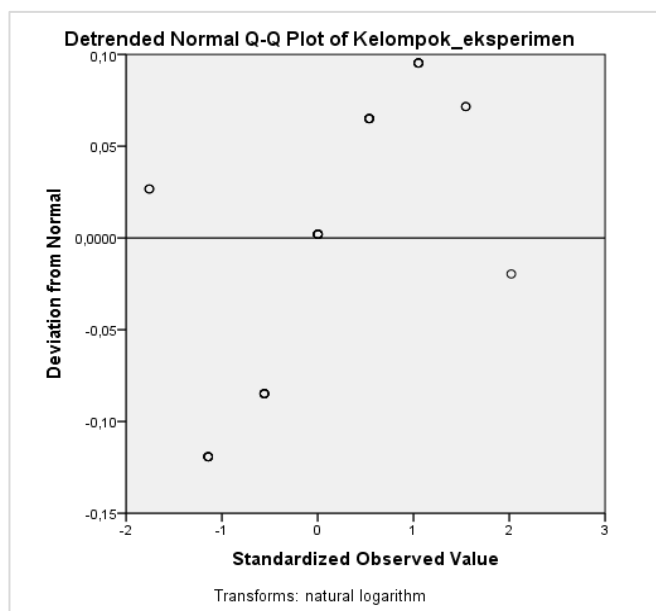


Figure 2. Normality of massage treatment data

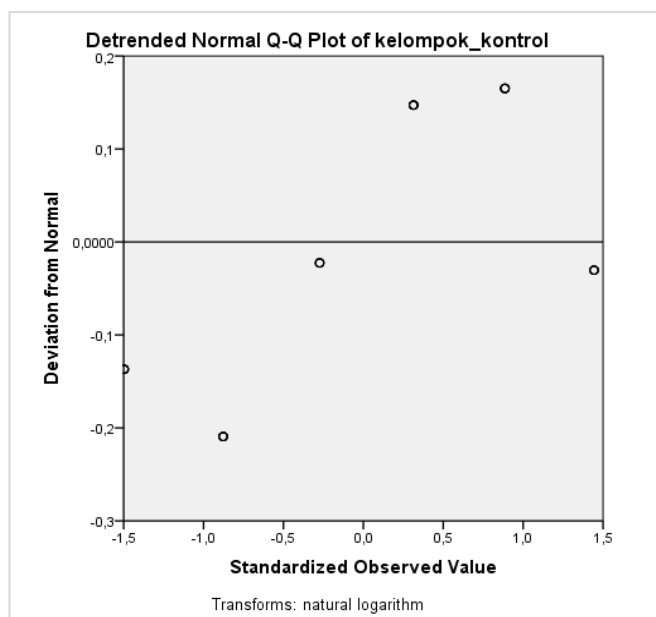


Figure 3. Normality of INMAS treatment data

From the results of Figure 3, shows that the points are quite far from the center line, especially in the middle and edge areas, this indicates that the data distribution for the INMAS treatment results is not normal, which means that there is a deviation from normality.

Table 8. Mann - Whitney Test Result

	Group	N	Mean Rank	Sum of Rank
Group_2	Experimental	30	15.50	465.0
	Control	30	45.50	1365.0
	Total	60		

Table 9. Mann-Whitney Statistical Results

Parameters	group_2
Mann-Whitney U	0.000
Wilcoxon W	465.000
Z	-6.675
Asymp. Sig. (2-tailed)	0.000

a. Grouping Variable: Group

From table 8 it shows that the massage treatment has a mean rank of 11.91 and the INMAS treatment has a mean rank of 21.09, when viewed from the average rank value, it shows that INMAS therapy has a greater effect in reducing pain than massage therapy. While table 9 shows that there is a statistically significant difference between the two treatments (Massage and INMAS) with the value of Asymp. Sig. (2-tailed) is 0.000, ($p < 0.05$). The statistical results also showed that INMAS therapy was more effective in reducing shoulder pain compared to Massage therapy (Exact Sig value. (1-tailed) is 0.000, $p < 0.05$).

Discussion

The results showed that the age of respondents who experienced shoulder pain was mostly at the age of more than 50 years, namely 40 respondents (66.67%). The gender of the respondents was mostly female, namely 38 respondents (63.33%). The most respondents' occupation as housewives is 17 respondents (28.33%). The most respondents' education is undergraduate, namely 25 respondents (41.67%). The average length of complaint was > 3 months, namely 21 respondents (35.0%). The most common cause of shoulder pain is prolonged shoulder pain, namely 21 respondents (35.0%). The most common shoulder pain disease syndrome is Exogenous Pathogen Invasion, namely 22 respondents (36.67%).

Shoulder pain generally develops gradually and without an obvious cause, although it can also appear suddenly due to a minor injury to the shoulder joint (Codsí et al., 2021). The condition usually occurs in middle age (around 50 years), is more common in women, and usually resolves on its own, although the duration and severity vary widely. Most sufferers

recover within two years, but some symptoms may persist for longer (Badley & Tennant, 1992). Those aged 30-60 years are more prone to shoulder pain (Bai et al., 2020).

Women's muscle ability is lower than men's muscle ability, because women's muscle strength is only one third of men's muscle strength (Bartolomei et al., 2021; Stotz et al., 2023). Complaints of muscle pain occur in female workers compared to male workers. The occurrence of excessive muscle stretching due to repetitive and excessive workloads, causing musculoskeletal pain (Siregar et al., 2022). According to TCM medicine, wind is considered the backbone of many diseases. Wind is a Yang phenomenon. When Feng Xie, or evil Wind, invades the body by penetrating the skin and pores, an important result in TCM is the emergence of imbalances of external origin caused by pathogenic factors of climatic aggression (De Bernardinis, 2023). When the body is attacked from the outside, its defense capabilities are weakened, causing a mismatch in the opening and closing of pores throughout the body, leading to the invasion of other pathogenic factors that cause illness with symptoms such as headache, nasal congestion, sore and itchy throat, facial edema, abnormal aversion to wind, and sweating (Dashtdar et al., 2016). This is in accordance with the results of the study, namely the most common shoulder pain disease syndrome is Exogenous Pathogen Invasion.

The results of data analysis show that the massage treatment has a mean rank of 15.50 and the INMAS treatment has a mean rank of 45.50, when viewed from the average rank value, it shows that INMAS therapy has a greater effect in reducing pain than massage therapy. It is concluded that there is a statistically significant difference between the two treatments (Massage and INMAS) with Asymp. Sig. (2-tailed) is 0.000, ($p < 0.05$). The statistical results also showed that INMAS therapy was more effective in reducing shoulder pain compared to Massage therapy (Exact Sig value. (1-tailed) is 0.004, $p < 0.05$).

This is in accordance with research conducted Fu et al., 2014 that in Chinese medicine, chronic shoulder pain is considered one of the most suitable conditions to be treated with acupuncture by conducting 18 weeks and found that acupuncture trials for shoulder pain are effective long-term treatment for patients with shoulder pain.

Conclusion

This study concluded from two treatments to reduce shoulder pain with massage therapy and INMAS therapy. From the Mann-Whitney test results, it was

found that INMAS therapy was more effective in reducing shoulder pain compared to massage therapy. A suggestion for future researchers is to consider examining the combined effect of INMAS therapy and massage to explore whether the two methods can be used together to achieve better results in reducing shoulder pain.

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Author Contributions

This article was written by four authors, namely J. T. H., P. C. Z., and E. D. W. All authors worked together in carrying out each stage of the article writing.

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Conflicts of Interest

The authors declare no conflict of interest.

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