STATISTICAL ANALYSIS
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Statistical analysis – Acupuncture treatment in patients with frozen shoulder

Blagica Zhu Arsovska[1] Orcid ID: 0009-0008-1053-3659
Jihe Zhu[1] Orcid ID: 0009-0006-7898-3731
Kristina Kozovska[1, 2] Orcid ID: 0000-0002-7342-1848
Elena Simeonovska Joveva [3,4] Orcid ID: 0000-0001-9659-1535

1 Center of Traditional Chinese Medicine "Tong Da Tang", Republic of N. Macedonia;
2 University “Skopje”, Skopje, Republic of N. Macedonia
3 Faculty of Medical Sciences, University “Goce Delchev” Shtip, N.Macedonia;
4 Depertment of Neurology, Clinical Hospital Shtip, N. Macedonia

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Abstract

Acupuncture has been investigated as a complementary treatment for adhesive capsulitis (frozen shoulder), particularly for the management of pain and functional restriction. Conventional acupuncture involves the insertion and stimulation of fine needles at selected acupuncture points. In traditional Chinese medicine (TCM), the treatment is understood in terms of regulating the flow of Qi and Blood through the meridians and addressing pathological patterns that may contribute to pain and restricted movement. From a biomedical perspective, acupuncture may influence sensory nerve stimulation and pain processing, potentially reducing pain and facilitating participation in therapeutic exercises. The study included 155 patients diagnosed with frozen shoulder, comprising 90 men and 65 women. The number of treatment sessions required to achieve complete pain relief and clinical improvement varied among the patients. A total of 93 patients achieved complete pain relief and improvement of their condition after fewer than two treatment sessions. Fifty-one patients required between two and five treatment sessions, while 11 patients required more than five sessions. The results of the present study demonstrated complete clinical recovery in all 155 patients following treatment, with resolution of pain and restoration of shoulder function and range of motion. The findings reported in the present research demonstrate highly positive clinical outcomes following acupuncture treatment and support its beneficial role in the management of frozen shoulder. The observed improvements in pain and shoulder mobility further encourage the use of acupuncture as a therapeutic approach for patients affected by this condition.

Key words – acupuncture, pain, shoulder, traditional Chinese medicine

Introduction

Frozen shoulder, medically referred to as adhesive capsulitis, is a condition characterized by pain, stiffness, and a progressive reduction in the range of motion of the shoulder joint. The condition develops when the connective tissue surrounding the shoulder joint becomes inflamed and contracts, making both active and passive shoulder movements increasingly difficult. Unlike some other causes of shoulder pain, adhesive capsulitis typically results in restrictions in several directions of movement. [1]

The condition is commonly progressing through 3 stages. During the first stage, often called the freezing phase, shoulder pain gradually increases while mobility becomes increasingly restricted. The second stage, known as the frozen phase, is generally characterized by substantial stiffness, while the intensity of pain may decrease. In the final thawing phase, shoulder mobility gradually improves. The duration of each stage varies between individuals, and recovery may take several months or longer. [2]

Treatment generally focuses on reducing pain and gradually restoring shoulder mobility. Physiotherapy and controlled range-of-motion exercises are commonly used to maintain and improve movement. Depending on the severity and stage of the condition, other medical interventions, such as corticosteroid injections, may also be considered.

Traditional Chinese Medicine (TCM) includes several approaches that have been investigated as treatments for frozen shoulder. These include acupuncture, Tui Na massage, cupping, moxibustion, and traditional herbal medicine. Among these approaches, acupuncture has received comparatively more scientific attention. Some clinical studies have reported reductions in pain and improvements in shoulder function following acupuncture. [3, 4, 5, 6]

In conventional acupuncture, fine needles are inserted into selected acupuncture points and may be manually stimulated. For frozen shoulder, points can be selected locally around the shoulder or at distal locations. For example, acupuncture at Tiaokou (ST38) has been specifically studied for adhesive capsulitis, with studies reporting improvements in pain and shoulder function.

From a biomedical perspective, acupuncture may help primarily through pain modulation. Needle stimulation activates sensory nerves and can influence the nervous system's processing of painful stimuli. Reduced pain may then make it easier for the patient to perform shoulder exercises and physiotherapy. Clinical research supports this possible role: one randomized trial found that acupuncture combined with shoulder exercise produced greater improvement than exercise alone, while another study found an immediate reduction in pain following acupuncture. [7]

Fire needle acupuncture (huǒ zhēn) is different from ordinary acupuncture. The needle is heated before it is briefly inserted into selected points or painful areas. Thus, treatment combines mechanical stimulation from the needle with a thermal stimulus. In

traditional Chinese medicine, fire needle is generally explained as warming the affected area, promoting the movement of Qi and Blood, and addressing patterns described as Cold-Dampness or Blood stasis. The heat and needling may stimulate local sensory nerves and tissues and potentially influence pain perception and local circulation. he fire needle treatment dissolves adhesions, removes cold and directly repairs the contracted joint capsule. [8]

Material and methods

The study included 155 patients diagnosed with frozen shoulder, 90 men and 65 women. All patients were treated in a Center for Traditional Chinese Medicine and acupuncture 'Tong Da Tang' in Skopje, RN Macedonia. The patients were treated for frozen shoulder in the Center in 2025. In all patients was achieved positive effect and were successfully treated with the acupuncture treatment, with certain number of treatments. The number of the treatments was different for all the patients and depending on age, gender, duration of symptoms, profession, symptoms, etc. The main symptoms were limited movement and pain in the shoulder.

Inclusion criteria - present pain for at least 1 month, restriction in both active and passive movement, present pain at night, positive abduction test (pain) at 60 degrees and 90 degrees.

Exclusion criteria – major shoulder surgery or injury, fracture or other associated disease.

The patients were treated with normal and fire-needle acupuncture. The duration of the fire-needle treatment was 5-10 minutes. The duration of the normal acupuncture was 45-60 minutes. 0.25x25mm dimension needles were used in the treatment, made by Wuijuiang City Medical Health Material Co., ltd. In the fire-needle acupuncture treatment was used Ashi i.e. trigger point located on the Spleen meridian, 2 cun from Sp20 (Zhourong). In the normal acupuncture treatment were selected the points: Li15 (Jianyu), Li14 (Binao), Lu1 (Zhongfu), Lu2 (Yunmen), Li11 (Quchi), Si10 (Naoshu), Si9 (Jianzhen) and Si14 (Jianliao).

Results and discussion

The study included 155 patients diagnosed with frozen shoulder, comprising 90 men and 65 women. All patients presented with the characteristic clinical symptoms of the condition, namely restricted shoulder range of motion accompanied by pain during movement.

Regarding the duration and presentation of pain, 58 patients presented with acute pain, whereas 97 patients experienced chronic pain. The age distribution demonstrated that 14 patients were younger than 30 years, 56 patients were between 30 and 50 years of age, and 85 patients were older than 50 years. The same results are shown in table 1.

Table 1. Age distribution

Age group	Number of patients
<30	14
30 – 50	56
>50	85

The number of treatment sessions required to achieve complete pain relief and clinical improvement varied among the patients. A total of 93 patients achieved complete pain relief and improvement of their condition after fewer than two treatment sessions. Fifty-one patients required between two and five treatment sessions, while 11 patients required more than five sessions. The results are shown in table 2.

Table 2. Number of sessions required to obtain complete healing

Number of sessions	***Number of patients***
<2	93
2 – 5	51
>5	11

Different acupuncture techniques were used during treatment. Six patients were treated exclusively with standard acupuncture needles, 125 patients were treated with hot needles (fire needle acupuncture), and 24 patients received a combination of standard and hot-needle acupuncture. Thus, hot-needle acupuncture represented the principal treatment approach within this patient group. The results are shown in table 3.

Table 3. Acupuncture techniques used and number of treated patients

Acupuncture technique	***Number of treated patients***
Normal needle acupuncture	6
Normal + fire needle acupuncture	24
Fire needle acupuncture	125

An analysis of the affected shoulder demonstrated a predominance of unilateral involvement. Among the male patients, 27 presented with involvement of the left shoulder, 62 with involvement of the right shoulder, and one patient with bilateral shoulder involvement. Among the female patients, 29 had involvement of the left shoulder, 33 had involvement of the right shoulder, and three had bilateral involvement. The results are shown on table 4.

Table 4. Demonstration of predominance of the affected shoulder

	Male	Female
Left shoulder	27	29
Right shoulder	62	33
Both shoulders	1	3

The assessment of pain in relation to the degree of shoulder movement also demonstrated considerable restriction of mobility among the patients. Ninety-eight patients experienced pain at approximately 60° of movement, while 50 patients experienced pain between 60° and 90°. In seven patients, pain occurred only at angles exceeding 90° of movement. The results are shown in table 5.

Table 5. Restriction of mobility and pain among the patients at a specific degree of shoulder movement

Degree of shoulder movement	***Number of patients***
60°	98
between 60° and 90°	50
>90°	7

Overall, the findings of this study demonstrate a positive clinical response to the acupuncture-based treatment approaches used in the 155 patients with frozen shoulder. Complete pain relief and improvement of the condition were achieved within a relatively small number of treatment sessions in the majority of patients, with 93 patients requiring fewer than two sessions. The observed outcomes provide clinical evidence from this patient population regarding the beneficial effects of the applied acupuncture techniques in the management of pain and restricted shoulder movement associated with frozen shoulder.

The treated areas are often characterized by localized tenderness on palpation and the reproduction of a specific pain response. For this reason, they are commonly referred to as trigger points. These areas are frequently found in regions where muscles and nerves are closely associated. On palpation, trigger points may be perceived as firm areas, small nodules, or palpable bands within the muscle tissue. Their development may be associated with prolonged muscle tension, psychological stress, excessive or repetitive muscular activity, previous injury, or postural abnormalities.

The acupuncture point LI15 is situated in the region of the deltoid muscle. Points SI9 through SI14, which belong to the Small Intestine meridian, are located in the anatomical regions of the supraspinatus and infraspinatus muscles. LU1 and LU2 are positioned in the upper arm region in relation to the biceps and triceps muscles. Stimulation of these local points is intended to address muscular tension and improve

local circulation, with the therapeutic objectives of reducing pain and increasing the available range of shoulder movement. When acupuncture is applied to a sensitive muscular point, the resulting stimulation may promote relaxation of the affected muscle and facilitate a reduction in muscular tightness. [9]

The findings reported in the present research demonstrate highly positive clinical outcomes following acupuncture treatment and support its beneficial role in the management of frozen shoulder. The observed improvements in pain and shoulder mobility further encourage the use of acupuncture as a therapeutic approach for patients affected by this condition.

Conclusion

The results of the present study demonstrated complete clinical recovery in all 155 patients following treatment, with resolution of pain and restoration of shoulder function and range of motion.

Informed patient consent

Complete written informed consent was obtained from the patients for the publication of this study.

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Conflict of interest

The authors have declared that no competing interests exist.

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