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The Effect of Acupuncture Using Specific Acupoints and Non-Acupoints in Non-Traumatic, Chronic Shoulder Pain: A Case Study

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Abstract

Chronic shoulder pain is one of the most common presentations of musculoskeletal pain in our community, which usually complicates or interferes with a person's daily activities, social events, and overall quality of life. It is the leading cause of disability among middle-aged working individuals. It has been reported that until the present day, none of the conventional treatments has proved effective for chronic shoulder pain in the long term. Furthermore, there are considerable side effects, to varying degrees of these treatments. Acupuncture, as part of Traditional Chinese Medicine, has shown effective results in treating shoulder pain by minimizing the pain and improving range of motion and mobility. The present case involves four patients diagnosed with non-traumatic chronic shoulder pain. All the patients were given three acupuncture treatments per week, lasting 40 minutes for the duration of two weeks. Needling was inserted at six specific acupoints and five specific non-acupoints. Pain and mobility assessments were done before and twenty minutes after each treatment. The result shows positive effects of acupuncture using specific acupoints and specific non-acupoints in alleviating non-traumatic chronic shoulder pain. At the end of this study, their shoulder pain was greatly minimized, and their shoulder functionality improved remarkably. Although larger clinical intervention studies on the effect of acupuncture treatment on chronic shoulder pain due to non-traumatic injury are needed, the result of this case study indicates that acupuncture treatment using specific acupoints and specific non-acupoints can be an effective alternative therapy or treatment tool for patients with non-traumatic chronic shoulder pain.

Keywords: *Acupuncture, Acupuncture points, Chronic shoulder pain, Conventional treatment, non-acupuncture points, non-traumatic shoulder pain, pain scale, range of motion and mobility.*

Introduction

Research shows that shoulder pain is one of the most common musculoskeletal pains in the community. It affects 6.9% to 26% of the population globally [1]. It is also a common musculoskeletal disorder, prompting many patients to seek medical treatment [2].

The shoulder is a multi-ligament, multi-tendon, multi-muscle joint. It is a complex and the most mobile joint in the body. This mobility provides the upper extremity with a tremendous range of motion [3]. Therefore, any of these tissues that sustain damage can cause pain and discomfort. Shoulder pain may be due to problems with the neck, shoulder joints, or other soft tissues around the shoulder [4]. According to the diagnosis of shoulder pain, it involves adhesive capsulitis, rotator cuff tendinitis, shoulder impingement syndrome, acromioclavicular joint disease, and so on [5]. The term "chronic shoulder pain" refers to shoulder pain that has persisted for more than 6 months [6]. Chronic shoulder pain continues to be prevalent in older populations that are still working, particularly if their work is physically active or, at least, involves the use of their upper limbs [7]. Non-traumatic chronic shoulder pain

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refers to complications such as capsulitis, calcific tendinitis, glenohumeral joint arthritis, polymyalgia rheumatica, rheumatoid arthritis, supraspinatus tendinopathy or subacromial bursitis, rotator cuff tear, referred pain from mid or lower cervical dysfunction, radiculopathy from disc or osteophyte complex [8]. It ruled out shoulder pain due to injuries such as fractures, dislocations, or shoulder separation.

Most research evidence shows that chronic shoulder pain is the third most common type of musculoskeletal pain. This condition can lead to a major impact on health-related quality of life, such as an inability to work and perform domestic and social activities. The worst implications of this condition could bring about serious economic hardships such as job instability, unemployment, or income loss for the affected individuals and their families.

Structurally and functionally, the shoulder is an enormously complex joint as it is one of the most freely moveable areas in the human body. It has a very wide range of movement, which can put the muscles, tendons, and ligaments around the joint under a lot of strain [9]. Four joints are present in the shoulder: the sternoclavicular, acromioclavicular, scapulothoracic, and glenohumeral joints. However, this complexity means that the shoulder tissues are susceptible to damage and degeneration [10].

Shoulder pain develops in or around the shoulder, specifically from its joints and surrounding soft tissues. Noticeably, the pain may be constant, or it may only be present when the shoulder joint is moving. Unattended shoulder pain for a long period will lead to restricted shoulder mobility and chronic shoulder pain. Six of the most common causes of chronic shoulder pain without any injury or any traumatic activity are arthritis, calcific tendonitis, frozen shoulder, rotator cuff tears, spinal issues, rotator cuff tendonitis, and bursitis [11].

Frozen shoulder (adhesive capsulitis) is a self-limiting disease with a chronic character. A decrease in joint volume because of fibrosis and hyperplasia of the joint capsule leads to painful and restricted glenohumeral motion [12]. Rotator cuff disorders may affect one or more portions of the rotator cuff and can be further defined as subacromial impingement (rotator cuff tendonitis). Age is the most common factor for rotator cuff disorders. It is a degenerative process that is progressive [13]. Dull aches deep in the shoulder, disturbed sleep, difficulty combing hair or reaching behind the back and accompanied by arm weakness are the symptoms of rotator cuff disorders. Rotator cuff tears (partial or full thickness) due to overuse, which leads to tendonitis and resulting tearing in the tendons. Rotator cuff tears are also rampantly prevalent, with an age-dependent increase in numbers [14]. Calcific tendonitis is similar to frozen shoulder, but it is due to calcium deposits built up in the muscle or rotator cuff tendon. It is a common disease that usually affects individuals aged between 40 and 60 years, and it seems to be more women affected than men. Clinically, calcific tendinitis is characterized by severe, disabling pain that occurs spontaneously, usually in the morning [15]. Most shoulder pain results from an injury or condition in the shoulder itself, but sometimes shoulder pain stems from a problem in the neck [16]. Shoulder pain is related to spinal issues where the cervical spine and disc issues can be the root cause of it. Regardless of the disorders, shoulder pain is the most common reason for consulting a practitioner [17].

The treatment for chronic shoulder pain mostly depends on the cause and severity of the shoulder pain itself. The general treatment options in conventional medicine are physiotherapy or occupational therapy, arm slings or shoulder immobilizers, or surgery for the most serious cases. Medical practitioners may also prescribe some medications such as oral paracetamol, opioid analgesics, topical nonsteroidal anti-inflammatory drugs (NSAIDs), and oral corticosteroids [18]. However, these options aren’t satisfactory, and most patients seek complementary and

alternative medicine, including acupuncture, as a solution [19].

Acupuncture is one of the therapeutic systems in alternative medicine. It is the oldest Chinese system of therapeutics where needles are pricked in specific acupuncture points of the body along specific meridian lines for the treatment of various diseases [20]. In this modern world, acupuncture is widely used as an alternative or complementary therapy for the treatment of pain [21]. According to Traditional Chinese Medicine (TMC), pain is believed to be the result of a specific blockage or stagnation of the normal flow of vital energy (qi or chi) in the region of injury [22].

In traditional Chinese medicine (TCM), all causes of shoulder pain are termed as "*shoulder at the age of 50 years"* [12]. In the case of chronic shoulder pain, it is believed that such stagnation or blockage of the flow of qi and blood originates in the tendons and muscles of the internal organs, such as the large intestine, small intestine, and internal membrane of acupuncture meridians.

It has been thought that by inserting acupuncture needles at specific points, the normal flow of energy can be restored [23]. Acupuncture treatment is aimed at stopping pain, decreasing inflammation, restoring range of motion, and regaining strength by moving qi and blood, clearing heat and obstruction, and draining dampness from the shoulder region [24]. In modern scientific studies, acupuncture has been shown to have multiple effects on the central and peripheral nervous systems [25]. These effects and other physiologic mechanisms are presumed to change pain perception, although the exact mechanism is unknown [26]. Anyway, research indicates that acupuncture has been shown to influence pain perception by modulating the activity of key subcortical and brainstem sites along the descending pain modulating system pathway [27].

Acupuncture is a non-drug therapy being used more and more to treat shoulder pain. According to research, acupuncture helps relieve pain, reduce inflammation, release tight muscles, and increase range of motion for a variety of shoulder problems.

Medical science hypothesises that acupuncture works either by releasing chemical compounds in the body that relieve pain, by overriding pain signals in the nerves, or by allowing energy (Qi) or blood to flow freely through the body [28].

Numerous research and trials have claimed that acupuncture is one of the most favourable treatments for chronic shoulder pain. However, with very limited high-quality research, the effectiveness of this treatment has still not been proven [29]. In recent years, there has been an increase in the quality of trials examining the clinical effects of acupuncture for back and neck pain, arthritis, carpal tunnel syndrome, fibromyalgia, and upper extremity tendinitis [30]. Research-based evidence shows that acupuncture treatment mostly benefits patients with specific pain conditions such as headaches, chronic idiopathic or tension migraines, neck pain, knee osteoarthritis, and low back pain. Promising but less definitive data exists for chronic shoulder pain, fibromyalgia, temporomandibular joint pain, and postoperative pain [21]. There are a few clinical studies claiming that acupuncture has been reported to be effective for the treatment of various shoulder-related pains. The clinical studies involved, however, were not randomized controlled trials [12]. Recent randomized controlled trials have reported significant and convincing long-lasting effectiveness of acupuncture treatment for chronic neck and shoulder pain [31]. These studies have indicated a greater improvement in shoulder mobility (abduction and arm above head test) for the treatment group in comparison to the control subjects immediately after treatment and after 3 months. The randomized controlled trials indicated that acupuncture is an effective alternative to conventional orthopedic treatment for chronic shoulder pain [32]. Currently, acupuncture is used to treat many medical

problems, particularly chronic pain. Shoulder pain is one of the indications that is most amenable to treatment with acupuncture [33].

Since shoulder pain is believed to be a result of stagnation or obstruction of the flow of qi and blood in the tendons and muscles of the large intestine, small intestine, and internal membrane of acupuncture meridians, several specific acupuncture points and non-acupuncture points along and nearby the meridians of these organs were identified. Non-acupuncture points are points located several millimeters or centimeters from specific acupuncture points, halfway between two parallel meridians or arbitrarily on the side of the trunk or the shoulder region away from most meridians [34]. Those non-acupuncture points are considered equally effective in treating shoulder pain.

The commonly used acupuncture points for chronic shoulder pain are Tiaokou (ST 38), Jianzhen (SI 9), Jianliao (SJ 14), Jianyu (LI 15), Binao (LI 14), Tianzong SI 11), and Tianfu (LU 3). Other suggested points are, Fan Hou Jue (T 22.12), Ce San Li (T 77.22), Lou Zhen (EX-UE8), Houxi (SI 3) and Jian Jing (GB 21) [35].

Six specific acupuncture points, including, Jianyu (LI 15), Binao (LI 14), Hegu (LI 4), Jianzhen (SI 9), Jianliao (SJ 14), and Tiaokou (ST 38) were identified for this study. In addition, another five non-acupuncture points, such as a point at the anterior axillary fold, a point at the posterior axillary fold, a point 2 cm below Tianzong (SI 11), and a point 3 cm below Yanglingquan (GB 34), were identified. In medical terms, non-acupuncture points are similar to trigger points. In many cases, shoulder pain is the result of tight muscles that form pain patterns around this particular points. Inserting acupuncture needles at these particular points will resolve the problem by releasing the tight band that is causing the pain and muscle restriction.

In Chinese Traditional Medicine (TCM) practices, Tiaokou (ST38) is used as one of the crucial single distal acupuncture points for treating shoulder adhesive capsulitis [36]. From ancient times to the present day, this point has been used for all kinds of shoulder pain, acute or chronic.

In this case study, four patients suffering from non-traumatic chronic shoulder pain were selected. The aim of this study is to evaluate the effect of acupuncture as a treatment procedure, using a protocol based on the needling of six specific acupuncture points combined with five non-acupuncture points to enhance the speed and degree of recovery of non-traumatic chronic shoulder pain.

Materials and Methods

Selection of Patients

Participants for this study were selected among the patient's seeking treatment in our acupuncture treatment center. Due to the COVID-19 pandemic, movement control orders, time constraints, and participants' anxiety, as well as the fear of participant dropout, only four patients were selected for this study. Patients' selection was based on the following criteria:

Inclusive criteria: Only patients with shoulder pain due to non-traumatic injuries, experiencing strong pain for more than 8 weeks, mobility impairment, and impairment in daily activities such as extension, flexion, abduction, or external rotation, and with valid medical reports are eligible.

Exclusive criteria: Participants must not be pregnant or lactating, have no recent shoulder surgery, fracture, severe infection, neurological or psychiatric disorders, or deformities, and are not undergoing any form of shoulder pain treatments. Written informed consent from all the participants was required to proceed with the treatment, and they were given enough time to consider their participation in this study.

Description of the Case

Four patients were selected according to the selection criteria set for this case study.

Subject A: A female, 36 years old, working as a banker, with chronic pain in her right shoulder, without any prior injury. She felt weak and in

pain when moving her right hand. Unable to lift the right hand more than 48 degrees, followed by pain and loss of motion in the shoulder. There was a silent grinding, clicking, or cracking at the joint. She felt stiffness at the joint and was unable to perform office work and normal activities like combing her hair, washing her face, and hooking up her bra. She had sought medical treatment. Her doctor diagnosed it as arthritis and had given her anti-inflammatory drugs and painkillers. Not much improvement after 8 weeks of medication and often on medical leave. She had discontinued hospital medications for almost 3 months. Other complaints are being unable to sleep on the right side, being depressed, having anxiety, and having low motivation to do office jobs.

Subject B: A male, 56 years old, working as a carpenter, with chronic pain in his right shoulder, without any prior injury. He felt constant pain and stiffness at the shoulder joint. He was unable to raise his right hand more than 65 degrees. Movement of the shoulder is limited, and is unable to perform normal activities like hammering, lifting objects, and handling tools. He had sought medical treatment. Doctors diagnosed it as adhesive capsulitis (frozen shoulder), and he was given anti-inflammatory drugs, pain killers, steroid injections, and had undergone physiotherapy. Not much improvement after 12 weeks. He had stopped all the hospital medication and physiotherapy. Other complaints are nocturnal shoulder pain on the right side, disturbed night sleep, anxiety, depression, and low motivation to do his job. He had stopped working for more than 8 weeks.

Subject C: A female, 35 years old, working as a cook in a busy restaurant, with chronic pain in her left shoulder (left-hander), without any prior injury. She complained of pain and stiffness in the shoulder area. She experienced painful shoulder movement, especially in the morning, with limited range of movement and being unable to lift her hand more than 60 degrees. She was unable to perform normal activities such as cooking, cutting vegetables, washing, combing her hair, and washing her face and her pain worsened at night. She had sought medical treatment. Her doctor diagnosed it as calcific tendonitis and prescribed her anti-inflammatory drugs, painkillers, and injections. Not much improvement after 15 weeks. She had stopped all medication. Other complaints include an inability to sleep on her left side, the pain coming on suddenly or building up gradually, feeling constant pain, and low motivation to do her job. She was using her right hand as her working hand.

Subject D: A female, 40 years old, a teacher with chronic pain in her right shoulder. She felt a sharp pain when her arms were extended, lifting and lowering the arm from a raised position or when reaching out. She felt pain when lying on her affected side. She complained of pain or achiness at night, which affected her ability to sleep. She felt weakness and stiffness in her right shoulder and arm. She felt a limited range of arm movement and was unable to lift her hand more than 40 degrees. She was unable to use her right hand properly due to persistent pain that affected her everyday activities. She had sought medical treatment. Her doctor diagnosed her condition as shoulder impingement and had given her oral anti-inflammatory medications and nerve pain relief drugs. There was not much improvement after 10 weeks of medical treatment, and she had stopped hospital medication.

Materials

Material used for this study are single-use sterile acupuncture needles (0.30 mm diameter x 40 mm length), Zhongyan Taihe; Beijing Zhongyan Taihe Medical Instrument Co., Ltd, China. Wong-Baker FACES Pain Rating Scale and Medical Goniometer Angle Ruler Joint Bend Measurement Tool (Brand OEM, Model G01).

Methodology

Due to the COVID-19 pandemic, movement control orders, time constraints, and

participants' anxiety as well as the fear of participants' dropout, the treatment was designed for just six treatment sessions only. Each treatment took about 40 minutes. The frequency of the treatment sessions was three times per week. The whole treatment took about two weeks to complete. The participants could stop the treatment at any session, but with the condition that they must receive a minimum of five acupuncture treatments.

The Wong-Baker FACES Pain Rating Scale was used to evaluate the degree of pain before treatment and twenty minutes after each treatment. This scale was selected because it is easy to use and is frequently used in adults with chronic pain [37]. The Wong-Baker Faces Pain Rating Scale is a pain scale that was developed by Donna Wong and Connie Baker to rate current pain intensity. It is a visual analogue scale to assess pain, normally in pediatric patients, but it is used in older patients too. The scale uses facial expressions to indicate pain level. The facial expressions range from a happy, smiling face at 0, to a crying face at 10, which represents the "most unbearable pain". It is scored by choosing a number between 0 to 1 (no pain), 1.1 to 3 (mild pain), 3.1 to 5 (moderate pain), 5.1 to 7 (severe pain), 7.1 to 9 (very severe pain), and 9.1 to 10 (worst pain level). The Wong-Baker Faces Pain Scale is a reliable and valid alternative for assessing pain intensity in cognitively intact and mildly to moderately impaired elderly people. [38].

A Medical Goniometer Angle Ruler Joint Bend Measurement Tool (Brand OEM, Model G01) was used to evaluate the mobility range of the affected shoulder. A normal range of motion for shoulder flexion is 180 degrees [39]. The Goniometer has been proven as a reliable and valid tool for measuring shoulder mobility range [40]. The mobility range test was performed at the beginning of the treatment and twenty minutes after each treatment.

The acupuncture treatment was conducted according to a treatment protocol already developed for this study, which was adopted from a designed protocol by a group of researchers led by Dr Qing-Nan Fu from the Acupuncture and Moxibustion Department Beijing Hospital of Traditional Chinese Medicine [17]. Specific acupuncture points (acupoints) and specific non-acupuncture points (acupoints) for chronic shoulder pain were used in this study. Specific acupoints are divided into local acupoints and distal acupoints according to their meridian location, whereas specific non-acupoints are divided into local non-acupoints and distal non-acupoints according to their anatomical position. In total, eleven acupoints were selected, as shown in Table 1.

Table 1. Selected Specific Acupoints and Specific non-acupoints for non-traumatic Chronic Shoulder Pain Treatment

Specific acupoints		**Specific non-acupoints**	
Local acupoint	**Distal acupoint**	**Local non-acupoint**	**Distal non-acupoint**
Jianyu (LI 15)	Hegu (LI 4)	Anterior axillary fold	3 cm below Yanglingquan (GB 34)
Binao (LI 14)	Tiaokou (ST 38)	Posterior axillary fold	
Jianzhen (SI 9)		2 cm below Tianzong (SI 11)	
Jianliao (SJ 14)		1 cm inward Tianfu (LU 3)	

Table 2. Location of the Selected Acupoints and non-acupoints for non-traumatic Chronic Shoulder Pain Treatment

On the same side of the affected shoulder		**On the opposite side of the affected shoulder**	
Local acupoint	**Local non-acupoint**	**Distal acupoint**	**Distal non-acupoint**
Jianyu (LI 15)	Anterior axillary fold	Hegu (LI 4)	3 cm below Yanglingquan (GB 34)
Binao (LI 14)	Posterior axillary fold	Tiaokou (ST 38)	-
Jianzhen (SI 9)	2 cm below Tianzong (SI 11)	-	-
Jianliao (SJ 14)	1 cm inward Tianfu (LU 3)	-	-

According to clinical practice, local acupoints could contribute to pain relief, while distal acupoints could improve the range of motion in the joints [17].

Needles were inserted into specific local acupoints and specific local non-acupoints on the same side of the affected shoulder, while needles for specific distal acupoints and specific distal non-acupoints were inserted on the opposite side of the non-affected shoulder. Sterile, single-use needles were used. First, needles will be inserted at specific distal acupoints (LI 4 and ST 38) and specific distal non-acupoints (3 cm below GB 34) for the first 20 minutes, followed by inserting needles at the specific local acupoints (LI 14, LI 15, SI 9 and SJ 14) and specific local non-acupoints (anterior axillary fold, posterior axillary fold, 2 cm below SI 11 and 1 cm inward LU 3) for another 20 minutes. The needles at acupoint Tiaokou (ST 38) will be rotated up and down to induce a needle sensation (‘de qi’) for about 30 seconds. [41].

It was found that acupuncture at ST 38 point on the opposite side of the affected shoulder could better alleviate pain and improve shoulder function in chronic shoulder pain patients than acupuncture at ST 38 point on the same side of the affected shoulder [38].The depth of the needle for specific acupoints was about 10 to 15 mm, while it was 5 mm for specific non-acupoints. Sterile acupuncture needles sized 0.30 mm x 40 mm were used on all the twelve points. The patients were kept in a sitting position on a half-inclined chair throughout this treatment. The same acupoints were used for all the patients throughout these six treatment sessions.

Results

As shown in Table 3, all four cases reported clear improvement in their pain condition after six acupuncture treatments using specific acupoints and non-acupoints for non-traumatic chronic shoulder pain for a period of two weeks.

Table 3. Assessment of Pain Score before and after Acupuncture Treatments

Treatment								
	Case A		**Case B**		**Case C**		**Case D**	
	Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
1st	9	7	9	8	9	8	8	6
2nd	7	6	8	7	8	6	7	5
3rd	6	4	7	6	6	5	5	4
4th	4	2	6	4	5	3	4	2
5th	2	1	5	3	3	1	1	0
6th	2	1	3	2	2	1	0	-

Improvement can be seen in the reduction of the pain score. In just one week of acupuncture treatment (first three treatments), the overall pain reduction for case A was 56% (pain score dropped from 9 to 4), case B was 33% (pain score dropped from 9 to 6), case C was 44% (pain score dropped from 9 to 5) and case D was 50% (pain score dropped from 8 to 4).

The overall pain score at the end of this study for case A dropped from 9 to 1 (worst pain to mild pain), case B dropped from 9 to 2 (worst pain to mild), case C dropped from 9 to 1 (worst pain to mild pain), and case D dropped from 8.0 to 0.0 (very severe pain to no pain) just in 6 treatments only. Case D shows a remarkable recovery. Cases A, B, and C did not recover fully from shoulder pain within 6 treatments. Initially, cases A, B and C demonstrated the highest pain scores (worst pain), whereas case D demonstrated the highest pain score (very severe pain). Surprisingly, case D was able to reach a zero-pain level (no pain) at the end of the 5th treatment and requested to discontinue the 6th acupuncture treatment. For the purpose of this study, case D continues the pain assessment and straight arm flexion assessment until the 6th session. Cases A, B, and C completed their six treatments successfully.

Noticeably, after the 6th acupuncture treatment, case B still has not fully recovered from her shoulder pain. There was still some dull pain and stiffness in her shoulder. Case A and case C showed a promising recovery after the 6th treatment.

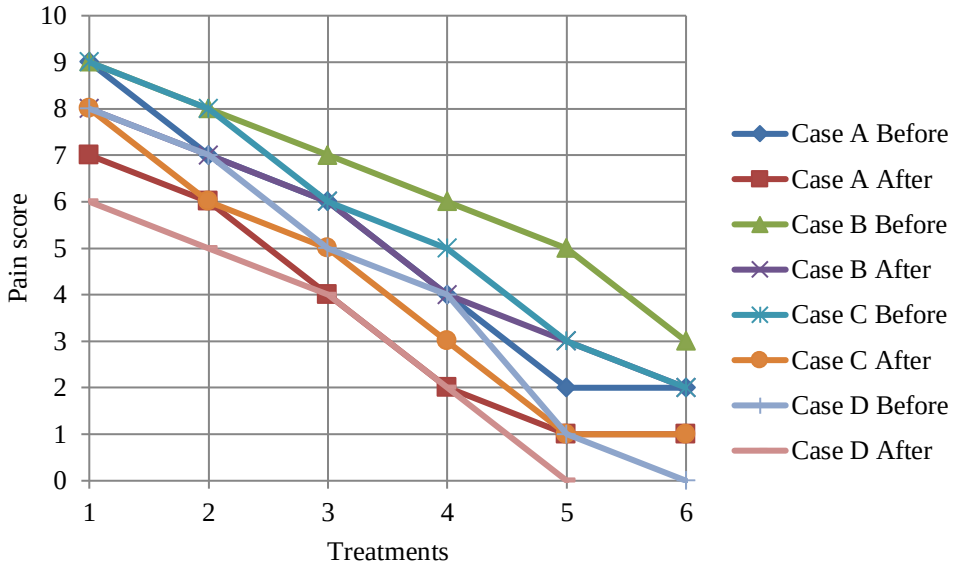

Figure 1. Assessment of Pain Score Improvement, before and after Acupuncture Treatments

Figure 1 clearly shows the progressive recovery of all the patients in this case study. These positive results signify that there is a positive effect of this acupuncture treatment for non-traumatic chronic shoulder pain.

The assessment of straight arm flexion amplitude before and after the acupuncture treatments along the study period are shown in Table 4.

Table 4. Assessment of Straight Arm Flexion Amplitude before and after the Acupuncture Treatments, along the Study Period

	Case A		**Case B**		**Case C**		**Case D**	
Treatment								
	Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
1st	48^{o}	90^{o}	65^{o}	80^{o}	60^{o}	95^{o}	40^{o}	85^{o}

2nd	75°	118°	75°	107°	88°	104°	104°	108°
3rd	96°	125°	98°	118°	102°	129°	129°	139°
4th	114°	143°	111°	120°	118°	135°	135°	167°
5th	138°	150°	116°	144°	130°	155°	155°	177^0
6th	148^0	158°	141°	150°	151°	160°	175°	-

As shown in Table 4, cases A, B, C, and D show a clear improvement in their mobility and range of shoulder movement following the six acupuncture treatments using specific acupuncture points and non-acupuncture points for non-traumatic chronic shoulder pain. Surprisingly, just in one week of acupuncture treatments (first three treatments), the overall improvement in mobility and range of shoulder movement for case A was 61% (48^0 to 125^0), case B was 45% (65^0 to 118^0), case C was 53% (60^0 to 129^0), and case D was 71% (40^0 to 139^0).

All cases presented a noticeable improvement in mobility and range of shoulder movement after completing the sixth treatment within the duration of six weeks. Case A had straight arm flexion from 48 degrees with severe pain to 158 degrees without pain. Case B had straight arm flexion from 65 degrees with severe pain to 150 degrees with mild pain, Case C had straight arm flexion from 60 degrees with severe pain to 160 degrees with mild pain, and Case D had straight arm flexion from 40 degrees with severe pain to 175 degrees without pain.

Case D showed the most remarkable straight arm flexion, with the score almost reaching 140 degrees after the third treatment. At the end of the fifth treatment, case D was able to flex her arm almost 180 degrees. With this score, the patient was allowed to discontinue the sixth acupuncture treatment. The overall improvement in mobility and range of shoulder movement for case A was 69%, for case B, it was 57%, for case C, it was 63%, and for case D, it was 77%. The overall shoulder mobility and range of shoulder movement improvement for all the cases throughout the six treatments was 67%.

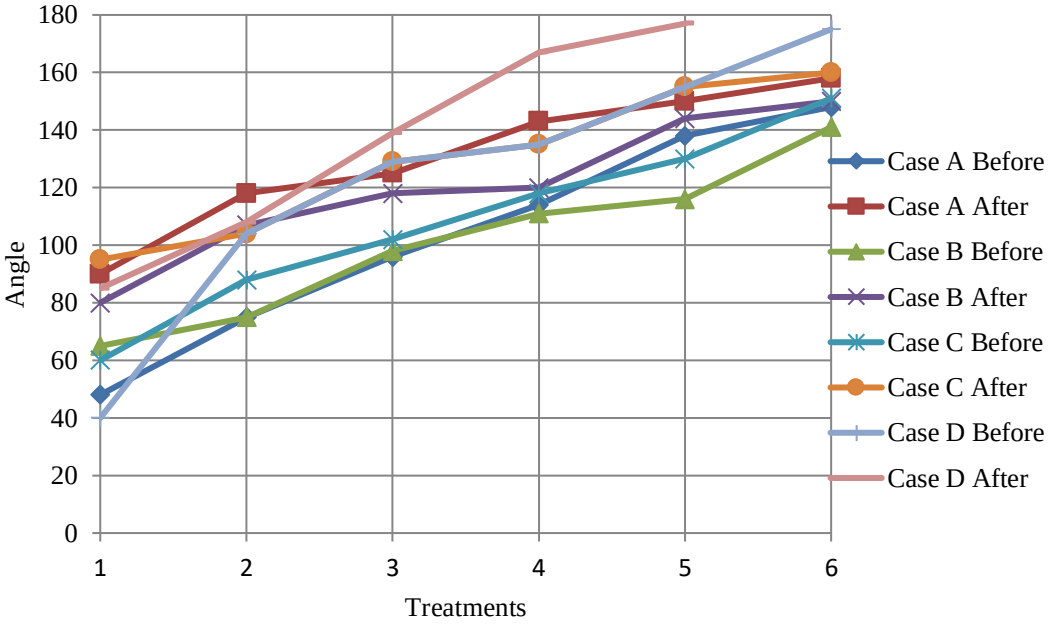

Figure 2. Assessment of Assessment of Straight Arm Flexion Amplitude, before and after Acupuncture Treatments

Figure 2 shows a progressive, positive recovery of the shoulder mobility. This positive result supports the positive effect of acupuncture for chronic shoulder pain since there is a great correlation between pain and mobility in non-traumatic chronic shoulder pain.

The overall improvement for pain and shoulder mobility after the sixth acupuncture treatment are shown in Figure 3.

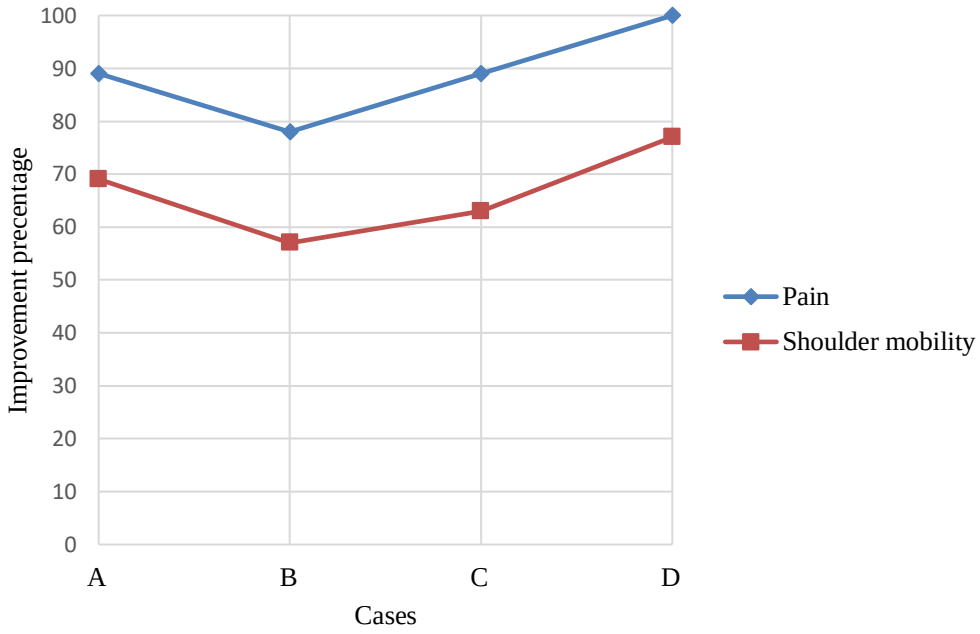

Figure 3. Overall Improvement Percentage for Pain and Arm Mobility of each case at the End of Six Treatments

The overall improvement in shoulder pain for case A was 89%, for case B it was 78%, for case C, it was 89%, and for case D, it was 100%. Regarding pain, case D experienced a remarkable pain improvement, whereas case B experienced a satisfying pain improvement after going through six acupuncture treatments for chronic shoulder pain. The overall shoulder pain improvement for all the cases throughout the six treatments was 89%. The overall improvement in mobility and range of shoulder movement for case A was 69%, for case B it was 57%, for case C, it was 63%, and for case D, it was 77%. Again, case A experienced a remarkable improvement in mobility and range of shoulder movement, whereas case D showed satisfying mobility and range of shoulder movement improvement at the end of the sixth acupuncture treatment in two weeks' time. The overall shoulder mobility and range of shoulder movement improvement for all the cases in this study was 67%.

Discussion

The results of this study showed a clear positive improvement in the shoulder pain of the patients. There was a remarkable reduction in the pain condition and a noticeable improvement in the range of shoulder movement among the cases in this study.

Out of four cases, patient Case D (shoulder pain related to a spinal issue) showed remarkable improvement in pain reduction and range of movement. This is the same for patient case A (arthritis). Patient case D recovered fully within five treatments (0 pain level and 178 degrees of straight arm flexion) out of six actual treatments, while patient case A recovered (0 pain level and 175 degrees of straight arm flexion) within six treatments. This result indicates that patients with chronic shoulder pain due to spinal issues and arthritis respond much faster to acupuncture treatment than other types of chronic shoulder pain. Even though there was a clear positive

effect of acupuncture in all the cases, the results showed that case B (frozen shoulder) and case C (calcific tendonitis) did not fully recover within the six treatments. After the sixth treatment, patient case C, with calcific tendonitis (1 pain level and 158 degrees of straight arm flexion), still experienced mild pain (with some restricted movement in the shoulder), whereas patient case B, with a frozen shoulder (2.0 pain level and 145 degrees of straight arm flexion), demonstrated much higher pain level and less straight arm flexion than case C.

This result indicates that the combination of specific acupuncture points and specific non-acupuncture points is effective for various types of non-traumatic chronic shoulder pain. Besides that, this study shows that different types of non-traumatic chronic shoulder pain need different time frames for recovery. This result also indicates that future studies should categorize types of shoulder pain accordingly, and studies must be done separately.

This study shows that acupuncture can be used as an effective therapeutic tool for chronic shoulder pain. The acupuncture treatment used in this study was conducted according to the principles of traditional Chinese medicine. Classical acupuncture prescriptions for chronic shoulder pain are designed by selecting specific acupuncture points and non-acupuncture points within the local and distal acupuncture points. According to clinical practice, specific acupuncture points and non-acupuncture points at distal points could improve the range of motion, while specific acupuncture points and non-acupuncture points at local points could be effective in providing pain relief [18].

A study on the comparative effects of acupressure at local and distal acupuncture points on pain conditions and autonomic function, showed that acupressure on local and distal acupuncture points, significantly improved pain conditions. The study concludes that acupressure on only the local acupuncture points affected the autonomic nervous system, while acupressure on distal acupuncture points has different physical effects according to location [42].

The combination of specific classical Chinese acupuncture points and specific non-acupuncture points could regulate the “qi” (vital energy) and blood by dispersing pathogenic factors such as excess wind, cold, and dampness, removing obstruction and relaxing the tight muscles in the affected meridian and its collaterals [12]. The effect of acupuncture treatment on pain relief has been often reported by many authors. The immediate analgesic effect on various types of pain may be involved in the nociceptive pathway, including descending noradrenergic and serotonergic pathways [43, 44]. Previous studies have shown similar results to the present study [45]. Acupuncture has been shown to be a safe treatment with a significant effect in regard to reducing pain, improving shoulder function, and flexion ROM in the short term and midterm [46]. Some studies suggest that acupuncture may be an effective treatment for chronic shoulder pain, but results show there was no difference between the individualized acupuncture and standardized acupuncture treatments [47]. Even though reviews of other studies concluded that there are no firm conclusions that can be drawn regarding the efficacy of acupuncture for shoulder disorders [28], there are sufficient studies to support the efficacy of acupuncture for shoulder pain [47, 48].

Conclusions

This case study illustrates the effect of acupuncture treatment using the combination of selected specific acupuncture and non-acupuncture points in non-traumatic chronic shoulder pain. The result shows a positive improvement in pain relief, mobility, and range of motion of the affected shoulder. At the same time, the treatment is also able to reduce the other side effects of chronic shoulder pain, such as sleep deprivation, depression, anxiety, and low motivation. The findings of this study are supported by findings from other research

regarding acupuncture treatment for shoulder pain. The result clearly indicated that acupuncture treatment using specific acupuncture points with a combination of specific non-acupuncture points had produced a positive effect in the treatment of non-traumatic chronic shoulder pain, with noticeable pain relief and improvement in shoulder joint mobility and range in just two weeks' time. Although the recovery rates for all four patients were not at the same level, each patient had shown good improvement in their pain reduction and shoulder mobility, according to their respective cases. It is important to mention that these results were achieved within a short duration of two weeks, with just three treatments per week. Compared to other studies, this case study involves a very modest intervention but with a positively high level of recovery. This case study will not only increase knowledge about the effects of acupuncture treatment for non-traumatic chronic shoulder pain but also confirm the effect of the combination of specific acupuncture points and specific non-acupuncture points used in this study. This study too might be able to provide additional data on the potential role of acupuncture in the treatment of non-traumatic chronic shoulder pain, particularly for those patients who do not respond well to conventional therapy or for those who don't want to seek conventional therapy. I am aware of the limitations of this study and suggest more research is needed to investigate the effect of acupuncture treatment on non-traumatic chronic shoulder pain. The results of the study indicate that future studies should categorize types of shoulder pain accordingly, and each study must be done separately according to the type of shoulder pain.

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Conflicts of Interest

The authors have no conflicts of interest to declare.

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