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ORIGINAL PAPER

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INVESTIGATION OF THE EFFECTIVENESS OF ACUPUNCTURE IN THE TREATMENT OF FROZEN SHOULDER

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ABSTRACT

Background: Adhesive capsulitis is a common disease that causes pain and reduced range of motion, but vague on the shoulder. Women are affected fewer than men, but there is no known racial or genetic tendency. Most patients with adhesive capsulitis will improve with nonsurgical treatment. Acetaminophen and nonsteroidal anti-inflammatory drugs for pain relief in patients without contraindication are first-line options. Acupuncture considered being safe and effective in reducing pain. The aim of this study was to investigate the effectiveness of acupuncture in the treatment of frozen shoulder. **Materials and Methods:** In a controlled clinical trial, patients referred to the *Baqyatallah* clinic in 91 years with shoulder pain, frozen shoulder diagnosed based on history and physical exam, they have been enrolled. Indicators measured in the study were included the involved joint pain, range of motion and quality of life. Patients, first at baseline, one and a half months later (end of session) and then 3 months after the examination information about each individual entered in the form of questionnaires were pre-determined and data were analyzed by SPSS 17 software. **Results:** In this clinical trial study total 40 patients with frozen shoulder (20 interference with the acupuncture and 20 people control) study that patients average age 55/54. Age maximum 71 years and minimum 44 years. Acupuncture in the treatment of frozen shoulder with the results achieved in the general case acupuncture may improve shoulder motion in patients. VAS index at three months after treatment compared with the control group had a greater improvement. **Conclusion:** In the case of acupuncture and ultimately improve the overall look of all the movement of flexion and adduction of the shoulder, but the movement has been further improved, VAS index at three months after treatment compared with the control group had a greater improvement and finally, we perform acupuncture as a way to improve shoulder motion in patients with frozen shoulder offered.

Key words: Frozen Shoulder, Acupuncture, Physiotherapy.

1. INTRODUCTION

Frozen shoulder is one of the prevalent and painful joint disorders which is being found in 2-5% of the people of the society in the age range of 40-60. That is to say that this disease is scarce among children, also women suffer less than men, but there is no known race or genetic intention about this disorder. This disease is prevalent among patients suffering from diabetes, both dependant and independent of insulin; and also among pre-diabetes patients (1). This disease forms up with activation of inflammation mechanisms in the glenohumeral joint accompanied by synovial tissue inflammation and will cause symptoms such as pain, movement limitations of joint, as well as muscle weakness without tangible disorders such as structural defects in the anatomy

of the joint (fracture and dislocation) (1, 2). The restriction in the movement can take place in flexion, extension, and external rotation, but it is less in abduction and internal rotation (3-5). Generally, the frozen shoulder can be divided into two groups, primary (idiopathic) and secondary (caused from a secondary disease) (6). This disorder can influence the person's daily activities. The starting process of this disease is unknown and usually is accompanied by a report of some type(s) of traumas of shoulder. However mainly the disorder is self-limiting, but the length of the disease and the intensity of the disorder might be severely annoying (3, 7). About some patients the symptoms of the disease might be with the patient up to some years and they will influence the quality of the person's life (sleeping disorders

and disability in doing daily stuffs) (3, 7). The information about the frozen shoulder is insufficient and most of the information is obtained from interfered studies, as still there is no unanimous about a specific therapy method. Some of the common therapies of this disorder consist of analgesic and anti-inflammatory medicines, massage therapy, heat therapy, ultrasound wave therapy, chiropractic techniques, and using stretch and isometric exercises and physiotherapy (8). Also, surgery methods and anesthesia manipulation, Intra-articular injection of corticosteroids and neural blocking of suprascapular nerve, are other approaches to heal the frozen shoulder. Review and meta-analysis articles have not reported any privilege about any of these approaches. Therefore, still in the new studies, the influence of different therapies on healing frozen shoulder is being surveyed, and one of them is acupuncture (9). Acupuncture is an approach used from 5000 years ago to heal disorders; and since it is safer than medical treatments and has less side effects, is being used nowadays to cure many types of diseases in the modern medicine, specifically to remedy of chronic joint pains. Acupuncture is a method in which piercing certain spots of the body using very thin needles causes a pain relief or treating a certain problem of the patient (10). These needles are disposable and the material is stainless steel; and are slightly thicker than human's hair. There are reports from WHO, National Center for Complementary and Integrative Health (NCCIH), and American Medical Association (AMA) that all declare effectiveness of acupuncture for treating many types of diseases (11). Many studies had been implemented in order to evaluation of effectiveness and pain-relief strength of acupuncture, such as a study by Ko Sun et al in 2001 in Hong Kong, in which they concluded that acupuncture accompanied by shoulder exercises is more effective to cure frozen shoulder (9). In another study in 2008 by Amanda Tiffany, she declared that acupuncture has effective results to cure chronic pains of frozen shoulder (12). Therefore, researchers unanimously decided to implement a study entitled determination of effectiveness of acupuncture to remedy the patients suffering from frozen shoulder who referred to Baghiatallah hospital in 2013.

2. MATERIAL AND METHOD

In this controlled clinical trial, all the patients who referred to Baghiatallah hospital in 2013 with a pain in the shoulder who were approved to have frozen shoulder according to clinical examinations were brought into the study. The standards which the participants were supposed to have in order to be brought in the study were restrictions in active and inactive movements of shoulder in flexion, extension, external rotation, and also night pains. Also all the patients should had the symptoms for 4-6 weeks. In this study patients with background disorders such as renal, hepatic, and hematic disorders, patients under shoulder surgeries, patients with painful arc syndrome, patients with a fracture background, patients with neurologic and pathologic joint symptoms in the graphs of upper limb on the same side of painful shoulder, were dismissed. Evaluation indexes in this study were intensity of pain in the suffering joint, movement domain of the joint, and life quality of the patient. In this study, patients with equal demographic properties

were divided randomly into 2 groups with 20 members in each group (according to the formulation of calculating the volume of the sample); in the control group, physiotherapy and in the case group, acupuncture was used in addition to physiotherapy. Acupuncture sessions were twice a week in ten sessions. Physiotherapy sessions were each the other day in ten sessions. Notably, physiotherapy continued until the last session of acupuncture for all groups daily. In order to eliminate all interfering and confounding effects of intervention agents, we adopted two studied groups. About the confounder variable of using analgesics during the research, for each group one type of analgesic was prescribed with the same dosage (ibuprofen 400 mg per day), in the case of intolerable pain. The patients were examined at the beginning of the study, 1.5 months after that (end of the sessions) and 3 months later, and the information was registered in the form of predetermined questionnaires, and eventually the obtained data were analyzed by SPSS 17 software. The qualitative variables were used by Chi square test, and quantitative variables were used by Student T-test.

3. RESULTS

At first, the variables were introduced and then the raw data were evaluated by proper statistic tests. In this study that was implemented on 40 patients suffering from frozen shoulder, the participants were divided into two test groups of acupuncture (20 persons) and control group (20 persons). The age range in this study reported 44-71 and the average age in test group was 54.65 ± 8.25 and in the control group was 54.45 ± 8.04 . In the test group, there was 40% male (8 persons) and 60% female (12 persons) and in the control group there was 45% male (9 persons) and 55% female (11 persons). In this study, the background diseases among the participants were surveyed. Results demonstrate that 8 persons (3 persons in the test group and 5 persons in the control group) were also suffering from diabetes, 3 persons (2 persons in the test group and 1 person in the control group) were suffering from hypothyroidism, 5 persons (3 persons in the test group and 2 persons in the control group) had a heart surgery and 3 persons (1 persons in the test group and 2 persons in the control group) were suffering from arthritis rheumatoid.

About evaluating the location of the disorder, it was revealed that 56.3% of patients of the test group, had disorders in the right shoulder and 45.8% of patients in the control group had disorders in the right shoulder. The average of

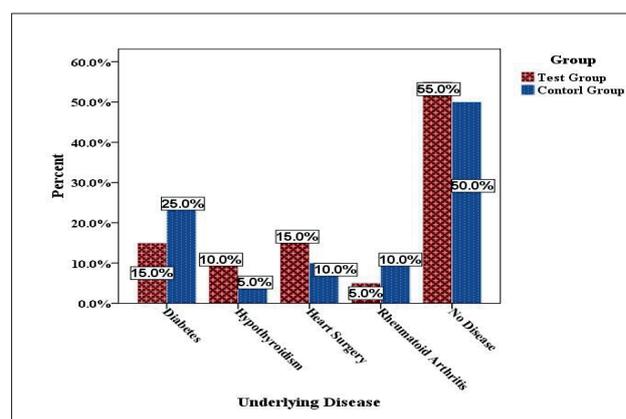


Figure 1. Underlying disease in patients at studied groups

Active						
P Value	After 3 month		P Value	After 1.5 month		Motion types
	Control group	Test group		Control group	Test group	
0.003*	112.5±32.4	146±34.7	0.046*	93.7±38.8	116.7±31	Abduction
0.193	66.5±17.1	74.2±19.7	0.257	59.5±21.0	65.7±24.1	Adduction
0.001*	125.2±21.3	149±19.09	0.001*	102.5±28.7	125.2±23.9	Flexion
0.130	44.25±9.07	48.5±8.4	0.269	37.2±10.4	41±10.7	Extension
0.550	57.25±16.2	61±23.3	0.786	47±19.08	48.7±21.3	Internal rotation
0.196	40.25±22.1	49±19.8	0.649	33.5±22.6	36.7±22.1	External rotation

Passive						
P Value	After 3 month		P Value	After 1.5 month		Motion types
	Control group	Test group		Control group	Test group	
0.002*	110±33.7	146.5±34.4	0.015*	91±40.4	121.2±34.3	Abduction
0.264	66±17.5	72.7±19.9	0.396	58.7±21.2	65.2±26.3	Adduction
0.000*	123.7±18.6	148.7±17.9	0.004*	100.5±27.4	124.5±22.4	Flexion
0.207	43±9.09	46.5±8.12	0.606	36.2±10.9	38±10.3	Extension
0.699	57.2±17.5	59.7±22.7	0.905	46.2±19.4	47±19.9	Internal rotation
0.579	41.5±21.9	45.25±20.4	0.860	33±22.08	34.2±22.3	External rotation

Table 1. Comparing the domain of active and inactive movements of shoulder in two therapy groups in follow up times of 1.5 and 3 months.

Test group								
P Value		3 month after treatment		1.5 month after treatment		Before treatment		Motion types
Passive	Active	Passive	Active	Passive	Active	Passive	Active	
0.000*	0.000*	146.5±34.4	146±34.7	121.2±34.3	116.7±31	74±40.5	72.7±40.8	Abduction
0.004*	0.003*	72.7±19.9	74.2±19.7	65.2±26.3	65.7±24.1	62.5±29.1	63±28.7	Adduction
0.000*	0.000*	148.7±17.9	149±19.09	124.5±22.4	125.2±23.9	85±35.1	83.5±35.2	Flexion
0.002*	0.000*	46.5±8.12	48.5±8.4	38±10.3	41±10.7	29.5±12.3	31±12.2	Extension
0.000*	0.000*	59.7±22.7	61±23.3	47±19.9	48.7±21.3	32.2±20.0	30.8±21.2	Internal rotation
0.001*	0.000*	45.25±20.4	49±19.8	34.2±22.3	36.7±22.1	20.2±24.6	19.8±24.2	External rotation

Control group								
P Value		3 month after treatment		1.5 month after treatment		Before treatment		Motion types
Passive	Active	Passive	Active	Passive	Active	Passive	Active	
0.002*	0.000*	110±33.7	112.5±32.4	91±40.4	112.5±32.4	72.2±25.4	73.7±41.3	Abduction
0.000*	0.002*	66±17.5	66.5±17.1	58.7±21.2	66.5±17.1	51.7±24.4	51.5±27.4	Adduction
0.000*	0.000*	123.7±18.6	125.2±21.3	100.5±27.4	125.2±21.3	80±36.2	81.7±37.6	Flexion
0.003*	0.000*	43±9.09	44.2±9.07	36.2±10.9	44.2±9.07	29.7±12.9	30±13.4	Extension
0.000*	0.000*	57.2±17.5	57.2±16.2	46.2±19.4	57.25±16.2	37.1±22.2	37.1±23.0	Internal rotation
0.000*	0.003*	41.5±21.9	40.25±22.1	33±22.08	40.25±22.1	25.3±24.7	23.8±25.3	External rotation

Table 2. Comparing the domain of active and inactive movements of shoulder in two therapy groups chronologically before starting the therapy, and follow up times of 1.5 and 3 months.

the length of frozen shoulder disorder in the test group was observed as 4.05±2.06 months, and for the control group it was 4.10±2.17 months. Statistic tests demonstrate no meaningful difference about the variable of age among the mentioned two groups (P-value=0.930). The correlation of the location of the disorder (left or right shoulder) was evaluated using a proper statistic test. The results demonstrate no meaningful difference between these two variables (P-value=0.510). In this study, the domain of active and inactive movements (flexion, extension, abduction, adduction, and internal and external rotation) were evaluated for two groups of test and control group chronologically after 1.5 and 3 months after starting the therapy using Independent Samples T-Test statistic test. The results showed that about both follow up times, there was a meaningful difference between the average of the movement domain in both active and inactive flexion and abduction in the control and test groups (P-value<0.05), so that the average of flexion and

abduction movements in the test group was meaningfully higher than control group (Table 1).

Also using Repeated Measures ANOVA statistic test, the domain of active and inactive movements were evaluated and compared separately in the test and control groups in three times before starting the therapy, 1.5, and 3 months after starting the therapy. Results demonstrated that there is a meaningful difference between the averages of studied movements for those three chronological times (P-value<0.05); so that by passing time, the movement domain of the joint has increased meaningfully for all the conditions (Table 2).

The intensity of the pain, the disability score and the sum of these parameters, which means the SPADI (Shoulder Pain and Disability Index), were compared between the control and test groups in three chronological times of before the therapy, 1.5 and 3 months after therapy using the Independent Samples T-Test. Results demonstrated that there is no

between 2 times (P-Value)			3 month after treatment			1.5 month after treatment			Before treatment			Test group
SPADI	Disability	Pain	SPADI	Disability	Pain	SPADI	Disability	Pain	SPADI	Disability	Pain	
0.000*	0.000*	0.000*	41.9±16	23.5±10	18.4±7	62.1±14	35.2±10	26.8±7	87.9±15	50±10	37.0±8	Test group
0.000*	0.000*	0.000*	49.7±13	27.8±8	21.8±7	67.8±9	38.5±7	29.3±6	88.8±14	50.4±9	38.4±8	Control group
			0.110	0.170	0.150	0.150	0.270	0.250	0.840	0.900	0.830	between 2 groups (P-Value)

Table 3. Comparing the intensity of the pain, disability score, and SPADI in both therapy groups chronologically before therapy, and follow up times of 1.5, and 3 months.

VAS					
between 2 times (P-Value)	3 month after treatment	1.5 month after treatment	Before treatment	Groups	
0.000*	3.3±1	5±1	8±1	Test	
0.000*	4.4±1	5.8±1	7.9±1	Control	
		0.041*	0.150	0.900	between 2 groups (P-Value)

Table 4. Comparing the VAS between the control and test groups and also chronologically for before the therapy, and follow up times of 1.5, and 3 months.

significant difference between the two groups of control and test (P-Value > 0.05). Also using the Repeated Measures ANOVA test, it revealed that there is meaningful difference between the intensity of the pain, disability score and SPADI in those three chronological times of before the therapy, 1.5, and 4 months of follow up (P-Value < 0.05), so that by passing the time, the amounts of all three parameters decreased significantly (Table 3)

The VAS (Visual Analog Scale) was surveyed for three times (before, 1.5, and 3 months after starting the therapy). The results of Independent Samples T-Test depicted that there is no meaningful difference between the amounts of VAS among the control and test groups for the mentioned times (P-Value > 0.05), but after 3 months, the VAS index reduced significantly in the test group comparing to the control group (P-Value < 0.05). Also using the Repeated Measures ANOVA test revealed that there is a meaningful difference between VAS amounts for the times of before, 1.5, and 3 months after the therapy (Table 4).

4. DISCUSSION

In the case of treating the frozen shoulder using the acupuncture, we realized that totally the implementation of acupuncture causes an improvement in movements of the shoulder in the patients suffering from frozen shoulder. Also the VAS index had a tangible improvement after three month of starting the treatment comparing to the control group.

Regarding the obtained results, we found out that in the case of improvement of movements of the shoulder in the patients, after 1.5 months of starting the treatment and also after 3 months, active and inactive movements in flexion and abduction directions were significantly improved in the case of mentioned movements comparing to the past. In the general case, implementation of acupuncture causes a tremendous improvement of shoulder movements, but the improvement was more significant about flexion and

abduction movements. Therefore, the implementation of acupuncture can be offered as an approach to improve movements of the shoulder in the patients suffering from frozen shoulder.

About the item of pain, generally about both groups of control and acupuncture, they had a reduced pain after treatment but in the acupunctured group the amount of this reduction was higher, but there was no meaningful difference between acupunctured and control group about this item.

About the comparison of the Disability score, generally about both groups of control and acupuncture, they had an improvement after treatment but in the case of acupunctured group the amount of this reduction was higher, but there was no meaningful difference between acupunctured and control group about this item.

About the SPADI index, generally about both groups of control and acupuncture, they had an improvement after treatment but in the acupunctured group the amount of this reduction was higher, but there was no meaningful difference between acupunctured and control group about this item.

About the comparison of VAS, generally both control and acupunctured groups had improvements after treatment and in the acupuncture group this improvement was observed as higher, but after 3 months after starting the treatment they had no significant difference.

In 2005, during the systematic surveys of Cochrane database, the influence of acupuncturing on shoulder pain disorders such as osteoarthritis, Adhesive capsulitis of shoulder, and Rotator Cuff Disorder was analyzed. Among these researches, 9 trial clinical studies which had good enough quality, were selected and reviewed. One of these trials had concluded that a compound treatment of acupuncture and physical treatment makes better results for increasing the movement domain comparing to the only physical treatment. Notably, the patients were studied who had shoulder pain for more than 3 weeks. Among the studies, those who reported the effectiveness of acupuncture declared that because of few numbers of the participants in these studies, methodological problems and few numbers of these researches, we cannot judge precisely about effectiveness or inefficacy of acupuncture (13). In our study it was concluded that acupuncture causes an improvement in movements of frozen shoulder.

In 2005, about physical treatment, Johnson et al started a research from the RCT type, entitled "the effect of acupuncture versus ultrasound in the patients suffering from

Shoulder impingement syndrome". 85 patients with this syndrome diagnosis were treated with acupuncture and ultrasound randomly; also both groups were under sport therapy plans. Though there were symptoms of improvement in both groups, but the acupunctured group experienced improvement over 12 months (13). In our study, considering sport therapy which was performed during the acupuncture for both groups daily, it was shown that acupunctured group had more improvement in shoulder joint movements.

Gladys LV et al in 2008 in China studied electric acupuncture and Interferential Electrotherapy in order to healing the frozen shoulder in a double blind study. The studied groups were under the electric acupuncture therapy companied by physical exercise. The third group, as the control group, was not under any type of therapy. This study surveyed therapy approaches for 4 weeks on target groups. In the case of VAS, in certain intervals a significant improvement was observed in target groups (P-Value=0.001). After 6 months of starting the therapy, the obtained results were stable; the result showed that electric acupuncture and interferential therapy companied by shoulder exercises is effective to heal the frozen shoulder (14). The result of our study was confirming the same results of the mentioned study.

In a study of Dong he et al in 2004 in Norway, they concluded that acupuncture has significant effects on reducing the intensity and frequency of the pain (15). But in our study we realized that however the reduction of pain is a real phenomenon, but had no meaningful difference with the control group. Regarding the obtained results and safety and low side effects of acupuncture comparing to other methods of therapies of frozen shoulder, it is suggested that with determination of the effectiveness of acupuncture to cure diseases and make this matter acceptable and believable for the public, we can achieve a reduction of spent money for ineffective therapies and increasing the speed of the recovery and going back to work process and increasing the quality of the work provided by a proper therapy.

5. CONCLUSION

Generally, acupuncture causes improvement of all movements of the shoulder, but about flexion and abduction the improvement was evaluated to be more. Also the VAS index had improved after 3 months after remedy comparing to the control group, and eventually the acupuncture can be offered as a method to improve the movement of the shoulder in patients suffering from frozen shoulder.

- Conflict of interest: none declared.

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