

A Comparison of Ultra Sound Therapy and Micro Wave Diathermy on Patients with Adhesive Capsulitis of Shoulder Joint

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Abstract

Introduction: Adhesive capsulitis is one of the most common causes of pain and disability of the shoulder joint. Most patients are managed conservatively in a primary care setting with the expectation of a good outcome. There are many alternative forms of treatment for this condition. Several interventions are also used in combination for its management but most of it remained unclear. Ultra Sound Therapy (UST) is commonly employed as a first line agent for the management of adhesive capsulitis. But whether the UST (Ultra Sound Therapy) and MWD (Micro Wave Diathermy) therapy would produce a significant difference in out come was not yet settled.

Objective: To compare the efficacy of ultra sound therapy (UST) and micro wave diathermy (MWD) for the management of patients with adhesive capsulitis of shoulder joint.

Materials and Methods: This observational study was carried out in the Department of Physical Medicine at Combined Military hospital, Dhaka from 01 May 2015 to 30 November 2015. A total of eighty patients were enrolled in this study and they were divided into two equal groups. One group received counseling plus UST (Ultra Sound Therapy) (1MHz @ 1.0 Watt/cm² area for 10 minutes for two weeks) with physical exercise. Another group received counseling, MWD (Micro Wave Diathermy) and physical exercise for same period. Each group received the above mentioned modalities on the basis of five days a week for 06 weeks.

Results: The result was observed by applying VAS (Visual analog scale) pain scale and SPADI (Shoulder Pain And Disability Index) pain score. The highest significant improvement (P<0.005) was observed in group "A" throughout the whole treatment period.

Conclusion: In this study, most patients with adhesive capsulitis were benefited with counseling plus Ultrasound therapy and physical exercise rather than counseling plus Microwave Diathermy with physical exercise.

Key-words: Adhesive capsulitis, VAS (Visual analog scale), SPADI (Shoulder Pain And Disability Index).

Introduction

Adhesive capsulitis is one of the common causes of pain and disability of the shoulder joint. It is characterized by a painful, gradual loss of both active and passive glenohumeral motion resulting from progressive fibrosis and ultimate contracture of the glenohumeral joint capsule¹. Mostly the adhesive capsulitis is idiopathic but there are some factors which influence the condition like diabetes mellitus, thyroid problem, dyslipidaemia, trauma etc². Adhesive capsulitis has four stages³. It occurs in approximately 2% to 5% of the population and majority of patient are female⁴. The optimum management of adhesive capsulitis has been the subject of great debate, particularly since the condition tends to resolve spontaneously over months to years. The resolution time may need up to 2 years to even some time 5 years⁵.

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Most patients can be managed conservatively in a primary care setting with the expectation of a good outcome. The aim of treatment is to relieve pain, improve range of motion and reduce shoulder disability. Several studies were conducted in different countries in respect of adhesive capsulitis of shoulder. But these studies did not adequately measure the effectiveness of UST and MWD with exercise and counseling. So this study was undertaken to evaluate and establish the comparative efficacy between UST and MWD on adhesive capsulitis patients and also the functional outcome of adhesive capsulitis was assessed.

Materials and Methods

This observational study was carried out in the Department of Physical Medicine, Combined Military Hospital, Dhaka. This study was conducted from 01 May 2015 to 30 November 2015. All the patients with adhesive capsulitis attending the Department of Physical Medicine either directly in outpatient department or referred from other departments meeting the inclusion and exclusion criteria, were recruited in the study. A total of eighty patients were enrolled in this study and they were divided into two equal groups. Inclusion criteria were: age >18 years, painful stiff shoulder diagnosed as adhesive capsulitis in one shoulder for > 3 month, limitation of both active and/or passive movements of the glenohumeral joint of >30° in at least 2 directions (abduction, flexion, external rotation, internal rotation,) compared with the contralateral shoulder or with normal values. Exclusion criteria were age under 18 and above 70, severe pain at rest that is >7 out of 10 on a VAS, systemic inflammatory joint disease like Rheumatoid Arthritis/Ankylosing Spondylitis, metabolic infectious arthritis, cerebrovascular accident, radiological evidence of shoulder TB, malignancy, Osteoarthritis, fracture calcification, Inability to participate in moderate exercise program, patients who receive intra-articular steroid in the affected shoulder in the preceding 4 weeks or oral steroid. After taking detailed history and doing physical examination, a total of 90 patients were included for necessary investigation. Among them, 2 patients were excluded due to the evidence of inflammatory arthritis in other joints with very high ESR. Rest 4 patients were also not recruited due to radiological evidence of osteoarthritis. Rest 4 patients

were lost during follow-up (drop-out). Ultimately a total of 80 patients were included in the study. Informed written consent was taken from each patient before inclusion in the study.

After completion of inclusion and exclusion criteria a written informed consent was obtained from the study population and all baseline information was gathered. The patients were divided into one of the following two treatment groups:

Group A: Counseling, Ultrasound therapy and physical exercise programme.

Group B: Counseling, Micro Wave Diathermy therapy and physical exercise programme.

All patients were counseled regarding the natural history of adhesive capsulitis of shoulder. Advice about the intensity, frequency, and progression of the exercises, the application of heat, ice and suitable position of shoulder was also briefed. In group "A" all the patients received ultrasound therapy (UST) with 1 MHZ frequency and @1.0 watt/cm² intensity with a transducer head of 5 cm² for 10 min per day. After coating the skin with an aqua sonic gel UST was delivered by moving the applicator over the anterior, superior and posterior regions of the shoulder joint in a slow, overlapping strokes. Each patient received daily UST for first 2 weeks and then every alternate day over next 2 weeks except the weekends and the holidays. The typical physical exercise programme, consisted of combination of Codman's pendulum (Gravity assisted stretching) exercises to increase range of motion of shoulder. Wall climbing exercise while shoulder is held in abduction and forward flexion Gleno-humeral joint stretching exercises was applied to the patient up to a good tolerance. Shoulder wheel exercise was also done by circumduction of shoulder joints, clockwise and anti-clockwise. Wand exercises was engaged by holding two ends of long stick or rod with hands and performing active and passive movements of shoulder joints and over head Pulley exercise by holding two ends of the rope, hanging from a pulley, by hands and moving the shoulder through abduction and forward flexion. This was followed by strengthening exercises, which were started within the regained range of motion as an isometric program progressing to resist strengthening through the full arc of motion.

Results

This observational study was done in the Department of Physical Medicine at Combined Military Hospital, Dhaka during the period from 01 May 2015 to 30 November 2015. A total of 80 (n=80) subjects had been enrolled and divided into 40 subjects (n=40) in each group. The study findings have been plotted in the master sheet.

Table-I: Female patients are higher than male in both groups by age and sex

		Group A		Group B	
		n(40)	%	n(40)	%
Age (in years)	<40	2	(5.0)	6	(15.0)
	41-50	16	(40.0)	20	(50.0)
	51-60	12	(30.0)	8	(20.0)
	>60	10	(25.0)	6	(15.0)
	Mean±SD	54.80±8.90		47.72±9.15	
Sex	Female	28	(70.0)	22	(55.0)
	Male	12	(30.0)	18	(45.0)
Occupation	Female	26	(65.0)	22	(55.0)
	Male	14	(35)	18	(45.0)
Employment	Mil service holder	12	(30.0)	20	(50.0)
	Civil employee	14	(35.0)	8	(20.0)
	Master roll	6	(15.0)	4	(10.0)
	Retired personal	8	(20.0)	8	(20.0)
Diabetes Mellitus	Present	12	(30.0)	11	(27.5)
	Absent	28	(70.0)	29	(72.5)
Shoulder involved	Dominant	19	(47.5)	18	(45.0)
	Non-dominant	20	(50.0)	22	(55.0)
	Both	01	(02.5)	0	

Group A: Counseling + Ultrasonic therapy + physical exercise

Group B: Counseling + Microwave Diathermy + physical exercise

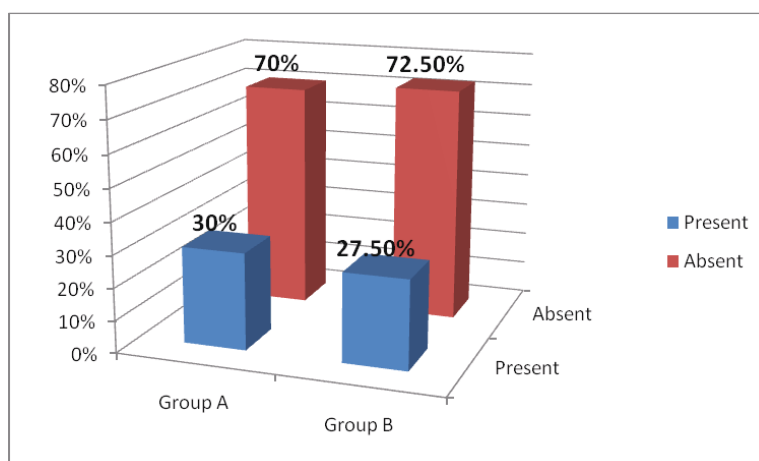


Fig-1: Comparison of diabetes mellitus in both groups

Figure-1 shows that 30% patients had diabetes mellitus in Group A and 27.5% patients had in Group B.

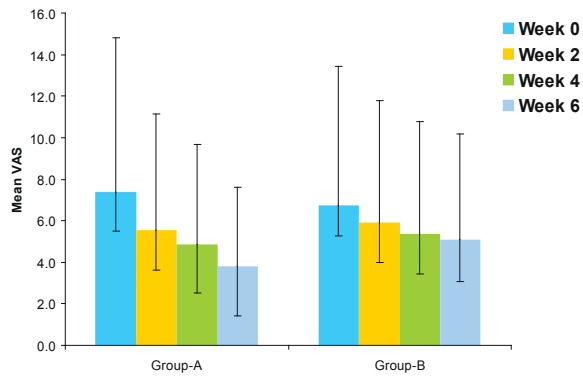


Fig-2: Assessment of shoulder pain by VAS

In both groups, there was progressive decrease in mean VAS pain score from the start of treatment modalities till 6 weeks. There was a better outcome in patients of group A than group B (Fig-2).

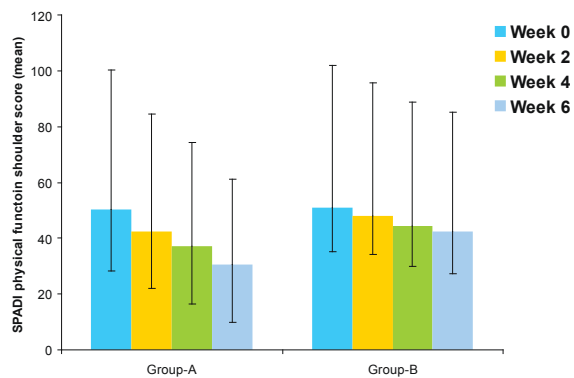


Fig-3: Assessment of shoulder disability by SPADI disability score

In both groups there was progressive decrease in mean SPADI disability score from the start of treatment modalities till 6 weeks. There was a better outcome in patients of group A than group B (Fig-3).

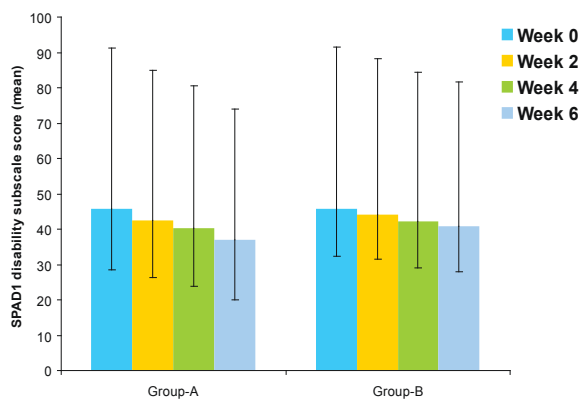


Fig-4: Assessment of shoulder pain/disability by total SPADI scores

Fig-4 revealed that in both groups, there was progressive decrease in mean total SPADI score from the start of treatment modalities till 6 weeks, but there was a better outcome in patients of group A than group B (Fig-4).

Table-II: Assessment of shoulder pain by VAS

	Group A (n=40) (Mean±SD)	Group B (n=40) (Mean±SD)
Week 0	7.04±1.90	6.72±1.44
Week 2	5.56±1.96	5.90±1.91
Week 4	4.84±2.33	5.38±1.92
Week 6	3.80±2.38	5.08±2.03
Change from week 0		
Week 2 Mean	-1.84 (-24.91%)	0.82(-10.44%)
Week 4 Mean	-2.56 (-35.78%)	-1.34 (-18.84%)
Week 6 Mean	-3.60 (-49.70%)	-1.64 (-23.25%)

Table-III: Assessment of shoulder disability by SPADI disability score

SPADI Disability score (%)	Group A (n=40) (Mean ±SD)	Group B (n=40) (Mean ±SD)
Week 0	45.65±17.26	45.79±13.46
Week 2	42.51±16.32	44.14±12.60
Week 4	40.32±16.62	42.14±13.04
Week 6	36.98±16.96	40.79±12.84
Change from week 0		
Week 2		
Mean	-3.14	-1.65
Percent (%)	-6.51	-3.06
Week 4		
Mean	-5.33	-3.65
Percent (%)	-12.34	-8.11
Week 6		
Mean	-8.66	-5.00
Percent (%)	-20.78	-10.69

Group A: Counseling + Ultrasound therapy + Physical exercise.
Group B: Counseling + Microwave Diathermy + Physical exercise.

Discussion

In this study, the mean age of patients in group A was found 54.80 (SD±8.90) and in group B it was 47.72 (SD±9.15) years. In the group "A", 16(40%) patients and in the group "B", 20(50%) patients were between 41 to 50 years of age. These findings are consistent with the findings of a study by Barua⁶ and Khan et al⁷ and multiple studies abroad^{8,9}. The total number of female patients were 28 (70%) in group A and 22 (55%) female patient in group B. Whereas 12 (30%) are male in group A and 18 (45%) are male in group B were in this study.

Female in two different studies were 66% by Jacobs et al¹³ and 64% by Khan et al⁷ and had found similar majority in their patients. Hand et al⁹ and Binder et al⁸ also found female majority in their study on on frozen shoulder.

In this study, 20 patients (50%) had non-dominant shoulder involvement in group "A" while dominant shoulder was involved in 19(47.5%) patients in group A. Only 1(2.5%) patient had involvement of both shoulder simultaneously. In group "B" non-dominant 22(55%) patients, dominant 18(45%) patients. This data of non-dominant shoulder majority conforms to a previous study by Barua⁶ (52%) and also by Hand et al¹² (52%).

In this study, 12(30%) patients in group A had diabetes mellitus and 11(27.5%) patients had in group B. In previous study by Khan et al⁷ had found an incidence rate of 19% for diabetes among their study patients. In another study, Hand et al⁹, also found 14% patients were diabetic³ on long term outcome of frozen shoulder³. Most studies show a 10% to 20% incidence of frozen shoulder, but some indicate the rate of incidence may be as high as 35%.

In the current study, one of the primary outcome variables was pain reduction that was assessed by VAS pain scale and SPADI pain score. In this study at the starting of treatment, the mean pain score according to VAS in group A and group B patients were 7.40 (SD ±1.90) and 6.72(SD±1.44) respectively. At the end of 2 weeks, the pain score come down by 24.91% to 5.56 (SD±1.96) in group A and by 10.44% to 5.90(±1.91) in group B. At the end of 4 weeks, there was further improvement in both the groups with VAS pain scales standing at 4.84(SD±2.33) and 5.38 (SD±1.92) respectively. At the end of 6 weeks, there was very significant change of VAS pain scale from the baseline score. In group A it scaled down to 3.80 (SD±2.38), a very significant change of 49.70%. In the current study from this data it is clear that patients in both groups had pain remission but those patients who had Ultrasound therapy as part of their regimen had significantly better outcome in terms of VAS pain score and the SPADI pain score than their counterpart who had MWD as part

of their treatment regime. Ulusoy et al¹⁰ had also found that shoulder pain was significantly decreased comparing to the initial level following Ultrasound therapy. Andreas B et al¹¹ also showed that pain was reduced and ROM (Range of Motion) was improved in both groups in 6 and 12 weeks. In that study, both groups were treated with transcutaneous electrical nerve stimulation, cold pack, and non-steroidal anti-inflammatory drugs; and the patients were given glenohumeral ROM exercises. Thanak et al¹⁴ found Ultrasound therapy and self-exercise are more important to reduce pain arising from adhesive capsulitis. This study also has the similar outcome.

Conclusion

In this study, most patients with adhesive capsulitis were benefitted with counseling plus Ultrasound therapy and physical exercise rather than counseling plus Microwave Diathermy therapy with physical exercise. In group "A" counseling plus Ultrasound therapy with physical exercise was given five days a week, the benefit is much more pronounced than counseling plus Microwave Diathermy therapy with physical exercise given at same duration. In addition to decreasing pain significantly, this treatment also reduces disability of the shoulder and ultimately increases Range of Motion of the affected shoulder joint. Therefore, counseling plus ultrasound therapy (UST) with physical exercise is recommended to be utilized as first line treatment in adhesive capsulitis.

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