

AXILLARY PHONOPHORESIS VERSUS POST ISOMETRIC FACILITATION IN THE TREATMENT OF SHOULDER ADHESIVE CAPSULITIS

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ABSTRACT

Background: This study was designed to compare between the effect of Axillary Phonophoresis and Post isometric facilitation on decreasing pain intensity level, increasing shoulder range of motion (ROM), improving pressure pain threshold (PPT), improving the Physical function, and functional activities in patients with Adhesive Capsulitis. **Methods:** pre and post randomized clinical designed on forty-five subjects with Adhesive Capsulitis. They divided randomly into three equal groups. Group "A" received axillary diclophenac phonophoresis in addition to traditional physiotherapy. Group B received post isometric facilitation and traditional physiotherapy. While group "C" (control group) received only conventional treatment. The pain intensity level, pressure pain threshold, shoulder range of motion, and the physical functional were measured before and after completion of treatment. **Results:** Statistical analysis (t-test) showed that there was a significant difference at all groups. But group A was significantly changed at post treatment when compared with pretreatment as ($p < 0.05$). **Conclusion:** AP is more effective than PIF on pain intensity level, functional activity and Shoulder ROM in Adhesive Capsulitis. **Keywords:** Adhesive capsulitis, Axillary Phonophoresis, Post isometric facilitation.

INTRODUCTION

Adhesive capsulitis (AC), also known as “Frozen Shoulder”, is a common cause of shoulder pain and disability and also a condition involving glenohumeral pain and loss of motion. It was defined by the American Shoulder and Elbow Surgeons as “a condition of uncertain etiology characterized by significant restriction of both active and passive motion that occurs in the absence of a known intrinsic shoulder disorder”. The intervention strategies for AC include a trial of conservative therapy followed by more invasive procedures (1). Adhesive capsulitis may be primary-onset is generally idiopathic or secondary- results from a known cause, predisposing factor or surgical event (2). Clinically, patients may present with pain and mild restriction of movement which can lead to a gross loss of function (3).

Symptoms of adhesive capsulitis were characterized as Pain that is progressive and initially felt mostly at night” sleeping is often interrupted and disturbed” or when the shoulder is moved close to the end of its range of motion. Patient felt discomfort lying on the affected shoulder, pain easily aggravated by movement. Restriction in certain combined movements of shoulder as abduction and external rotation (e.g., grooming ones’ hair) or extension and internal rotation (e.g., reaching for aback pocket), Progressive loss of passive ROM (PROM) and active ROM (AROM) of the glen humeral joint (4).

The incidence of adhesive capsulitis in the general population is approximately 3% to 5% but as high as 20% in patients with diabetes. Idiopathic adhesive capsulitis often involves the nondominant extremity, although bilateral involvement has been reported in up to 40% to 50% of cases (5).

Adhesive Capsulitis (AC) was most frequent in women, diabetic population and patient older than 40 years. It is described as having 3 stages. Stage I involves pain (freezing or painful stage) and lasts from 3 to 9 months and is characterized by an acute synovitis of the glen humeral joint. Stage II (frozen or transitional stage) includes pain and restricted movement and lasts from 4 to 12 months. Stage III (thawing stage) involves painless restriction and lasts from 12 to 42 months. Contributing factors include diabetes mellitus, stroke, thyroid disorder, dupuytren disease, complex regional pain syndrome and metabolic syndrome (5,6).

It was diagnosed by physical examination of the shoulders, arms and neck can help determine if the person’s complaints were related to daily activities or to an underlying disorder and also rib mobility should be performed. A physician could rule out other conditions that mimic adhesive capsulitis. The shoulder was examined for tenderness, sensation and the muscles of the shoulder should be examined for strength and signs of atrophy (7). Specific tests might produce the symptoms of AC. In the shoulder shrug sign, the doctor assessed the patient ability to lift the arm to 90-degree abduction without elevating the whole scapula or the shoulder girdle. The test was positive when the patient cannot raise arm or raise it with elevation of shoulder or scapula, investigate the reliability of 3 function related tests “Hand to neck, Hand to scapula, Hand to opposite scapula” (8).

The best passive intervention technique used for Adhesive Capsulitis is exercise and had the best effects in the short and long term treatment. Dierks on the converse reported that exercise below pain threshold and active movements within the painless range, gave good results (9).

There is a lack in scientific evidence that support a particular treatment approaches for subjects with Adhesive Capsulitis (10). So, the physical therapist has a difficulty and interruption in choosing the most appropriate method of treatment for each individual subjects. Additionally, there is a lack in clinical trials that determine the true influence of Axillary Phonophoresis or Post isometric facilitation on Adhesive Capsulitis due to the combination of AP with other therapy modality and the

MATERIAL AND METHODS:

Study design:

This pre and post randomized clinical trial was performed at the outpatient clinic at the Faculty of Physical Therapy, Cairo University during the period from January 2023 to April 2023. This research was approved by research ethics committee of Faculty of Physical Therapy (NO: P. T. REC/012/003719) and registered at the Pan African Clinical Trial Registry (Registry ID PACTR NCT05475639).

Determination of sample size

The number of subjects were calculated by using G*Power (version 3.1.9.2) (Franz Faul, Uni Kiel, Germany). A calculation was based on t test, the type I error rate was set at 5% (alpha-level 0.05), and the effect size was 1.24 of the main outcome variable "pressure pain threshold" (PPT) obtained from a pilot study performed on ten subjects and type II error rate was at 80% power. The estimated number was 24subjects in the three groups but due to the probability of occurrence drop out we used 45subjects 15 in each group.

Participant

Forty-five subjects were recruited from the outpatient clinic at the Faculty of Physical (Cairo University- Egypt). Their ages ranged from 40 to 60 years with a mean

combination of Post isometric facilitation with other therapy modality and to compare the effect of Axillary Phonophoresis or Post isometric facilitation with active control group in the management of Adhesive Capsulitis. (11). So, this research was conducted to focus on the comparison between the effect of Axillary Phonophoresis and Post isometric facilitation in reducing pain and improving shoulder functional activities in patients with Adhesive Capsulitis.

year 50 ± 10 (12). During assessment of eligibility (figure 1) five subjects excluded because they received treatment at past three months. Forty-five subjects received verbal and written explanation for the purpose of this study, if they agreed to participate they signed the consent form which approved by the Faculty of Physical Therapy. Then the allocation performed randomly by sealed envelopes to three groups:

Group (A): received axillary diclophenac phonophoresis in addition to traditional physiotherapy

Group (B): received post isometric facilitation and traditional physiotherapy

Group(C): traditional physiotherapy

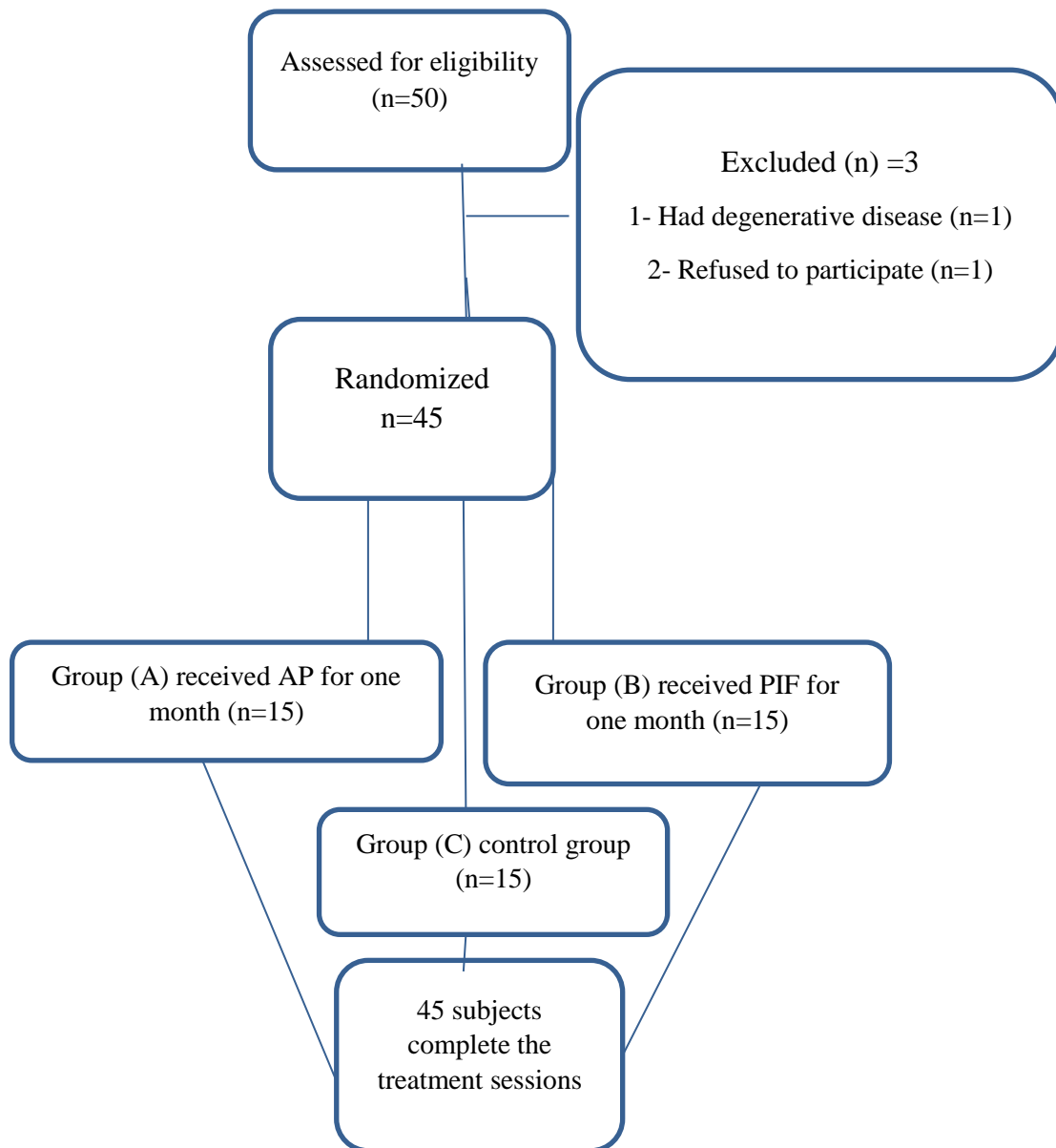


Figure 1: Assessment of eligibility

Inclusion and exclusion criteria

The subjects were involved in this research if they are in the 2nd stage of adhesive capsulitis (transitional stage). Including two or more of the following pain complaints: Grooming ones hair, Scratching your back and getting dressed, Overhead activities or Difficulty in the action of throwing the ball and giving a high –five (13). The diagnosis was confirmed by shoulder MRI (14). Subjects were excluded

if they had any Previous fracture with or without internal fixation in the shoulder joint, any previous surgery in the shoulder joint and patient with tendon calcification, Local corticosteroid injection to the affected shoulder within the last three months or recent ones (15)., Neuromuscular disease, Rotator cuff tear, History of metastatic cancer or diagnosis of cancer within 12 months and Unstable angina (16).

Measurement Procedures:

Pressure pain threshold was the primary outcome at this research and assessed by digital algometer (Kg/cm²). The secondary outcome was range of motion and assessed by the digital goniometer. Assessment performed before and after completion of study.

1-pressure pain threshold assessment:

It was used to assess Pressure pain threshold, (PPT) is the lowest stimulus intensity at which a subject recognizes mechanical pain (17). To assess PPT the subject was asked to determine the area of pain because they had active trigger points. All subjects had active trigger points at the middle of transverse portion of upper trapezius, acromion and the insertion of deltoid muscle. The area was confirmed by pincer palpation and then marked it. The transducer probe tip (1 cm²) was applied perpendicularly over trigger points as shown in figure (2). The pressure was applied gradually by pressing the transducer downwards. Exerted pressure was held and gradually increased until the subject indicated first sign of pain and said stop (18). Algometric measurements have a good inter-rater and intra-rater reliability (19).



Figure 2: pressure algometer assessment for upper trapezius



Figure3: pressure algometer for insertion of deltoid.



Figure: pressure algometer for acromion.

2-The digital goniometer (Absolute Axis): It is used to measure the shoulder range of motion (20). Goniometric readings are used extensively in rehabilitation to provide objective measures of ROM at synovial joints. Repeated assessments are used to determine quantitative (1) baselines of joint mobility before rehabilitation procedures are initiated; (2) measures of improvement in joint mobility during treatment; and (3) treatment outcomes. (21).

Digital goniometry is valid and showed high reliability and can be used for measuring the shoulder range of motion (22); it is a reliable tool for assessing ACROM in a clinical setting for healthy subjects. (23).



Figure 3: Digital goniometer

Testing protocol:

•Pain Intensity Assessment: The subject was being in a relaxed position then gave him the appendix which contains NRS. The subject was instructed to place a vertical mark on the line to indicate his/her pain. The subject chose between 0 (no pain) and 10 (excruciating pain) that best describes the intensity of pain the subject felt (24). NPRS is valid and reliable scale to measure pain intensity (25).

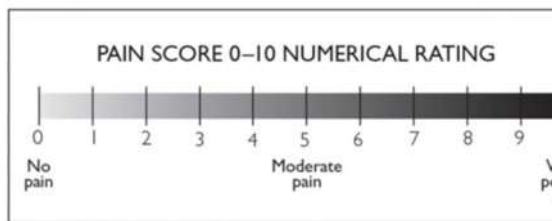


Figure 4: Numerical pain rating scale

-Disability of the Arm, Shoulder and Hand questionnaire (DASH)

Disability of the Arm, Shoulder and Hand (DASH) questionnaire is 11 item questionnaire that shows the ability of the patient to perform certain upper extremity activities. This questionnaire is self-report questionnaire that the patient can rate difficulty and interference with daily life; the severity of pain and tingling (2 items); and the problems effect on social activities, work, and sleep (3 items) (26). The validity and reproducibility of DASH has been established by many researchers (27)

Treatment Procedures:

-Group A: Therapeutic Ultrasonic US :(Axillary Diclofenac Phonophoresis)

Axillary Diclofenac phonophoresis applied for group 1 plus conventional therapy program. Applied the Diclofen gel (voltaren gel) on the head of the ultrasound device and apply it on the axilla of the affected shoulder. Set the parameters as 1 MHz frequency, stroking technique, at 1.5 W/cm², 10 minutes (28). The application of US will adopt as the axilla is the site of axillary pouch of the capsule, which has been implicated in the inflammation and adhesion within the shoulder joint that may interfere with the ROM. The axillary adhesions can tighten and cause the shoulder joint loses mobility over time (16).



Figure 5: Axillary phonophoresis

-Group 2(Post isometric facilitation technique)

This is considered as Muscle Energy Technique (MET) used for treatment of restricted and fibrotic soft tissue (fascia and muscle) (29) Several review studies illustrated different treatment protocols and their effects in reducing symptoms of pain and limitation of ROM in AC, although the most recent review recommended future studies to incorporate other interventions within the scope of physiotherapy practice.

Muscle energy technique (MET) has been advocated for the treatment of shortened and/or weakened muscles, restricted joints, and lymphatic drainage. It is a form of osteopathic manual treatment in which the patient's muscles are actively engaged as part of applying the treatment. It has 6 main variations: (1) isometric contraction using reciprocal inhibition, (2) isometric contraction using post isometric relaxation (without stretching), (3) isometric contraction using post isometric relaxation (with stretching) also known as post facilitation stretching, (4) isotonic concentric contraction, (5) isotonic eccentric contraction (isolytic), and (6) isokinetic (combined isotonic and isometric contractions) (16).

This technique involves isometric contraction of the muscle followed by isometric relaxation followed by stretching. During performing isometric facilitation with the shoulder in flexion, the participant will seat with his/her back supported and the therapist will stand facing the participant's painful shoulder. The participants shoulder will flex to maximum available range with the elbow completely flexed. The participant will perform isometric contraction of the shoulder extensors against maximum resistance that will be provide by the therapist. This contraction will last for 10 seconds and will be followed by relaxation for 5 seconds. This will allow the shortened shoulder extensors to relax and permit easier stretching. The therapist then will stretch the participants shoulder extensors to the limit of the painful range. Once the participant performance improved, the duration of isometric contraction will extend to 20 seconds (29). Each exercise will be repeated 5 times in each session. The duration of each post isometric facilitation session will range from 9 to 13 minutes. Each participant will receive 12 treatment sessions over a 4-week period (3 sessions/wk. for 4 weeks).



Figure 6: Post isometric facilitation for shoulder flexion.



Figure 7: Post isometric facilitation for shoulder external rotation.



Figure 8: Post isometric facilitation for shoulder abduction

-Group 3(Infrared, Supervised Exercise Program, Home exercise)

Infrared (IR) lamps apply heat to deep joints such as shoulder joint. Avoid deltoid muscle; apply over thin, bony areas for maximum penetration.



Figure 9: Infrared application

Supervised exercises are self-exercise included: 1-Codmans or pendulum exercise (circumduction): It should be done 5 times daily in 5 to 10 minute sessions (30).

2-Passive stretching exercise (for shoulder extensors, abductors, and internal rotators) such as “climbing the wall exercise” (i.e., facing a wall about three quarters of an arm’s length away and raising the affected arm up to the shoulder level using only ones’ fingers without using shoulder muscle) (31).

3-Corner stretch: Standing facing a corner or open doorway and position the arms with the elbows at shoulder level. The

arm was placed at a 90-degree angle to the shoulder with a 90-degree angle at the elbow. The patient was ordered to keep the forearms vertical Move your feet forward, moving your body gently forward toward the corner or doorway until a stretch felt in the front of the shoulder. Hold 10 seconds. (31)

The home exercise program includes the same exercise as in supervised exercise program. The participant will instruct to perform exercises 1-2 times/day within pain-free ROM, and gradually build up the number of repetitions and to stop performing exercise if the symptoms exacerbated.

Data Analysis:

Subject characteristics were compared between groups by ANOVA test. Chi-squared test was used for comparison of sex distribution between groups. Normal distribution of data was checked using the Shapiro-Wilk test. Levene’s test for homogeneity of variances was conducted to test the homogeneity between groups. Mixed MANOVA was performed to compare within and between groups effects on NRS, DASH, shoulder ROM and PPT. Post-hoc tests using the Bonferroni correction were carried out for subsequent multiple comparison. The level of significance for all statistical tests was set at $p < 0.05$. All statistical analysis was conducted through the statistical package for social sciences (SPSS) version 25 for windows (IBM SPSS, Chicago, IL, USA).

was no significant difference between groups in age and sex distribution ($p > 0.05$)

RESULTS

- Subject characteristics:

Table (1) shows the subject characteristics of group A, B and C. There

Table 1. Basic characteristics of participants.

	Group A	Group B	Group C	p-value
Age, mean \pm (SD), years	49.40 \pm 8.32	52.67 \pm 7.15	51.40 \pm 10.61	0.59
Sex, n (%)				
Females	12 (80%)	10 (67%)	11 (73%)	0.91
Males	3 (20%)	5 (33%)	4 (27%)	

SD, standard deviation; p-value, level of significance

Effect of treatment on NRS, DASH, shoulder ROM and PPT

Mixed MANOVA revealed that there was a significant interaction of treatment and time ($F = 11.45$, $p = 0.001$, Partial Eta Squared = 0.72). There was a significant main effect of time ($F = 410.21$, $p = 0.001$, Partial Eta Squared = 0.98). There was a significant main effect of treatment ($F = 2.51$, $p = 0.004$, Partial Eta Squared = 0.36).

Within group comparison

There was a significant decrease in NRS and DASH in the three groups post treatment compared with that pre treatment ($p < 0.001$). There was a significant increase in flexion, abduction and external rotation ROM in the three groups post treatment compared with that pre treatment ($p < 0.001$). There was a significant increase in PPT of upper trapezius, deltoid and acromion in the three groups post treatment

compared with that pre treatment ($p < 0.001$). (Table 2-4).

Between group comparison

There was a significant decrease in NRS and DASH of A group compared with that of group B and group C ($p < 0.01$) and significant decrease in group B compared with that of group C ($p < 0.05$). (Table 2).

There was a significant increase in flexion, abduction and external rotation ROM of group A compared with that of group B ($p < 0.05$) and group C ($p < 0.001$) and a significant increase in group B compared with that of group C ($p < 0.05$). (Table 3).

There was a significant increase in PPT of upper trapezius, deltoid and acromion of group A compared with that of group B ($p < 0.05$) and group C ($p < 0.001$) and a significant increase in group B compared with that of group C ($p < 0.05$). (Table 4).

Table 2. Mean VAS and DASH pre and post treatment of group A, B and C:

	Group A	Group B	Group C	p-value		
	mean \pm SD	mean \pm SD	mean \pm SD	A vs B	A vs C	B vs C
NRS						
Pre treatment	7.33 \pm 0.82	7.13 \pm 0.74	7.60 \pm 0.73	0.75	0.61	0.22
Post treatment	2.33 \pm 0.48	3.07 \pm 0.70	3.73 \pm 0.79	0.01	0.001	0.02
MD (% of change)	5 (68.21%)	4.06 (56.94%)	3.87 (50.92%)			
	p = 0.001	p = 0.001	p = 0.001			
DASH						
Pre treatment	68.84 \pm 13.07	64.84 \pm 9.16	65.29 \pm 10.78	0.08	0.65	0.99
Post treatment	34.33 \pm 10.16	44.16 \pm 7.94	53.56 \pm 8.22	0.01	0.001	0.01
MD (% of change)	34.51 (50.13%)	20.68 (31.89%)	11.73 (19.97%)			
	p = 0.001	p = 0.001	p = 0.001			

SD, Standard deviation; MD, Mean difference; p-value, Probability value

Table 3. Mean shoulder ROM pre and post treatment of group A, B and C:

ROM (degrees)	Group A	Group B	Group C	p-value		
	mean \pm SD	mean \pm SD	mean \pm SD	A vs B	A vs C	B vs C
Flexion						
Pre treatment	92.67 \pm 14.13	97.07 \pm 15.37	94.67 \pm 10.76	0.65	0.91	0.87
Post treatment	139.53 \pm 12.43	127.40 \pm 10.73	112 \pm 13.90	0.02	0.001	0.004
MD (% of change)	-46.86 (50.57%)	-30.33 (31.25%)	-17.33 (18.31%)			
	p = 0.001	p = 0.001	p = 0.001			
Abduction						
Pre treatment	64.67 \pm 14.82	65.07 \pm 13.15	66.67 \pm 12.63	0.99	0.91	0.94
Post treatment	120.80 \pm 13.05	106 \pm 10.72	93 \pm 12.1	0.004	0.001	0.01
MD (% of change)	-56.13 (86.79%)	-40.93 (62.90%)	-26.33 (39.49%)			
	p = 0.001	p = 0.001	p = 0.001			
External rotation						
Pre treatment	30 \pm 8.39	31.67 \pm 8.62	28.73 \pm 6.69	0.83	0.9	0.57
Post treatment	48 \pm 7.22	40 \pm 7.38	33.13 \pm 6.71	0.01	0.001	0.03
MD (% of change)	-18 (60%)	-8.33 (26.30%)	-4.4 (15.32%)			
	p = 0.001	p = 0.001	p = 0.001			

SD, Standard deviation; MD, Mean difference; p-value, Probability value

Table 4. Mean PPT pre and post treatment of group A, B and C:

PPT (lb)	Group A	Group B	Group C	p-value		
	mean \pm SD	mean \pm SD	mean \pm SD	A vs B	A vs C	B vs C
Upper trapezius						
Pre treatment	2.60 \pm 0.22	2.75 \pm 0.26	2.62 \pm 0.23	0.21	0.97	0.31
Post treatment	3.83 \pm 0.41	3.49 \pm 0.39	3.04 \pm 0.29	0.03	0.001	0.005
MD (% of change)	-1.23 (47.31%)	-0.74 (26.91%)	-0.42 (16.03%)			
	p = 0.001	p = 0.001	p = 0.001			
Deltoid						
Pre treatment	2.85 \pm 0.21	2.99 \pm 0.21	2.86 \pm 0.27	0.23	0.98	0.3
Post treatment	4.09 \pm 0.37	3.70 \pm 0.42	3.32 \pm 0.32	0.01	0.001	0.002
MD (% of change)	-1.24 (43.51%)	-0.71 (23.75%)	-0.46 (16.08%)			
	p = 0.001	p = 0.001	p = 0.001			
Acromion						
Pre treatment	2.43 \pm 0.29	2.52 \pm 0.31	2.51 \pm 0.34	0.71	0.8	0.98
Post treatment	3.85 \pm 0.49	3.32 \pm 0.45	2.91 \pm 0.39	0.007	0.001	0.03
MD (% of change)	-1.42 (58.44%)	-0.8 (31.75%)	-0.4 (15.94%)			
	p = 0.001	p = 0.001	p = 0.001			

SD, Standard deviation; MD, Mean difference; p-value, Probability value

DISCUSSION

This study aimed to compare between the effect of AP and PIF on pain intensity level, range of motion, pressure pain threshold and physical function in the treatment of Shoulder Adhesive Capsulitis.

This study was conducted on forty-five volunteers their ages ranged between 50-60 years old represented the sample of this study.

This study was conducted in the outpatient clinic of the faculty of physical therapy, Cairo University. Patients were assigned into three equal groups (each consist of 15 patients)

Group (A): received axillary diclophenac phonophoresis in addition to traditional physiotherapy

Group (B): received post isometric facilitation and traditional physiotherapy

Group(C): traditional physiotherapy.

The results of current study according to the data analysis showed that the group of AP revealed that there was a significant improvement after treatment in the values of NPR. Axillary phonophoresis break down adhesions at shoulder joint. To understand the effect of Axillary phonophoresis on pain the physiological effect of it on the human tissue should be explained according to Elhafez and Elhafez, 2016(16).

In the comparison between group A and group B there was significance improvement in the shoulder ROM, pain and physical activity.

Regarding to group A the effects of axillary diclophenac phonophoresis on Pain

functional activity and range of motion on patients' with AC:

According to the data analysis in the current study, the results of axillary diclophenac phonophoresis group revealed that there was a significant improvement after treatment in the values of NRS 68.21%., PPT on upper trapezius was 47.31%., PPT of deltoid was 43.51% and PPT of acromion was 58.44%. Shoulder ROM (flexion ROM was 50.57%, abduction ROM was 86.79%, external rotation ROM was 60%).DASH was 50.13%. There was a significant improvement after treatment in pain pressure threshold, shoulder range of motion and functional activity.

Additionally, in a study done by Adel et al., (2013) (32) who studied the effect of shock wave versus phonophoresis in the treatment of diabetic frozen shoulder. There was significant decrease of functional disability of the phonophoresis group due to ultrasonic effect plus anti-inflammatory and anesthetic effect of declophenac gel used in phonophoresis. These include: enhanced blood flow, increased membrane permeability and nerve conduction and collagen formation.

The results of the study come in agreement with Elhafez and Elhafez, (2016) (16) that showed a significant improvement of shoulder ROM and compare it with laser therapy. In this study the author proved that axillary application of US and laser with post isometric facilitation technique produced immediate and medium-term improvements in shoulder ROM, primarily abduction and external rotation, as well as a reduction in pain.

In a study, ultrasound therapy produced higher results for the Barua (33) Disability Index score for Shoulder Pain from 2014. The results of exercise and phonophoresis in the treatment of patients with adhesive

capsulitis; according to the study, both exercise and phonophoresis had positive effects on adhesive capsulitis. Phonophoresis also had an additive effect on exercise to reduce discomfort and to restore shoulder movements and activities.

Regarding to group B the effects of Post isometric facilitation on Pain functional activity and range of motion on patients with AC:

According to the data analysis in the current study, the results of Post isometric facilitation group revealed that there was a significant improvement after treatment in the values of NRS. 56.94%, PPT on upper trapezius was 26.91%., PPT of deltoid was 23.75%., and PPT of acromion was 31.75%. Shoulder ROM (flexion ROM was 31.25%., abduction ROM was 62.90%., external rotation ROM was 60%). DASH was 31.89%.

Also similar results were obtained by Afzal et al., 2021(34) in a study about the Effect of Muscle Energy Technique on Pain and Function in Adhesive Capsulitis proved that MET along with conventional physiotherapy, both are individually effective in relieving pain, improving range of motion and functional ability in patients with adhesive capsulitis, but among these two, the group which received MET along with conventional physiotherapy was found to be more effective in relieving pain, improving range of motion and functional ability in patients with adhesive capsulitis.

Additionally, similar results were obtained by Adel et al., (32)., in 2021 that study The Effectiveness of Muscle Energy Technique in Patients with Adhesive Capsulitis concluded that METs techniques was effective in treatment of adhesive capsulitis to decrease the pain and disability in comparison to control groups.

In contrast; Ravichandran and Balamurugan, (2015) (35) found that the use of proprioceptive neuromuscular facilitation (PNF) for the glenohumeral joint in adhesive capsulitis subjects results in pain relief, ROM restoration, and function, according to a study about the Effect of proprioceptive neuromuscular facilitation stretch and muscle energy technique in the management of adhesive capsulitis of the shoulder. When compared to the most significant and effective PNF approach, the muscle energy technique, its effect was less substantial.

Regarding to group C the effects of conventional therapy on Pain, functional activity and range of motion on patients with AC:

According to the data analysis in the current study, the results of conventional therapy group revealed that there was a significant improvement after treatment in the values of NRS 50.92%., PPT on upper trapezius was 16.03%., PPT of deltoid was 16.08%., and PPT of acromion was 15.94%. Shoulder ROM (flexion ROM was 18.31%., abduction ROM was 39.49%., external rotation ROM was 15.32 %.). DASH was 17.97%.49%., external rotation ROM was 15.32 %.). DASH was 17.97%.

Similar results were obtained by Barua in 2014, (33) revealed that early intervention of physical therapy such as exercises would give better outcome and early restoration of movements, as well as additional implementation of phonophoresis alleviates pain earlier and this resulting more ROM could be restored in a study done on 2014 about the effect of phonophoresis and exercise in the treatment of patient with adhesive capsulitis. The study was revealed exercise with or without phonophoresis had beneficial effects on adhesive capsulitis and phonophoresis had an additive effect on exercise to alleviate pain and for restoration of movements and activities of shoulders

Limitation: The study was limited by the short treatment time, and there was no follow-up evaluation.

CONCLUSION

Axillary diclophenac phonophoresis is more effective than post isometric facilitation in relieving pain, promoting and improving the functional activity, increasing shoulder joint ROM in cases of Adhesive Capsulitis. It helps the patient to return quickly to his normal life style.

Conflict of interest: The authors declare that they have no conflict of interest.

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