



TO ASSESS THE EFFECT OF CONVENTIONAL PHYSIOTHERAPY COMBINED WITH VIBRATION THERAPY ON PAIN & FUNCTION AND ABDUCTION & EXTERNAL ROTATION RANGE OF MOTION IN PATIENTS WITH FROZEN SHOULDER: A COMPARATIVE STUDY.

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ABSTRACT

Introduction: A frozen shoulder (FS); Hui Bin Yvonne et al defined it as "a condition of uncertain aetiology, characterised by significant restriction of both active and passive shoulder motion mostly the shoulder abduction and external rotation that occurs in absence of a known intrinsic shoulder disorder"^[2].

Methodology: The study consists of total 20 patients diagnosed with frozen shoulder. Between 40 to 60 years of age including male and female. All the patients included in the study were ones falling into inclusion criteria of the study. Informed and written consent was taken from all the patients and further all the patients were divided into two groups by concealed envelope method consisting of 10 patients in each group. Both the groups received treatment for 5 days/week for 4 weeks. Group-A received the Vibration therapy along with Conventional Physiotherapy and Group-B received Conventional Physiotherapy treatment.

Result: For group-A and group-B pre and post intervention outcome measures were taken in form of Goniometry and SPADI. Significance was assessed at 5% level of significance $p < 0.05$ (2-tailed hypothesis test was considered). Both the groups showed improvement post intervention but Group A along with Conventional Physiotherapy showed more improvement where pain was reduced, improved function, improved shoulder abduction and external rotation ROM.

Conclusion: The study showed significant effectiveness in both the groups significant effect of the treatment on post intervention but when compared the effect was more significant in Group-A that is Vibration therapy in patients with frozen shoulder.

Keywords: Frozen shoulder, vibration therapy, shoulder abduction, shoulder external rotation, SPADI

INTRODUCTION

The shoulder is one of the most movable, structurally and functionally complex joint in the human body. The joint consist of the shoulder girdle, where the upper limb is connected to axial skeleton through the sterno-clavicular joint^[1].

Structure and function: There are in total four joints present in shoulder they are; Sterno-clavicular, Acromio-clavicular, Scapulo-thoracic, gleno-humeral joint. Also there are fluid-filled in a very small number which surround the capsule and aid in mobility to the joint known as bursae. Bursae present in shoulder joint are: subacromial, subdeltoid, subscapular, and subcoracoid bursae^[1]. The primary movements occurring in shoulder joint occurs at the gleno-humeral joint are: flexion, extension, abduction, adduction, internal rotation, external rotation, horizontal abduction & adduction, diagonal abduction & adduction. The intrinsic muscles named deltoid, Teres major, Teres minor, Supraspiantus, Infraspinatus, Subcapularis, of shoulder joint helps in connecting scapula and/or clavicle to humerus.

A frozen shoulder; it is defined as "a condition of uncertain aetiology, characterised by significant restriction of both active and passive shoulder motion mostly the shoulder abduction and external rotation that occurs in absence of a known intrinsic shoulder disorder"^[2]. Codman was the first to introduced the term "frozen shoulder" in the year of 1934, where he described that these condition has an insidious onset with pain in shoulder joint which worsens at night and usually associated with joint stiffness and difficulty in lying on affected side. Codman also described that these condition usually reduces range of motion of shoulder flexion and external rotation.

A frozen shoulder is associated with synovitis and capsule contracture, and is not associated with capsular adhesions. Frozen shoulder is basically divided into two types: Primary & Secondary, where primary frozen shoulder is associated with systemic illness and secondary frozen shoulder is associated with extrinsic and intrinsic factors occurring in shoulder joint, where usually this condition is with unknown etiological factors, pain in the shoulder joint, reduced range of motion in almost all three planes but commonly affecting ranges are shoulder abduction and external rotations^[4].

According to previous studies frozen shoulder is usually present in patients in the sixth decade of life, & onset before the age of 40 is very uncommon. Frozen shoulder is thought to have an occurrence between the ages of 40-65 yrs with an incidence of 2%-5% in general population, where females are more affected than males. Non-dominant shoulder is more likely to be affected in patients with frozen shoulder. The occurrence of frozen shoulder in either of one shoulder joint shows high risk of contra-lateral shoulder joint involvement of 5%-34% and incidence of bilateral shoulder joint involvement shows 14% of prevalence^[3,4,5,6].

Frozen shoulder consist of three phases of clinical presentation they are^[1] :

1. The freezing phase: It lasts for 2-9 months, their is pain and stiffness felt around shoulder with no history of injury .Their is constant nagging and increased nocturnal pain.
2. The frozen/adhesive phase: It lasts for 4-12months, the pain now gradually subsides apparently occurs at extreme joint movements, but the stiffness still remains. Also their is gross reduction in movements taking place of gleno-humeral joint with near total obliteration of external rotation.
3. The thawing/resolution phase: It lasts for 12-42 months ,patient in this phase experiences a gradual return of range of motion. Compared to the frozen phase patient is able to perform more motions at shoulder joint especially motion occurring at glenohumeral joint.

Physiotherapy plays an important role in conservatively treating the patients with frozen shoulder. Conventional Physiotherapy treatment along with home exercises can be used as first line treatment for treating frozen shoulder.

The treatment method included in these study will be conventional physiotherapy and

Vibration Therapy: uses vibration as a physical tool during treatment. Vibration is propagation of elastic waves producing deformations and tensions on a continuous medium. The vibratory movement is very short and fast and repeated around and

equilibrium position. Physiological effects of vibration therapy are: helps in increasing electromyography activity, oxygen consumption, muscle temperature and skin blood flow.

- Shoulder pain and disability index(SPADI):

It is a questionnaire that consist of 2 dimensions: pain and functional activities.

Pain dimension consist of 5 questions regarding severity of pain in individual, functional dimension consist of 8 questions designed to measure degree of difficulty in activity of daily living that requires the use of upper extremity.

SPADI takes 5-10 minutes to complete by a patient and is reliable and valid specific measure for shoulder^[1]

- Goniometry:

gonio=angle, metron=measure

it is technique used to measure and document amount of available range of motion of joints, both passive and active ROM can be checked .

it helps in identify abnormal conditions related to muscles, tendons and joints such as: contractures, decreased ROM, developing treatment goals, for evaluating progress of treatment it is also valid for assessing the joint ROM and reliability depends upon the host factors such as methods of application, variation among different patient types.

METHODOLGY

A. Source of data: Physiotherapy OPD at Parul Sevaashram Hospital.

B. Method Of Collection Of Data:

- ✓ Study design: a comparative study
- ✓ Sampling method: Concealed envelope method
- ✓ Sample size :20 (10 patients in Group A & 10 patients in Group B)
- ✓ Intervention Duration: 5 days/week for 4 weeks

C. Inclusion Criteria:

- ✓ Pre diagnosed cases with frozen shoulder with pain, decreased ROM & function.
- ✓ Patients suffering from Frozen Shoulder since last 3 months.
- ✓ Age: 40-60 years.
- ✓ Males and females.
- ✓ Subjects who can understand English/ Hindi/ Gujarati.

D. Exclusion Criteria:

- ✓ Patient complaining of any other musculoskeletal problem: neck pain with radiculopathy, recent injury to elbow joint and upper back .
- ✓ Patient suffering from any other neuromuscular condition.
- ✓ Patient with acute shoulder injuries/ recent fractures.

E. Material Used:

- ✓ Assessment form
- ✓ Consent form
- ✓ Paper
- ✓ Pen
- ✓ Pencil
- ✓ Rubber
- ✓ Chair
- ✓ Plinth

- ✓ Goniometer
- ✓ Vibrator

F. Outcome Measures:

- ✓ Shoulder pain and function disability index –for pain and function of shoulder joint.
- ✓ Goniometry-for ROM.

G. Ethical Clearance:

- ✓ In the act of reasearch consists of human subjects,ethical clearance was obtain from ethical committe of parul university institutional ethica committe for human research (PU-IESHR).Also written consent was taken from every subjects who associate in the study.

H. Procedure :

Subjects for my study were recruited from Physiotherapy OPD at Parul Sevaashram Hospital.

The entire subjects with stiffness and pain at shoulder were assessed on the basis of a assessment Performa (Appendix I). Subjects diagnosed with frozen shoulder were recruited for the study and ones falling into inclusion criteria were asked to sign the written informed consent form (Appendix II). Subjects were having complete freedom to refuse from participating in the study. Once the consent form was signed the subjects were divided into two groups, Group A (Conventional Physiotherapy) & Group B (Vibration Therapy & Conventional Physiotherapy) by the concealed envelope method. Both the groups then received the given treatment for total duration of 5 days/week for 4 weeks. Both groups were assessed before and after intervention for function and pain using SPADI (appendix III) & ROM using Goniometry and then final results were analysed by paired & unpaired t-test.

Details of the treatment protocol are as follows:

Treatment regimen for Group A:

- ✓ Group A received conventional physiotherapy treatment which included of stretching exercise (capsular stretch) 3-5 repetitions with 30 seconds of hold in between & 5 seconds of rest in between each repetitions for 1 session per day; and home programme included finger ladder exercise for abduction 10 repetitions, 3 times a day along with Codman's/Pendulum exercise with 10 repetitions in one session and 3 times per day.

Treatment regimen for Group B:

- ✓ Group B received conventional physiotherapy treatment along with vibration therapy, conventional physiotherapy treatment remains same as given above for Group A and vibration therapy was given with the help of mechanical vibration at a frequency ranging from 50-150 Hz for 30 minutes of duration with 2 seconds of rest in between each repetitions, one session per day.

DATA ANALYSIS

- ✓ In the present study total 20 patients were recruited between the age group 40to 60 years including male & female. All the patients recruited for the study followed the treatment session and each of them were analyzed pre and post intervention on outcome measures.

STATISTICAL ANALYSIS

- ✓ Descriptive statistical analysis was accomplished in the present study. Outcome measurement was measured using SPADI and Goniometry. Significance was assess at 5% level of significance $p < 0.05$ (2-tailed hypothesis test consider).

Statistical test

- ✓ Paired t-test was used as a parametric test for analysis within the group-A and Group-B with calculation of percentage of change for shoulder abduction and external rotation and SPADI.

- ✓ unpaired t-test was used as a parametric test for analysis between the group-A and Group-B with calculation of percentage of change for shoulder abduction and external rotation and SPADI.

Statistical software

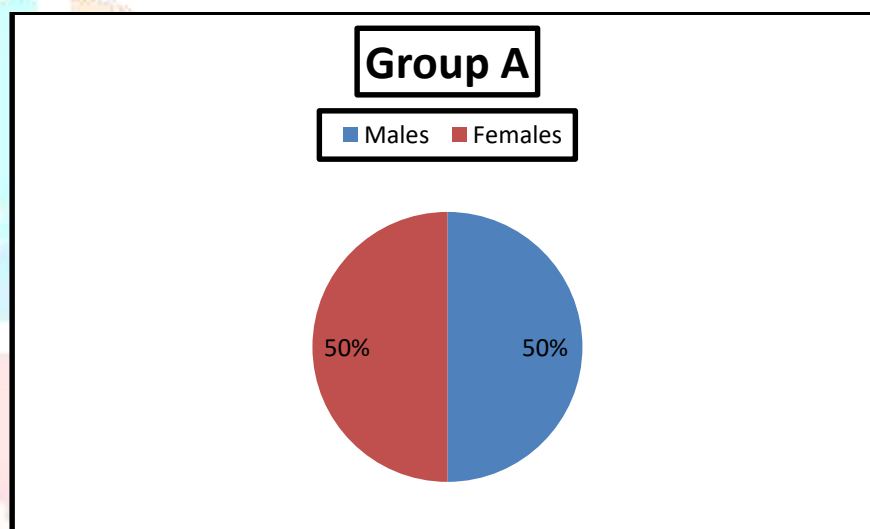
The statistical software namely SPSS 2.1.0.1 was used for the analysis of data, Micro soft word and excel was used to generate graphs, table.

RESULT

Table:1 Gender Distribution

Gender	Group A	Group B
Males	05	07
Females	05	03

Graph:1 Gender Distribution Group A



Graph:2 Gender Distribution Group B

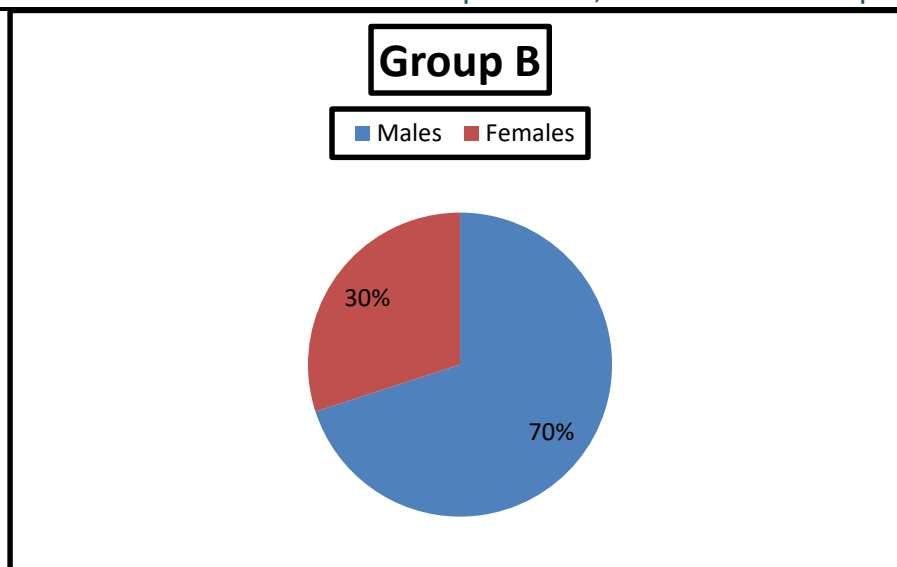


Table 2: Comparison of pre and post outcome measures of Group A

Outcome Measures	Experimental Group				t-value	p-value
	Pre test		Post test			
	Mean	SD	Mean	SD		
Shoulder Abduction	129.2	7.74	146.1	8.68	7.77	0.005
Shoulder External Rotation	40.1	5.54	51.6	6.25	3.89	0.005
SPADI	40.5	6.98	23.7	5.59	4.53	0.004

Graph:3 Comparison of pre and post outcome measures of Group A

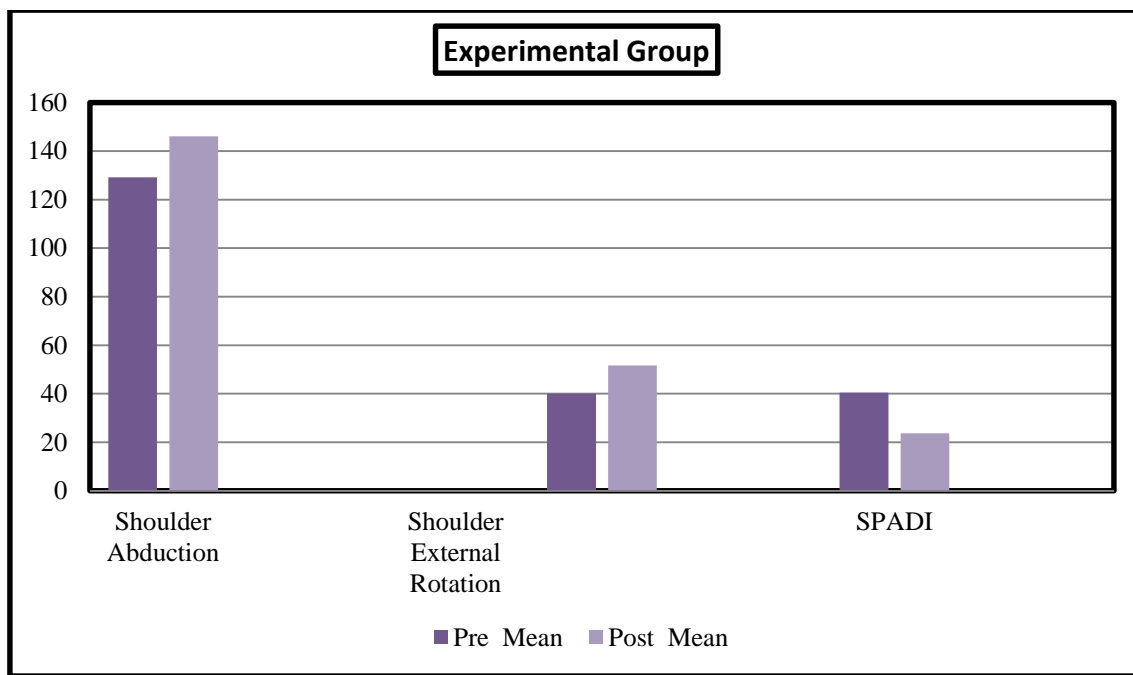


Table:3 Comparison of pre and post outcome measures of Group B

Outcome Measures	Control Group				t-value	p-value
	Pre test		Post test			
	Mean	SD	Mean	SD		
Shoulder Abduction	115	7.38	122.5	6.44	4.19	0.005
Shoulder External Rotation	41.4	5.35	58.8	6.26	1.36	0.004
SPADI	42.3	3.13	34.3	4.38	2.24	0.001

Graph:4 Comparison of pre and post outcome measures of Group B

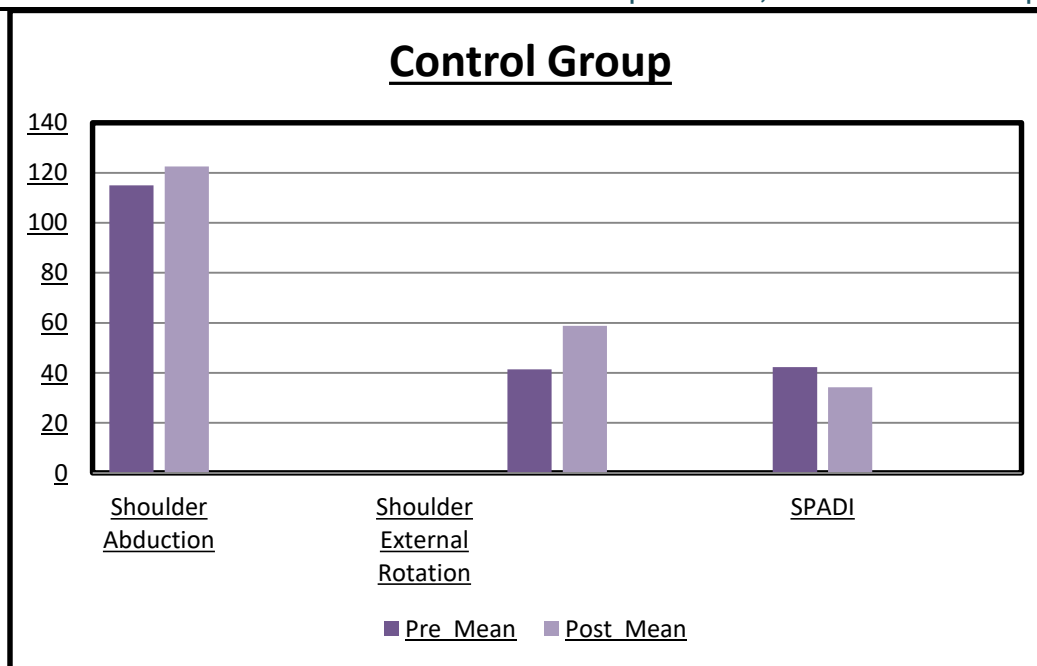
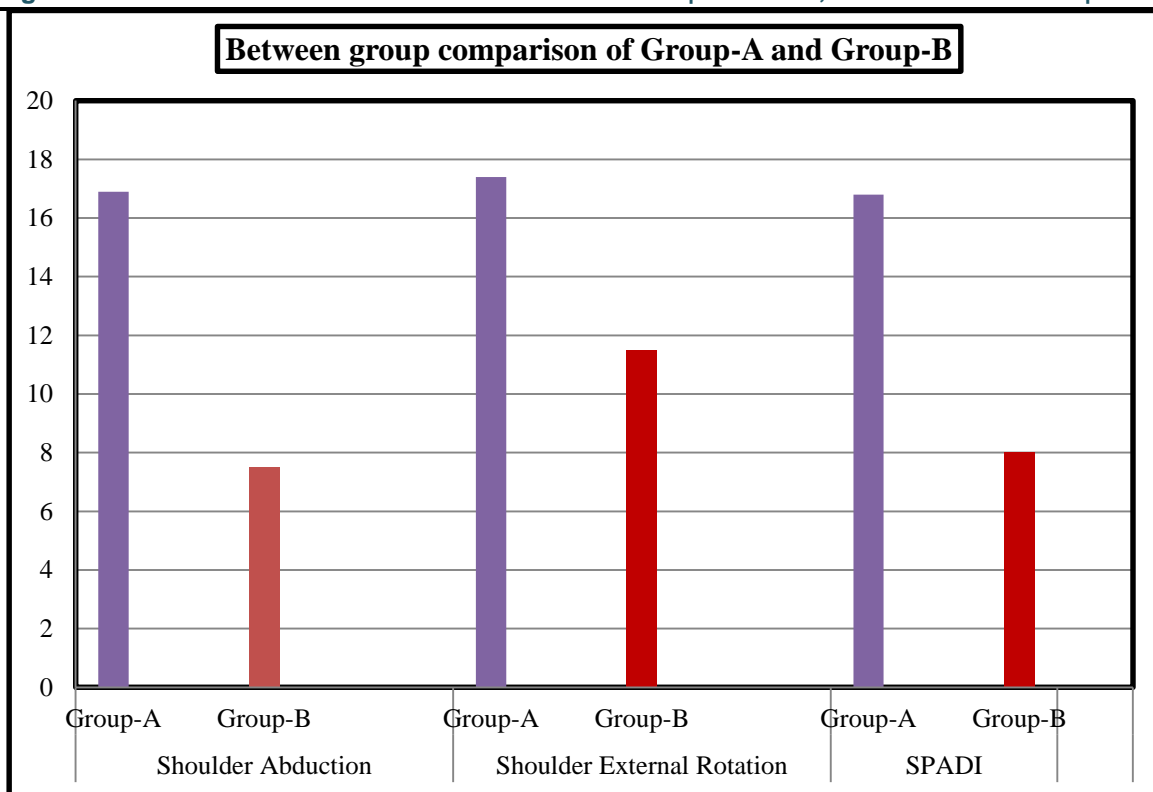


Table:4 Between group comparison of Group-A and Group-B

Outcome Measures	Groups	Mean	SD	t-value	p-value
Shoulder Abduction	Group-A	16.9	4.45	4.88	0.005
	Group-B	7.5	1.84		
Shoulder External Rotation	Group-A	17.4	2.22	6.75	0.004
	Group-B	11.5	2.79		
SPADI	Group-A	16.8	3.19	2.24	0.002
	Group-B	8	1.82		

Graph:5 Between group comparison of Group-A and Group-B



DISCUSSION

The present study was done on patients with frozen shoulder to determine effects of vibration therapy on pain, function, shoulder abduction & external rotation.

In this study shoulder pain, function was assessed by SPADI and shoulder abduction & external rotation range of motion was assessed by goniometry in patients diagnosed with frozen shoulder.

Table 1, Graph 1 & 2 describes about the age distribution of Group A & B among two groups consisting of 10 patients each, of which age ranged between 40-60 years.

Shoulder abduction of group A is described in table 2, Graph 3. In group-A the mean value post intervention increased to 146.1 from 129.2 and for group B it is describe in table 3 graph 4. The mean value post intervention for group B increased to 122.5 from 115.

Shoulder external rotation of group A is described in table 2, Graph 3. In group-A the mean value post intervention increased to 51.6 from 40.1 and for group B it is describe in table 3 graph 4. The mean value post intervention for group B increased to 58.8 from 41.4.

SPADI score of group A is described in table 2, Graph 3. In group-A the mean value post intervention decreased to 23.7 from 40.5 and for group B it is describe in table 3 graph 4. The mean value post intervention for group B increased to 34.3 from 42.3.

The tables and graphs of in between groups also showed more improvement in Group A and less improvement in Group B post intervention.

Therefore after reviewing the tables and graphs for each objective whether it may be pain , function , abduction and external rotation range of motion comparison of both groups post intervention results revealed that there is significant improvement in group B and in group A the improvement seen was highly significant.

The reduction in pain improvement in function and abduction, external rotation range of motion can be considered because of physiological effect of vibration therapy which help in reducing pain by activating superficial and deep mechanical receptors. As this is also seen in the study of Ritteveger J et.al.

So, when vibration therapy was given to the patients with frozen shoulder showed better improvement in pain reduction, improvement of function, in improving shoulder abduction and external rotation range of motion in comparison to conventional physiotherapy.

SUMMARY

The study was done to see the effect of Vibration Therapy for reducing pain, improving function and increasing ROM (specifically the shoulder abduction and external rotation).

Total 20 pts were recruited to the study between the age group of 40-60 years of age, which included both males and females. Based on the inclusion and exclusion criteria the pts were randomly divided into two groups by the concealed envelop method into Group A and Group B consisting of 10 pts in each group respectively, where both the groups received treatment for 5 days/week for 4 weeks

As outcomes the goniometry method was used for assessing the shoulder abduction and external rotation ROM and the SPADI score was taken for assessing the pain. Both the outcomes were taken prior and post intervention. The statistical analysis was done with the help of Paired t test and Unpaired t test for within and in between group analysis respectively.

The post intervention results revealed that Vibration therapy had highly significant effect on patients in comparison to the Conventional Physiotherapy alone. Thus it can be concluded that Group A treatment can be given for better results, rather than Group B treatment alone, in patients with Frozen Shoulder those complaining pain and restricted ROM of shoulder abduction and external rotation.

CONCLUSION

From above study, it can be concluded that applying Vibration Therapy treatment has great significance in improving the shoulder abduction and external rotation ROM by reducing the pain score on SPADI in the studied population than Scapular PNF. The most effective part of the treatment was adding the vibration therapy as it just not only helped in reduction of pain but because of pain reduction it helped in improving the shoulder abduction and external rotation ROM in patients with Frozen Shoulder

However patients who were given the only treatment of Conventional Physiotherapy showed less but significant improvement in comparison with vibration therapy. Thus Vibration Therapy is considered to be more effective in reducing pain and improving the joint function, as well as helps in improving the shoulder abduction and external rotation ROM in pts with pain and restricted ROM in Frozen Shoulder condition.

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