International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Effect of Task-Specific Training in Frozen Shoulder

Amey Rajaram Sawant[1], Sandeep Shinde[2]

[1]MPTh Student, Department of Musculoskeletal Physiotherapy, Krishna Institute of Medical Sciences Deemed to be University, Faculty of Physiotherapy, Karad, Maharashtra.
[2]Associate Professor, Department of Musculoskeletal Sciences, Krishna Institute of Medical Sciences Deemed to be University, Faculty of Physiotherapy, Karad, Maharashtra

Corresponding Author: Sandeep Shinde

ABSTRACT

Background: Frozen shoulder, characterized by capsular thickening and capsular adhesions leads to pain, restricted ranges and disability. Task specific training focuses on use of functional activity along with repetitions which is based on concept of motor learning. This study has been done to evaluate the effect of task specific training in frozen shoulder.
Methods: Ethical clearance was obtained from Institutional Ethical Committee, KIMSDU, Karad. 48 subjects were included in the study and were divided into two groups. Group A was treated with conventional physiotherapy treatment i.e. Hot Moist Pack, Ultrasound, Maitland mobilization and exercises and Group B was treated with conventional physiotherapy and task specific training.
Results: In pre-intervention analysis no significant difference was seen with p values for Visual Analogue Scale (VAS) of 0.7236, for Range of Motion(ROM) for flexion of 0.4270 , extension of 0.6847, abduction of 0.9805, internal rotation of 0.9779, external rotation of 0.5946 and for Shoulder Pain and Disability Index (SPADI) pre-interventional p value was 0.3652. While post-interventional analysis showed extremely significant difference was seen in p value for VAS of 0.0027. While post-interventional analysis for ROM showed extremely significant difference for flexion with $p<0.0001$, very significant difference for extension with $p=0.0065$, extremely significant difference for abduction with $p<0.0001$, significant difference for internal rotation with $p=0.0261$, and very significant difference for external rotation with $p=0.0097$ and SPADI of $p<0.0001$.
Conclusion: The study concludes that there is significant effect of task specific training in frozen shoulder.
Key-words: task-specific training, frozen shoulder, range of motion, disability, pain, motor learning

INTRODUCTION

"Frozen shoulder or adhesive capsulitis is characterized by an insidious and progressive loss of active and passive mobility in the glenohumeral joint presumably due to capsular contracture." [1] Frozen shoulder affects 2-5 % of general population, with females being affected more than males. There is also evidence of non-dominant side being affected more than dominant side. [1,2]

Frozen shoulder is categorized into three stages, stage 1 is freezing stage, stage 2 is frozen stage and stage 3 is thawing stage. In freezing stage the main symptom is pain with no marked limitation in range of motion, frozen stage shows gradual reduction in pain with marked reduction in range of motion, and thawing stage shows restoration of range of motion. [3]

Task specific training, focuses on function that has evolved out of motor learning. The basis of task specific training, is goal directed functional activities instead of focusing on impairment reduction exercises, which leads to changes in the cortical representations. Only repetition and practice is not able to produce such changes, it must be accompanied along with some functional activity. Task oriented activity

even if associated with less intensity is capable of cortical reorganization. [4] A complex interplay between internal structures as well as environment along with cognition and perception is required for performing functional tasks. [4,5]

In frozen shoulder, for changes within capsule, higher amounts of forces must be applied; so it might be a possibility that the pain and stiffness are not present only due to capsular adhesions. Pain is a subjective phenomenon, and may be present even after healing of the capsule. Several studies have been done which study effect of therapeutic options on frozen shoulder, but there is paucity of rehabilitation protocol has been made to target central system along with shoulder joint in treatment of frozen shoulder. This study has been done to find out effect of task specific training in frozen shoulder.

MATERIALS AND METHODS

The study protocol was started after being approved by Institutional Ethical Clearance Committee of Krishna Institute of Medical Sciences 'Deemed to Be' University, Karad for using human subjects in research. Informed consent was taken from all subjects before commencement of protocol.

After protocol and ethical clearance, subjects who fulfilled the inclusion and exclusion criteria were selected and 48 subjects were recruited for the study. Subjects were divided into two groups using Consecutive Sampling with Random Allocation. Informed consent was taken from each of the subject prior to participation. Instructions were given to the subjects about techniques to be performed.

Pre-Test

VAS was used to assess the pain.

Goniometer was used to assess the Range of motion.

SPADI was used to assess the disability of patient.

- Treatment protocol included hot moist pack (15 minutes), Ultrasound (7 minutes), Maitland mobilisation (10 glides in one set, 3 set in one session) and conventional exercises in Group A.
- Treatment protocol included hot moist pack (15 minutes), Ultrasound (7 minutes), Maitland mobilisation (10 glides in one set, 3 set in one session) and task specific training in Group B.
- Treatment was given for 4 weeks, 5 days/week for 45 minutes every day.

TASK SPECIFIC TRAINING:

- Exercises were taught according to the available range of the subjects.
- The tasks which were allotted were simple and related to activities of daily living.
- Three sets of ten repetition with 30 second hold were given.
- Time and repetitions were noted, the subject was encouraged using verbal and visual cues while performing the tasks.
- Participants were encouraged to complete the task in lesser time duration. The tasks were simplified or complicated by the therapist, according to the progression and in relation to environment

TASK ASSIGNED	DOSAGE
Lifting bag from low height chair	3 sets of 10 repetitions, 30 second hold at the end range
Rubbing the board with duster	3 sets of 10 repetitions in oblique direction 3 sets of 10 repetitions in horizontal direction 3 sets of 10 repetitions in longitudinal direction
Transferring objects(side)	3 sets of 10 repetitions
Switch on and off the buttons	3 sets of 10 repetitions
Placing the objects at high shelf	3 sets of 10 repetitions for flexion 3 sets of 10 repetition for abduction 3 sets of 10 repetition for horizontal adduction
Reaching an object at overhead shelf	3 sets of 10 repetitions and 30 second hold at end range
Hanging towel on overhead bar	3 sets of 10 repetitions
Overhead clapping	3 sets of 10 repetitions
Pulling out a drawer	3 sets of 10 repetitions
Transferring objects (behind)	3 sets of 10 repetitions
Combing hair	3 set of 10 repetition

STATISTICAL ANALYSIS:

The statistical analysis was done using Instat Software.

- Paired 't' test was used for statistical analysis of pre and post intervention within group.
- Unpaired 't' test was used for between group statistical analysis of Group A and Group B.

RESULTS

1. VISUAL ANALOUGE SCALE

In the present study pre-interventional mean of VAS was 8.4533±0.5107 cm in Group A and 8.5166±0.6197 cm in Group B whereas post-interventionally mean of VAS was 3.1875±1.244 cm in Group A and 2.3166±0.5045 cm in Group B. Pre-interventional analysis sho4wed no significant difference between Group A and Group B (p=0.7236). Post-interventional analysis showed very significant difference between Group A and Group B (p=0.0027)

Intra group analysis revealed statistically extremely significant for both the groups. Group A(p<0.0001), Group B (p<0.0001)

2. RANGE OF MOTION

In the present study pre-interventional mean of shoulder flexion was 77±26.033º in Group A and 83.7916±32.337º in Group B whereas post-interventionally mean of shoulder flexion was 148.1666±18.911º in Group A and 172.4583±7.774º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B (p=0.4270). Post-interventional analysis showed extremely significant difference between Group A and Group B (p<0.0001)

Intra group statistical analysis revealed statistically extremely significant for both the groups. Group A (p<0.0001) and Group B (p<0.0001)

Pre-interventional mean of shoulder extension was 31.6666±8.368º in Group A and 32.6666±8.565º in Group B whereas post-interventionally mean of shoulder extension was 46±4.354º in Group A and 49.2083±3.388º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B (p=0.6847). Post-interventional analysis showed very significant difference between Group A and Group B (p=0.0065).

Intra group statistical analysis revealed statistically extremely significant for both the groups. Group A (p<0.0001) and Group B (p<0.0001)

Pre-interventional mean of shoulder abduction was 72.1666±32.304º in Group A and 72.4166±37.950º in Group B whereas post-interventionally mean of shoulder abduction was 140.083±18.058º in Group A and 161.625±10.392º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B (p=0.9850). Post-interventional analysis showed extremely significant difference between Group A and Group B (p<0.0001)

Intra group statistical analysis revealed statistically extremely significant for both the groups. Group A (p<0.0001, t=10.753), Group B (p<0.0001, t=12.366)

Pre-interventional mean of shoulder internal rotation was 26.5416±5.626º in Group A and 26.5±4.709º in Group B whereas post-interventionally mean of internal rotation 42.125±4.758º in Group A and 45.5416±5.509º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B(p=0.9779). Post-interventional analysis showed significant difference between Group A and Group B (p=0.0261)

Intra group statistical analysis revealed statistically extremely significant for both the groups. Group A (p<0.0001, t=11.225) and Group B (p<0.0001, t=15.107)

Pre-interventional mean of shoulder external rotation was 32.25±6.867º in Group A and 31.1666±7.136º in Group B whereas post-interventionally mean of external rotation 45.0416±3.9973º in Group A and 48.583±5.055º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and

Group B (p=0.5946). Post-interventional analysis showed very significant difference between Group A and Group B (p=0.0097)
Intra group statistical analysis revealed statistical analysis revealed statistically extremely significant for both the groups. Group A(p<0.0001, t=8.241) and Group B(p<0.0001,t=14.691)

3. SHOULDER PAIN AND DISABILITY INDEX

In the present study pre-interventional mean of SPADI 105.625±10.460 in Group A and 107.625±7.240 in Group B whereas post-interventionally mean of SPADI is 23.625±6.540 in Group A and 16.666±3.714 in Group B. Pre-interventional analysis showed no significant difference between Group A and Group B (p=0.3652). Post-interventional analysis showed extremely significant difference between Group A and Group B (p<0.0001)
Intra group analysis revealed statistically extremely significant for both the group. Group A(p<0.0001,t=54.337), Group B(p <0.0001, t= 51.454)

Table no 1: INTER GROUP ANALYSIS-VAS

	Mean±SD (cm)	Median (cm)	'p'	Inference
GROUP A	3.187±1.244	3.1	0.0027	Very significant
GROUP B	2.3166±0.5045	2.1		

Table No 2: POST INTERVENTIONAL INTER GROYP ANALYSIS-ROM

	FLEXION (º)		EXTENSION (º)		ABDUCTION (º)		INTERNAL ROTATION (º)		EXTERNAL ROTATION (º)	
	Group A	**Group B**	**Group A**	**Group B**	**GroupA**	**Group B**	**Group A**	**Group B**	**Group A**	**Group B**
Mean ± SD	148.1666± 18.911	172.4583± 7.774	46±4.354	49.2083± 3.388	140.0833± 18.058	161.625±10.392	42.125± 4.758	45.5416± 5.509	45.0416± 3.973	48.583± 5.055
Median	144.50	175.00	46.50	49.00	140.0	160.0	43.00	45.00	45.00	49.50
'p'	<0.0001		0.0065		<0.0001		0.0261		0.0097	
Inference	Extremely Significant		Very Significant		Extremely Significant		Significant		Very Significant	

Table No 3 INTER GROUP ANALYSIS SPADI

	Mean±SD	Median	'p'	Inference
GROUP A	23.625±6.540	23	<0.0001	Extremely significant
GROUP B	16.6666±3.714	17		

DISCUSSION

48 subjects clinically diagnosed with frozen shoulder were included in the study with the age group of 40 to 60 years. They were allocated into two groups Group A which was conventional group and Group B being the experimental group, each containing 24 subjects.

The mean age of participants was 56.75 to 57.08, which showed no significant difference between the mean ages of the participants in both the groups. (p=0.8877) The study finding co relates with the study of Edrish Contractor which states the age group affected by frozen shoulder is between 40-60 years. [6]

The total numbers of participants were 48 out of which 27 were males and 21 were females. Group A included 14 males and 10 females and Group B included 13 males and 11 females. The present study correlates with the finding of Ankit Shrivastava which states that in frozen shoulder males are more affected than females. [7]

There was significant reduction of pain in both the groups which can be due to the physiological effects of hot moist pack, ultrasound and Maitland mobilization.

Hot moist pack is a form of superficial heating which works on the principle of conduction. It helps in pain reduction, as it reduces the muscle spindle sensitivity. This inhibition results in relaxation of stretch reflex. It has been proven beneficial for improving range, pain reduction and relaxation of the tissues. This can probably be one of the reason of pain

reduction which co-relates with the study of Chakradhar Reddy and Santosh Metgud which state that pain reduction was seen in subjects with frozen shoulder due to application of hot moist pack. [8]

The significant reduction in pain and increase in range of motion can also be attributed to the effect of Ultrasound. Numerous studies have been done to understand the effect of ultrasound on pain and range of motion. Literature states that sensitivity sensory receptors of the muscle such as muscle spindle and mechanoreceptors are affected by ultrasound which can be the reason of increase in range of motion. [9] Various reports have stated that the beneficial effects of ultrasound are due to mast cell degeneration, phagocytic proliferation of T-cells, osteoblasts and several proteins associated with inflammation and tissue repair. [10,11] The findings of the present study can be correlated with the findings of J Mahendran which compared effect of ultrasound in addition to Maitland mobilization with short wave diathermy and Maitland mobilization. The result revealed that ultrasound had better effect in pain reduction and improving range of motion in subjects with frozen shoulder. [12] Ultrasound has also shown beneficial effects in pain reduction in supraspinatus tendinitis owing to above physiological effects. [13]

The increase in range of motion, reduction in pain and disability might also be seen due to effect of Maitland mobilization. This can probably be explained due to the inhibitory effect of oscillations on the painful stimulus by stimulation of mechanoreceptors, which in turn block the pain pathways at cortical and sub-cortical levels. Maitland mobilization also produces mechanical forces which are helpful in breaking adhesions and in realignment of collagen. The findings correlate with the findings of Zaki Anwer which compared effect of graded Maitland mobilization and laser therapy in frozen shoulder and concluded that Maitland mobilization had greater effect in reduction of pain and improvement of range of motion in subjects with frozen shoulder. [14]

Also, the present study states that the experimental group showed more significant effects when compared to the conventional group. These effects can be due to the additional benefit of task-specific training.

Task specific training implies goal of training the patient using 'practice context-specific training along with some kind of feedback. [15]

Skeletal muscles show an adaptive potential which implies that they are able to modify their structure in response to changes in environment. Various reasons of reduction in the activity of skeletal muscles have been reported one of which primarily being immobility. After any injury or trauma, body creates a protective spasm around the injured area, which leads to reduced use of the affected area. [13] The soft tissues in and around the area after injury gets adapted to this change and modifies their structural response. Literature states that, after few hours of reduced mobility the muscle activity gets reduced considerably; so after prolonged reduced mobility there will be reduction in peak voluntary contraction of muscles. [14,16,17] These changes take place in the peripheral structures but also cause changes in the central circuits.

Pain and difficulty leads to non-use of the structures which leads to changes in the cortical representations. Existing literature states that motor training leads to change in the cortical motor representations within few days, and repetition along with functional movement is the key to these changes. These changes can be related to neuronal plasticity, which is the ability of the neurons in the brain to adapt to alteration in structure as well as function secondary to internal and external stimuli. It is applicable to central nervous system with or without brain damage. [17]

This can be probably due to the micro stimulation which occurs after training and helps in performing complex combinations and helping in co-contraction

of the skeletal muscles. When task specific training is given to the subject, he is given a goal to achieve, and when he performs the activity there is an interplay between the cognitive function, learning, memory and emotions. After several repetition and modification of the environment when the subject is able to achieve the goal, there could be possible cortical reorganization. This implies that the changes in cortex are learning dependent and not only use dependent. [16,17] This can probably be the reason of the additional effects seen in the experimental group. The findings co-relates with the study of Bove AM which studied the effect of task specific training in chronic knee pain and stated that task specific training was effective in reducing pain when compared to conventional physiotherapy. [18]

CONCLUSION

The study provides evidence to use task specific training along with conventional physiotherapy techniques in reducing pain, improving range and decreasing disability in frozen shoulder.

ACKNOWLEDGEMENT

We acknowledge Dr. G. Varadharajulu Dean, Professor KIMSDU, Dr. Sandeep Shinde Associate Professor KIMSDU for constant support and guidance and Dr. SV Kakade for statistical help.

REFERENCES

1. Yatheendra kumar G, S. Sudhakar, aitha Yashvanth, Siva Jyothi, Effect of high grade mobilization techniques and scapular stabilization exercises in frozen shoulder; IJPESH, 2015, 2(1): 80-83
2. Zuhaira Faraqu S, Abid Mehdi Kazmi, Effect of mobilization in sun-acute and chronic frozen shoulder management, European International Journal of Science and Technology, Vol4(8), 120-129.
3. Tighe CB, Oakley WS; Prevalence of diabetic condition and adhesive capsulitis of the shoulder, South Med Journal, 2008; 591-595
4. Mulder T, A process oriented model of human motor behavior: toward a theory-based rehabilitation approach, Phys Ther 1991; 71: 157-64
5. Schmidt RA, Lee TD; Conditions of practice, Motor control and learning, Edition three, 1999; 285-321
6. Edrish Saifee Contractor, Dhara Santosh Agnihotri, Ronak Mukeshbhai Patel;Effect of Spencer Muscle Energy Technique on pain and functional disability in cases of adhesive capsulitis of shoulder joint, IATM,2016; 3(8);126-131.
7. Ankit Shrivastava, Ashok K Shym, Shaila Sabnis, Parag Sancheti; Randomised Controlled study of Mulligan's versus Maitland Mobilization Technique in Adhesive Capasulitis of shoulder joint, Indian Journal of Physical Therapy and Occupational Therapy-An International Journal,2011 5(4),12-15.
8. Chakradhar Reddy, Santosh Metgud A randomized controlled trial to investigate the effect of mulligans mwm and conventional therapy in Stage 2 Adhesive Capsulitis, Indian Journal Of physical Therapy, 2015,Vol 3(1) 55
9. Katsuyuki Morishita , Hiroshi Karasuno, Yuka Yokoi, Kazunori Morozumi, Hisayoshi Ogihara; Effects of therapeutic ultrasound on range of motion and stretch pain,2014, J Phys. Ther Sci. 26: 711-715.
10. Anderson DW, Barrett JT, Depression of phagocytosis by ultrasound, Ultrasound Med Biol, 7(3): 267-73.
11. Doan N, Reher P, Meghji S, Harris M, In vitro effects of therapeutic ultrasound on cell proliferation, protein synthesis, and cytokine production by human fibroblasts, osteoblast and monocytes, J Oral Maxillofac Surg. 1999 Apr; 57(4), 409-19
12. J Mahendran, A.N Sundaresan, Gowrishanakr Potturi, P.D. Karthikeyan, Efficacy of ultrasound with maitland mobilization over short wave diathermy with maitland mobilization in improving the functional performance of patients with periarthritis shoulder, International Journal of Physiotherapy and Research, 2014, Vol 2(4): 621-25
13. Diksha Uparkar, Sandeep Shinde, Effect of movement with mobilization in supraspinatus tendinitis, 2017, International Journal of Science and Research, 6(2); 673-676.
14. Zaki Anwer, Suraj Kumar; The role of GD Maitlndand Laser in Adhesive Capsulitis,

International Journal of New Technology and Research,2017,3(10), 12-17
15. Morrissey MC, Harman EA, Johnson MJ, Resistance training modes, specificity and effectiveness; Med Sci Sport Exerc, 1995; 27, 648-60.
16. Kleim JA, Jones TA, Principles of experience-dependent neural plasticity: implications for rehabilitation after brain damage, J speech Lang Hear Res,2008, 51: 225-239
17. Randolph J Nudo, NeuroRx: The Journal of American Society for experimental NeuroTherapeutics Plasticity, 2006,3;420-427.
18. Bove AM, Baker N, Livengood H, King V, Mancino J, Popchak A, Fitzgerald GK; Task-specific training for adults with chronic knee pain: A case series, International Journal of Physiotherapy Research, 2014, Vol2(4); 621-25.

How to cite this article: Sawant AR, Shinde S. Effect of task-specific training in frozen shoulder. Int J Health Sci Res. 2019; 9(6):149-155.

******