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Original Research Article

To study the effects of exercise therapy regimes on pain, range of motion and function in patients of frozen shoulder.

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Abstract:
The aim of the study is to study the effects of exercise therapy regimes on pain, range of motion and function in patients of frozen shoulder. Both groups were given passive or active assistive ROM and pulley exercises led by physiotherapists at minimum pain level. After exercises and 20 min of TENS, a cold pack was applied in the clinic. Depending on the pain status of the patient, active assistive ROM exercises were given as home program, and cold application was added to the home program in periods of 15 min 3 times a day. Patients were also given nonsteroidal antiinflammatory drugs (NSAIDs). Scapulothoracic dyskinesis should be assessed, and myofascial trigger points and muscle imbalance should be considered a result of shoulder pain in planning and assessing treatment programs.

Keywords: exercise, therapy, pain & frozen shoulder.

Study Designed: Prospective Observational Study.

1. INTRODUCTION

The expression "If you don't use it you loose it" applies perfectly to diseases of the shoulder because any voluntary or involuntary guarding of the shoulder may result in loss of mobility[1].The shoulder is the most movable but unstable joint in the body because of the range of motion it allows. It is easily to subject to injury because the ball of the upper arm is larger than the socket that holds it. To remain stable, its muscles, tendons and ligaments must anchor the shoulder[2].

Shoulder pain and stiffness are common presenting symptoms in patients who seek evaluation from musculoskeletal physicians. A common quandary with this set of complaints exists in determining the cause and effect cycle of the symptoms[3]. It is often difficult to establish which came first and whether pain results from stiffness or produces it. To answer these important questions thorough understanding of the differential diagnosis and pathophysiology of shoulder stiffness is necessary[4].

Frozen shoulder is a pathology of often unknown aetiology characterized by painful and gradually progressive restriction of active and passive glenohumeral joint motion (Pearsall and Speer,1998).Approximately 2-3% of adults aged between 40 and 70 years develop frozen shoulder with a greater occurrence in women (Connolly,1998). Full or partial restoration of motion may occur over months or years with or without medical intervention[5].

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2. MATERIAL & METHOD

The patients provided written informed consent.
The patients were divided randomly into two groups. The exercise programs of the groups were as follows:
Group I: Glenohumeral ROM exercises.
Group II: Glenohumeral ROM and scapulothoracic exercises.
The results of the treatment were evaluated with modified Constant score and visual analogue scale (VAS) before the beginning of the treatment and at 6 and 12 weeks; ROM (flexion and internal and exter- nal rotation) was measured with a goniometer passively at the same intervals. Since the patients had limited movement and abduction <90° in shoulder before the treatment, the strength parameter could not be assessed; hence the modified Constant score was used.[14]
The clinical phase of frozen shoulder was determined for each patient, and a 6-week (30 sessions) treatment approach was planned accordingly.
The intensity of scapulothoracic exercises was gradually increased. Exercises were as follows:

1. Scapular retraction with exercise band
2. Extension with exercise band
3. Scapular adduction and elevation
4. Wall, table, and floor push-ups
5. Scapular stabilization with exercise ball in upright standing position
6. Scapular adduction in prone position
7. Extension in prone position
8. Scapular protraction in supine position
9. Push-up in sitting position
10. Scapular abduction in upright standing position

Both groups were given passive or active assistive ROM and pulley exercises led by physiotherapists at minimum pain level. After exercises and 20 min of TENS, a cold pack was applied in the clinic. Depending on the pain status of the patient, active assistive ROM exercises were given as home program, and cold application was added to the home program in periods of 15 min 3 times a day. Patients were also given nonsteroidal antiinflammatory drugs (NSAIDs).
The intensity of the exercises was increased gradually, depending on the functional and pain status of the patients. In addition to the exercises in the clinic, the patients were also given self-stick exercises, posterior and inferior capsule stretching exercises, flex- ion, scapular elevation, and internal and external rotation exercises. Besides manual stretching exercises, proprioceptive neuromuscular facilitation (PNF), and phase I gliding exercises were assisted by physiotherapists, and stick exercises and self- stretching exercises were given as home program. TENS and cold applications were continued.
In addition to the exercises given to group I, the second group received additional exercises such as scapulothoracic strengthening (serratus anterior, middle and lower trapezius, latissimus dorsi), upper trapezius stretching, and postural exercises.
From the beginning of the 5th week of the treatment, the dose of the stretching exercises was increased in both groups considering pain levels of the patients. TENS and NSAID were terminated. Cold pack was applied only when the patient had pain. The frequency and intensity of the scapulothoracic exercises for group II were increased.

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The exercises were carried out once a day and 5 times a week in the clinic under the supervision of a physiotherapist. In addition patients followed the exercise program at home twice daily with 20 repeats.
Comparison between groups was made using the Mann-Whitney test, and the Wilcoxon signed rank test was used to evaluate the groups separately.
The patients were assessed at day 0 – before starting the treatment
And at week 6 at the end of the treatment.

Inclusion criteria:
1. Male female both patients.
2. 40-60 years of age
3. Dominant hand
4. ROM in external rotation, abduction, and flexion less than 50% in com- parison to the other shoulder;
5. normal radiography (anteroposterior, lateral);

Exclusion criteria:
1. Radiculopathy,
2. thoracic outlet syndrome,
3. rheumatologic disorders,
4. fractures and tumors of the upper extremity,
5. neurological disorders causing muscle weakness in the shoulder.

3. RESULTS

Table No. 1: Pain Score

	Group 1 – Week 1				**Group 2 – Week 1**			
	Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum
Pain Score	3.0000	1.41421	1.00	5.00	2.8800	1.42361	1.00	5.00

	Group 1 – Week 6				**Group 2 – Week 6**			
	Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum
Pain Score	12.4400	1.29357	10.00	15.00	12.1200	1.36382	10.00	14.00

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Table No. 2: Activities of daily living

	Group 1 – Week 1				Group 2 – Week 1			
	Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum
Disturbed Sleep	.9600	.67577	0.00	2.00	1.0000	.64550	0.00	2.00
Normal Daily Work	1.2000	.81650	0.00	2.00	1.1600	.74610	0.00	2.00
Normal recreational avtivity	1.8800	.83267	1.00	4.00	1.7200	.93630	1.00	4.00
Level of hand use	5.5200	1.66132	2.00	8.00	5.6800	1.49220	2.00	8.00

	Group 1 – Week 6				Group 2 – Week 6			
	Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum
Pain free ROM F	1.9200	.27689	1.00	2.00	1.7600	.43589	1.00	2.00
Pain free ROM Ab	3.7600	.43589	3.00	4.00	3.8000	.40825	3.00	4.00
Pain free ER	3.8000	.40825	3.00	4.00	3.7200	.45826	3.00	4.00
Pain free IR	9.2800	.97980	8.00	10.00	9.4400	.91652	8.00	10.00

Table No. 3: Movement

	Group 1 – Week 1				Group 2 – Week 1			
	Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum
Disturbed Sleep	6.5600	.91652	6.00	8.00	6.9600	1.01980	6.00	8.00
Normal Daily Work	5.7600	1.45144	4.00	8.00	6.0000	1.52753	4.00	8.00
Normal recreational avtivity	2.7200	.97980	2.00	4.00	2.5600	.91652	2.00	4.00
Level of hand use	2.1600	1.40475	0.00	4.00	1.8400	1.28062	0.00	4.00

	Group 1 – Week 6				Group 2 – Week 6			
	Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum
Pain	9.6800	.74833	8.00	10.00	9.5200	.87178	8.00	10.00

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free ROM F								
Pain free ROM Ab	9.5200	.87178	8.00	10.00	9.6800	.74833	8.00	10.00
Pain free ER	9.5200	.87178	8.00	10.00	9.8400	.55377	8.00	10.00
Pain free IR	9.3600	.95219	8.00	10.00	9.9200	.40000	8.00	10.00

Table No. 4: Constant Murley Score (100)

Group 1 – Week 1					**Group 2 – Week 1**			
	Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum
Sum of Points	29.7600	5.34072	21.00	40.00	29.8000	4.03113	23.00	36.00

Group 1 – Week 6					**Group 2 – Week 6**			
	Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum
Sum of Points	69.2800	3.00721	64.00	75.00	69.8000	2.73861	61.00	74.00

4. DISCUSSION

Both groups showed improvements in VAS, modified Constant score, and ROM. Using scapulothoracic exercises in addition to glenohumeral ROM exercises in the second group resulted in significant improvements in VAS at 6 weeks and flexion ROM at 12 weeks.

Pain management is the primary concern in treatment during the first phase of frozen shoulder; improvement in ROM is the goal of the second and third phase[6]. In addition, a careful history to distinguish between primary and secondary frozen shoulder is important in planning treatment. In this study there were 10 patients with primary frozen shoulder and 4 patients with secondary frozen shoulder in group I, and 5 patients with primary frozen shoulder and 10 patients with secondary frozen shoulder in group II[7].

There are many treatment options for treatment of frozen shoulder. It has been shown that cold pack, NSAIDs, TENS, corticosteroids and intra-articular injections to reduce synovial inflammation are effective in the early phase of pain management of frozen shoulder.[15-17] In our study, cold packs, NSAIDs, and TENS were used for pain control. When pain was reduced in the second phase, the goal was to achive increasing ROM and muscle strength. There are many methods of increasing ROM. Callinan et al[8]. studied the effectiveness of

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hydroplasty and therapeutic exercises and concluded that they were effective when used together. In another study with a 4-week rehabilitation program, pain was diminished and muscle strength was increased.[9] In our study, pain was reduced and ROM was improved in both groups at 6 and 12 weeks. Muscle strength was not evaluated before treatment because of pain; it was therefore not assessed at 6 and 12 weeks[10].

5. CONCLUSION

Scapulothoracic dyskinesis should be assessed, and myofascial trigger points and muscle imbalance should be considered a result of shoulder pain in planning and assessing treatment programs.

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