

Conservative Treatment can reduce the Rate of Arthroscopic Subacromial Decompression Surgery: A Randomised Control Trial

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ABSTRACT

OBJECTIVE: To relieve symptoms of subacromial pain syndrome, and associated upper limb functional limitations to reduce the need for arthroscopic subacromial decompression surgery for grade I, II-tendinopathy by using a well-developed conservative treatment plan.

METHODOLOGY: A randomized control clinical trial was performed on 100 patients suffering from subacromial pain syndrome in November 2020. Patients with failed previous pharmacological treatment and interest for subacromial decompression surgery were screened and selected after filling inclusion criteria (long-standing shoulder pain due to grade I, II supraspinatus tendon calcification diagnosed on radiograph, and upper limb functional limitation), randomly divided into two groups, the intervention group (n=50), and control group (n=50). The patients in the intervention group received moist-heat for 10 minutes, and isometric exercises, non-steroidal anti-inflammatory drugs twice a day for 12 weeks, then progressive resistance exercises along with medicine up to 24 weeks. The patients in the control group received routine medication or continued conventional remedies. The intensity of pain was measured by a numeric rating pain scale, and upper limb functional activities were measured by the disability of arm, shoulder, and hand index before and after treatment.

RESULTS: Disability of arm, shoulder, and hand index score showed a significant improvement in upper limb functional activities (<0.05) in the intervention group after 12 and 24 weeks. Similarly, a significant improvement in pain intensity was observed in the intervention group (<0.05) after treatment compared to the control group.

CONCLUSION: It was concluded that conservative treatment reduced shoulder pain, upper limb disabilities by improving upper limb functional capacity in subacromial pain syndrome patients.

KEYWORDS: Subacromial pain syndrome, Arthroscopic subacromial decompression surgery, arms shoulder and hand disability index, Pain rating scale

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INTRODUCTION

Shoulder pain is a common problem affecting most populations during their lifetime. The prevalence and incidence evaluation of pain faced many difficulties as different selection criteria, classification, terminologies used for disorders, a diagnostic procedure like x-ray or ultrasound, and different risk factors affect the requirements². According to an estimation, 50% of the United States population having one episode of shoulder pain once in a year due to either one underlying pathology, two pathologies, and a very few presented with more than three pathologies at one time. Pathologies reported as Acromio-Clavicular joint arthritis, supraspinatus tendon calcification/degeneration, rotator cuff full or partial thickness tear, traumas, rheumatoid arthritis, and an effusion of Subacromial bursae³. Mechanical compression and degeneration of supraspinatus tendon in subacromial space during arm elevation activities called subacromial pain syndrome, a most common cause of shoulder pain in young adults and athletes.

Recently, shoulder muscle imbalance considered as a cause of subacromial pain syndrome, as abnormal muscle tightness reduced posterior tipping or tilting of the scapula, as well as decrease elevation during overhead movements, maybe a source of pain, inflammation, impingement of soft tissues in subacromial space, and reduced functional capacity of the upper limb⁴. Weakness of rotator cuff by repetitive elevation activities led to decrease stability and disturbed movement rhythm in shoulder girdle joints. Alteration of the biomechanical rhythm of joints may increase the chances of inflammation of tendon or bursa in subacromial space⁵.

Early diagnosis and treatment may be helpful in the prevention of further impairments. Treatment of shoulder pain syndrome included conservative approach^{6,7} and surgical repair⁸ focused on restoring full range of motion, improving rotator cuff strength, scapular stability, and reducing pain and discomfort⁹. The exercise showed long-term and short-term improvement in pain, ROM, and functional capacity of

the patient^{10,11}. Exercises are helpful as conservative treatment and helped in the postoperative recovery of Subacromial pain syndrome¹². Evidence suggested that surgery results in reduced pain and improved shoulder functions were temporary and unsatisfactory for the long run¹³. Different therapeutic exercises were reported previously but lacked proper intensity, duration, and mode of exercises. It was hypothesized that if muscle weakness is the leading cause of subacromial pain syndrome, then strengthening of muscles and regaining normal movement mechanism could be the recovery. A conservative treatment plan grounded on evidence-based exercises was devised in current study, targeting weak shoulder muscles to mitigate symptoms to avoid surgical procedures.

METHODOLOGY

A randomized control clinical trial was conducted to investigate the role of well-developed conservative treatment in alleviating symptoms of subacromial pain syndrome in grade I, II tendinopathy. For this purpose, the subjects were recruited having shoulder pain with failure of previous conservative treatment. They were considering subacromial decompression surgery as a final treatment option. For this purpose, 129 patients were screened based on inclusion criteria. One hundred patients were chosen from the orthopedic department of DHQ hospital, Niazi Medical Complex, Bajwa trauma center, Sadiq hospital, Faiz memorial orthopedic hospital, in November 2020 and randomly divided into two groups: intervention (n=50) and control group (n=50).

Study inclusion criteria were; Shoulder pain on rest, with movement during arm elevation activities that last >6 months, and was not relieved by medicine. Grade I & II supraspinatus tendon degeneration (calcification) diagnosed by radiographs, and constant Murley shoulder score >40. Moreover, two out of four physical diagnostic tests for subacromial pain syndrome were positive: Neer test, Hawkins-Kennedy test, painful arc, and job's sign.

Grade III tendon degeneration is only treated by subacromial decompression surgery. Patients who were suffering from shoulder joint pain due to osteoarthritis, rheumatoid Arthritis, and frozen shoulder were also excluded.

The intervention included moist heat for 10-mins on the affected area and oral NSAIDs twice a day throughout the treatment duration. In the exercise regimen each patient was asked to perform repetitive isometric contractions for 6-10 seconds, 10 to 20 repetitions/day for 5-6 days/week upto 12 weeks¹⁴. From 12- 24 weeks, patients were assigned to perform progressive resistance exercise (PRE) 5days/week. For training protocol, ten repetitions maximum observed in all participants in the interventional group, then 40% of 10RM was the primary workload for all participants¹⁵. This load was progressed 10 percent at

the end of every 3-week up to 24weeks. Control group patients were provided with no specific treatment but asked to continue their conventional treatment. Disability of arm, shoulder, and hand (DASH) score was used to assess the functions of the upper extremity, and numeric rating pain scale to assess pain intensity at baseline, and at end of 12 and 24 weeks of treatment in both groups.

The patients were given verbal detail of the whole study and were asked to sign an official consent form. A local institutional ethical committee approved the study according to the Helsinki accord.

The data was illustrated as mean and standard deviation. To compare the changes independent variables between intervention and control groups over time, repeated measure analysis of variance (ANOVA) was used. The P-value was set to be significant at < 0.05.

RESULTS

Most of the participants were females (57%). The mean age of the participants was 39.74± 4.9 years. Analysis of Disability of arm, shoulder, and hand scores revealed a significant improvement in functional capacity in the intervention group at 12 and 24weeks compared to the control group (<0.05). (Table I & Figure I)

TABLE I: ANOVA TEST, DISABILITY OF THE ARM, SHOULDER, AND HAND SCORE

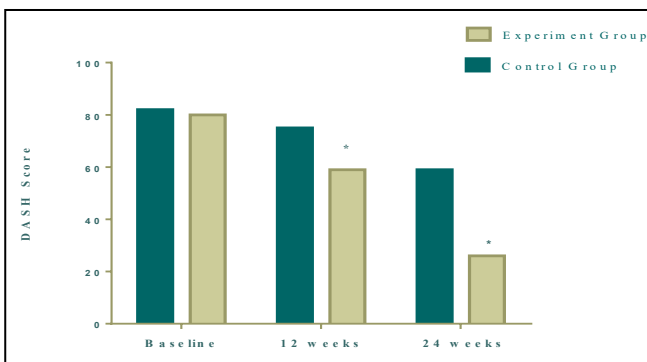
		Sum of Squares	Df	Mean Square	F	Sig.
DASH score at baseline	Between Groups	.427	1	.427	.819	.367
	Within Groups	77.147	148	.521		
DASH score after 3 Months	Between Groups	30.827	1	30.827	48.563	.000
	Within Groups	93.947	148	.635		
DASH score after 6 Months	Between Groups	82.140	1	82.140	197.606	.000
	Within Groups	61.520	148	.416		

The intensity of pain decreased from baseline to 12 and 24 weeks after conservative treatment compared to the control group (**Figure II**).

DISCUSSION

Muscle weakness resulted in shoulder pain syndromes, and strengthening might be reversed the problem. Resistance exercises improved muscle endurance, increased work performance, delayed fatigue, and increased shoulder stabilizer muscle strength. Although surgical treatment has increased significantly in developed countries, few studies comparing exercise treatment with surgical treatment

FIGURE I: DASH SCORE IN EXPERIMENT AND CONTROL GROUP AT BASELINE, 12 AND 24 WEEKS



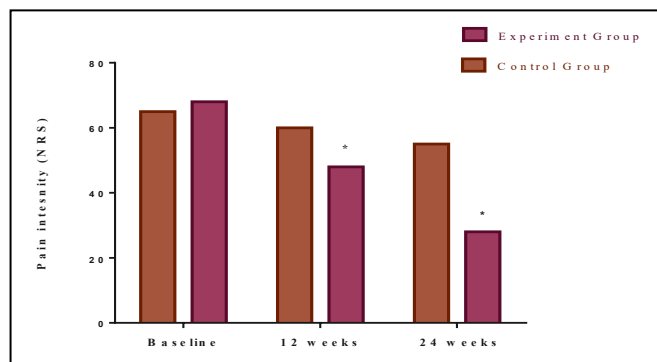
*Significant difference compared to baseline

in Grade I and II supraspinatus tendon calcification found that the outcomes were nearly equal. A well-developed conservative therapy with a detailed description of the content, dosage, and progression to treat patients with shoulder pain in clinical practice may be effective in subacromial pain syndrome or impingement syndrome and reduced the need for surgical interventions in mild cases. However, the role of arthroscopic decompression surgery cannot be denied in cases of severer tendon degeneration or grade III calcification of the supraspinatus tendon-induced subacromial pain syndrome.

The surgical approach mainly used for impingement syndrome was arthroscopic decompression surgery, which showed good recovery in patients¹⁶. The prognosis of arthroscopic decompression surgery was determined to be dependent on the patient's baseline condition. However, in a very deteriorating shoulder condition, arthroscopic decompression surgery resulted in a good prognosis^{8,17}. The severe degeneration of subacromial soft tissues is an indication that surgery is required¹⁸. Studies also determined that grade 3 tendon pathology was considered for surgical treatment but grade 2 or less tendinopathy showed the same recovery rate after surgery or conservative treatment^{19, 20}. The same baseline criteria were used in the selection of participants in the current study (patients with Grade-I, II tendinopathy were considered for conservative therapy). Two methods were used to label the stage of tendon injuries. A constant shoulder score >40 designated supraspinatus tendon pathology in grade-I or II, and tendon calcification was also confirmed by shoulder joint x-rays. Constant score <40 indicates grade-3 tendon degeneration/calcification, which was only reversed by surgery.

Evidence suggested that outcomes of surgical procedures were not satisfactory for improving functional capacity in case of subacromial pain syndrome however helped in reduction of pain.

FIGURE II: PAIN INTENSITY IN CONTROL AND INTERVENTION GROUP AT BASELINE, 12 AND 24 WEEKS



*Significant difference compared to baseline

Improvement of functional capacity was well appreciated in the case of movement rehabilitation conservative regimen¹³. Exercises have a role in the recovery after surgery. Patients who had subacromial decompression surgery must follow postoperative exercises for full retrieval of joint functions⁴. Exercises used for shoulder pain syndrome^{12,21} consisted of resistance exercises, active ROM²², and stretching exercises²³ helpful in relieving shoulder pain. As it was evidenced that ASD surgery must follow some exercise regimen to regain full recovery, as well while comparing results of both conservative and surgical treatment showed same recovery rate in case of minor tendinopathy induced shoulder pain proved the role of rehabilitation exercises. However, no data is available about specific exercise therapy with complete dosage and duration. In the current trial, participants were prescribed fully planned muscle strengthening exercise therapy to regain muscle stability and normal joint mechanics. It was determined that pain was relieved and shoulder joint functional capacity had improved at end of therapy. However, patients with pain avoided dynamic exercise, so isometric exercises (exercises without movement) were introduced at the start of the treatment session then moved towards dynamic progressive resistance exercises. All patients were carefully diagnosed and then assigned for intrusion. Still, there are some reservations that unsupervised home-based exercise programs gave the same result as those for supervised exercise programs²⁴. To alleviate this apprehension, various follow-ups were scheduled, and participants were evaluated not only on their performance but also on their satisfaction with home-based exercise performance. Follow-ups were carefully performed, and attention was paid to any questions about their shoulder condition, exercise program, and any other concerns they wanted to discuss. The current study showed that progressive resistance exercises provide a righteous alternative to relieve pain and regain

shoulder joint functional capacity for patients who were reluctant to go for surgical treatment as an invasive procedure followed by time taking healing procedure. It was estimated that a conservative treatment plan emphasizing the strengthening of shoulder rotator cuff muscles improved shoulder stability, and glenohumeral rhythm, and relived symptoms of subacromial pain syndrome.

CONCLUSION

Well-planned resistance exercises along with heat therapy and medicine relived shoulder pain, improved upper limb movement, and functional capacity. Moreover, it can reduce the rate of arthroscopic subacromial decompression by surgery in the subacromial pain syndrome.

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Basharat A: Conception, designing, and drafting
Qamar MM: Statistical analysis and interpretation of data
Javaid M: Conception, designing, and drafting
Ali Sajid: Literature writing, data collection
Basharat S: Literature writing, data collection
Ali M: Statistical analysis and interpretation of data

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