

Exercise therapy mitigate symptoms of subacromial pain syndrome

Ayesha Basharat,¹ Muhammad Ramzan,¹ Sajid Ali,² Muhammad Mustafa Qamar³
Mariam Javaid,⁴ Muhammad Ali⁵

¹Department of Physical Therapy, SMC, UOS, ²Punjab Institute of Neuroscience, LGH Lahore, ³Department of Allied Health Sciences, University of Sargodha, ⁴DHQ Hospital, Khushab and ⁵University of Illinois, USA

Objective: To evaluate the efficacy of well-prescribed resistance training in pain management and quality of life in patients with subacromial pain syndrome.

Methodology: This randomized control trial included 150 patients who were randomly allocated into the experimental group (EG) and control group (CG). The control group had home-based exercise program 1) Multiangle isometric and progressive dynamic resistance exercises and heat therapy. The experimental group received supervised exercise sessions at the start and then at the end of 3rd month for a change in an exercise program from isometric to dynamic resistance exercise up to 6-months. The control group was not assigned with any planned

exercise therapy regimen. Outcomes were measured as pain by using visual analog scale and quality of life by modified SF – 36 scale and shoulder movements by constant Murley score.

Results: Pain improved (6.81 ± 1.67 to 2.90 ± 1.36) measured on a visual analogue scale. Constant shoulder score increased from 57% to 89%. Quality of life had significant improvement ($p < 0.05$) in experiment group as compared to control group.

Conclusion: Multiangle isometric exercise and dynamic progressive resistance training reduced subacromial pain and improved quality of life.

Keywords: Subacromial pain syndrome, isometric exercises, dynamic resistance exercises, pain, quality of life.

INTRODUCTION

Upper extremity disorders are a major problem in the modern world and create a substantial economic burden for health care.¹ A systematic review found prevalence of upper extremity disorders as one time (point) prevalence of 1 – 53% and 12 month prevalence of 2 – 41%, and lifetime prevalence of 29%.² Shoulder pain is common,^{3,4} and second most serious problem in general population,⁴ and 41% associated with reduced work capacity suffered from mild to moderate shoulder pain.⁵ Causes include vascular degeneration in the rotator cuff tendons,⁶ structural variations in the acromion or humeral head, degenerative hypertrophic changes of AC joint; or tropic changes in coracoacromial arch.⁷ Changes in clavicle or scapula orientation during movement and increased antero-superior humeral head translations are examples of biomechanical factors.^{8,9}

Different clinical modalities have been used to treat shoulder pain syndrome.¹⁰ The main focus is to regain joint stability and normal mechanics during the full range of movement. Remedies include conservative treatment,¹¹ exercise therapy, manual therapy,¹² steroid injection,¹³ and surgical procedures.¹⁴ The current study has provided a detailed description of strength training program and investigated if a well-planned exercise program effectively reduces subacromial pain and

improves the quality of life (QOL) in patients suffering from subacromial pain syndrome.

METHODOLOGY

We screened 175 patients; out of which 150 were selected from the orthopedic department of different hospitals in Sargodha city. A total of 80 patients had left study due to personal reasons. The participants provided a written informed consent. Patients were randomly divided into control and experimental group by using the lottery method. Inclusion criteria were constant Murely score > 40, age 30 – 50 years and shoulder pain with positive Painful Arc Physical diagnostic test 4 for subacromial pain syndrome. Patients with loss of flexion, elevation, an abduction that indicated rotator cuff full-thickness tear, osteoarthritis of shoulder joint/ acromioclavicular joint, previous fracture or surgical history, malignancy, RA, hypermobility due to ligament damage, frozen shoulder, shoulder corticosteroid injection in last two months were excluded from the study.

In the experimental group ($n = 75$), patients were assigned to perform a well-prescribed exercise regimen along with 10 minutes of heating of the shoulder joint. The exercise regime consisted of multiangle isometric exercise (at 40° & 60° ROM with 18 – 20 repetitions)

for 3-months and then progressed to dynamic resistance exercise¹⁵ (from 3rd month to end of treatment) of shoulder stabilizers' (rotator cuff, deltoid, retractors and elevator). For this purpose, 8RM was observed with 2lb, 3lb, 4lb weight, and an average calculated was 2.5lb at 8RM at start of dynamic resistance training to end of 4th month, which was progressed to 15RM with 2.5lb weight till the end of 5th month, 20RM with the same weight at the end of 6th month. This progression in dynamic resistance exercises was made based on the improvement of pain measured by the VAS scale. Patients in the control group had no planned physical therapy regimen.

Outcomes measured were pain using VAS (0 – 10), quality of life using modified SF-36 scales, and shoulder movement by CM-score, at baseline, after three months and six months in both groups.

Statistical Analysis: Data were analysed using SPSS version 22. ANOVA was applied on data after testing normality of data. $p < 0.05$ was considered significant.

RESULTS

Constant Murley score increased from 57% to 89% in EG group as compare to CG (CMscore 64%). ANOVA showed significant ($p = 0.00$) improvement in pain intensity (Fig. 1). Significant improvement in the modified SF – 36 scale score in EG indicated the enhanced QOL (Fig. 2).

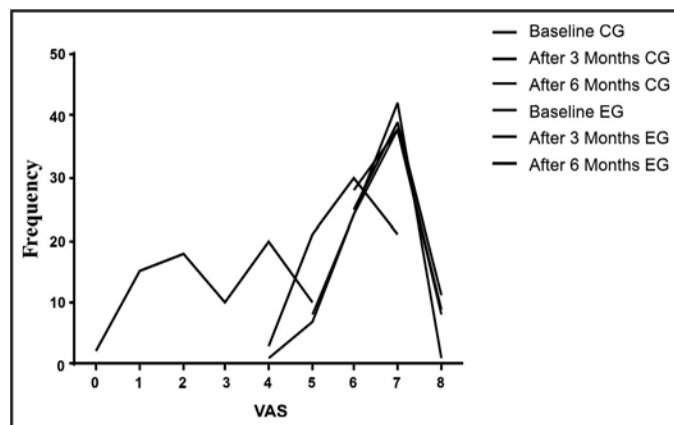


Fig. 1: Intensity of pain in control and experimental group at different time points.

Patients showed improvement in all activities, as opening and closing of jar 95%, writing 89%, floor and wall washing 74%, bathing own back 67%, recreational activities 73%, and sleeping improved to 91% at the end of treatment. It was determined that 60% of patients in EG could easily perform overhead activities after treatment compared to CG. The score increased 34%

and 57%, in the EG group indicating improvement of activities of daily living.

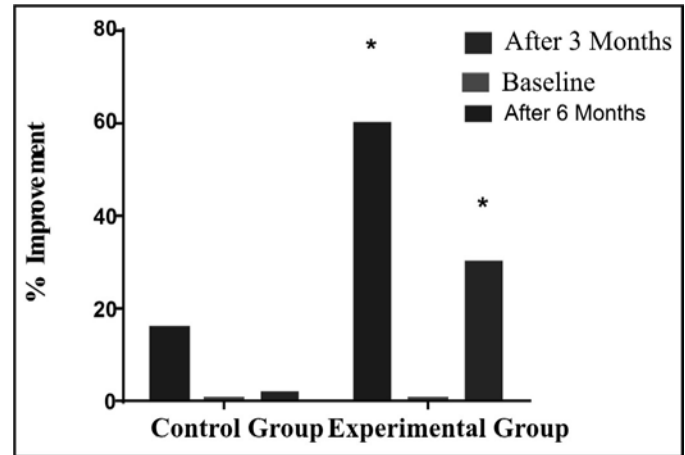


Fig. 2: Control and experimental Groups.

DISCUSSION

Exercises are the natural ways to improve functional disorders, and if used correctly and fully planned, provide very dynamic results and surgery can be avoided. The exercise program used in the present study was based on the theory that if muscle weakness may cause impingement pain syndrome, then strengthening these muscles can revert the situation. The effectiveness of resistance exercise therapy was not fully clear in shoulder joint pain conditions,¹⁵ and many studies suggest different exercise regimes in subacromial pain syndrome.¹⁶

Mechanical, physical and psychological factors caused shoulder pain syndrome by reducing subacromial space and caused mechanical irritation of soft tissue under that space.¹⁷ Muscle upper trapezius helps elevators in movement. These muscles are stabilizers to keep normal joint mechanics, but the imbalance of these may result in impingement of tissues.¹⁸ As exercises improved muscle weakness and performance as well associated glenohumeral rhythm with dealing with impingement. Exercises improve the stability of joints by maintaining normal joint mechanics. Isometric exercises were used previously in rehabilitation programs to improve muscle strength.¹⁹ Resistance exercises were used to gain muscle strength by bringing changes at gross and microscopic levels.²⁰ Conservative treatment primarily focused on strengthening shoulder muscles to improve joint mechanics during functional activities.

CONCLUSION

Multiangle isometric exercise and dynamic progressive

resistance training reduced Subacromial pain and improved quality of life.

Author Contributions:

Conception and design: Ayesha Basharat, Muhammad Mustafa Qamar.
Collection and assembly of data: Ayesha Basharat, Muhammad Ramzan.
Analysis and interpretation of data: Muhammad Mustafa Qamar, Muhammad Ali.
Drafting of the article: Ayesha Basharat.
Critical revision of article for important intellectual content: Muhammad Ramzan.
Statistical expertise: Sajid Ali, Muhammad Mustafa Qamar.
Final approval and guarantor of the article: Muhammad Ramzan.

Corresponding author email: Ayesha Basharat:
doc.ayesha.smc@gmail.com

Conflict of Interest: None declared.

Rec. Date: Sep 21, 2020 Revision Rec. Date: March1, 2022 Accept Date: Mar 5, 2023.

REFERENCES

- Arvidsson I, Gremark Simonsen J, Dahlqvist C, Axmon A, Karlson B, Björk J, et al. Cross sectional associations between occupational factors and musculoskeletal pain in women teachers, nurses and sonographers. *BMC Musculoskel Disord* 2019;17:35-40.
- Ma CC, Gu JK, Charles LE, Andrew ME, Dong RG, Burchfiel CM. Work-related upper extremity musculoskeletal disorders in the United States: 2006, 2009, and 2014 National Health Interview Survey. *Work* 2018;60:623-34.
- Epstein S, Sparer EH, Tran BN, Ruan QZ, Dennerlein JT, Singhal D, et al. Prevalence of Work Related Musculoskeletal Disorders Among Surgeons and Interventionalists: A Systematic Review and Meta-analysis. *JAMA Surg* 2018;153:e174947.
- Marsalli M, Sepúlveda O, Moran N, Breyer JM. Shoulder terrible triad: classification, functional results, and prognostic factors. *J Am Acad Orthop Surg* 2020;28:200-7.
- Pan F, Byrne KS, Ramakrishnan R, Ferreira M, Dwyer T, Jones G. Association between musculoskeletal pain at multiple sites and objectively measured physical activity and work capacity: results from UK Biobank study. *J Sci Med Sport* 2019;22:444-9.
- Park HB, Gwark JY, Im JH, Jung J, Na JB, Yoon CH. Factors associated with a traumatic posterolateral rotator cuff tears. *J Bone Joint Surg Am* 2018;100:1397-99.
- Watanabe A, Ono Q, Nishigami T, Hirooka T, Machida H. Differences in risk factors for rotator cuff tears between elderly patients and young patients. *Acta Med Okayama* 2018;72:67-72.
- Akhtar A, Richards J, Monga P. The biomechanics of the rotator cuff in health and disease – A narrative review. *Clin Orthop Trauma* 2021;18:150-6.
- Hawk C, Minkalis AL, Khorsan R, Daniels CJ, Homack D, Gliedt JA, et al. Systematic Review of Nondrug, Nonsurgical Treatment of Shoulder Conditions. *J Manipulative Physiol Ther* 2017;40:293-319.
- Larsson R, Bernhardsson S, Nordeman L. Effects of eccentric exercise in patients with subacromial impingement syndrome: a systematic review and meta-analysis. *BMC Musculoskel Disord* 2019;20:1-22.
- Nazari G, MacDermid JC, Bryant D, Athwal GS. The effectiveness of surgical vs. conservative interventions on pain and function in patients with shoulder impingement syndrome. A systematic review and meta-analysis. *PLoS One* 2019;14:e0216961.
- Sharma S, Hussain ME, Sharma S. Effects of exercise therapy plus manual therapy on muscle activity, latency timing and SPADI score in shoulder impingement syndrome. *Complement. Ther Clin Pract* 2021;44:101390.
- Vergili O, Oktas B, Canbeyli ID. Comparison of kinesiotherapy, exercise and subacromial injection treatments on functionality and life quality in shoulder impingement syndrome: a randomized controlled study. *Indian J Orthop* 2021;55:195-202.
- Hashiguchi H, Iwashita S, Okubo A, Takai S. Arthroscopic Removal and Tendon Repair for Refractory Rotator Cuff Calcific Tendinitis of the Shoulder. *J. Nippon Med Sch* 2017;84:19-24.
- Campolo M. Muscle Strength. *Fundamental Orthopedic Management for the Physical Therapist Assistant-E-Book*. 2021 Jul 15:89.
- Clausen MB, Bandholm T, Rathleff MS, Christensen KB, Zebis MK, Graven-Nielsen T, et al. The Strengthening Exercises in Shoulder Impingement trial (The SExSI-trial) investigating the effectiveness of a simple add-on shoulder strengthening exercise programmed in patients with long-lasting subacromial impingement syndrome. *Trials* 2018;19:154.
- Bakhsh W, Nicandri G. Anatomy and physical examination of the shoulder. *Sports Med Arthrosc Rev* 2018;26:10-22.
- Powell JK, Lewis JS. Rotator Cuff–Related Shoulder Pain: Is It Time to Reframe the Advice, You Need to Strengthen Your Shoulder. *J Orthop Sports Phys Ther* 2021;51:156-8.
- Oghadam AN, Rahnema L, Dehkordi SN, Abdollahi S. Exercise therapy may affect scapular position and motion in individuals with scapular dyskinesis: a systematic review of clinical trials. *J Shoulder Elbow Surg* 2020;29:29-36.
- Bea JW, Blew RM, Howe C, Hetherington-Rauth M, Going SB. Resistance Training Effects on Metabolic Function Among Youth: A Systematic Review. *Pediatr Exerc Sci* 2018;29:297-315.