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# EFFECT OF MYOFASCIAL RELEASE VERSUS INSTRUMENT-ASSISTED SOFT TISSUE MOBILIZATION IN IMPROVING RANGE OF MOTION AND PAIN IN ATHLETES WITH SUBACROMIAL SHOULDER IMPINGEMENT

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## ABSTRACT

**Objective:** To find effect of myofascial release versus instrument-assisted soft tissue mobilization in improving range of motion and pain in athletes with subacromial shoulder impingement. **Methods:** A experimental study was conducted on 36 athletes having subacromial shoulder impingement. Data was gathered from university athletes of Agriculture and Government university Faisalabad through non probability convenient sampling technique.20-35 year old male athlete, having positive Hawkins kennedy test were included. 2 experimental groups were made group A received Myofascial Release group B received Instrument-Assisted Soft Tissue Mobilization therapy. SPSS version 21 was used for statistical analysis. **Results:** Suggested SPADI Pain score were non significant at baseline ($p = 0.868$). Group B, however, declined more in pain post-treatment ($p = 0.007$). SPADI Disability scores improved significantly with $p = 0.033$ in Group B. Shoulder movements including flexion, abduction and external rotation showed post-treatment improvement to a significant extent in Group B ($p < 0.001$). Shoulder internal rotation ($p = 0.002$) and extension ($p = 0.034$) also indicated significant differences in favor of Group B. Shoulder adduction, however, did not indicate a statistically significant difference after the intervention ($p = 0.813$). **Conclusion:** Both myofascial release and instrument-assisted soft tissue mobilization showed improved results in improving range of motion and pain in athletes with subacromial shoulder impingement but instrument-assisted soft tissue mobilization showed more superior results.

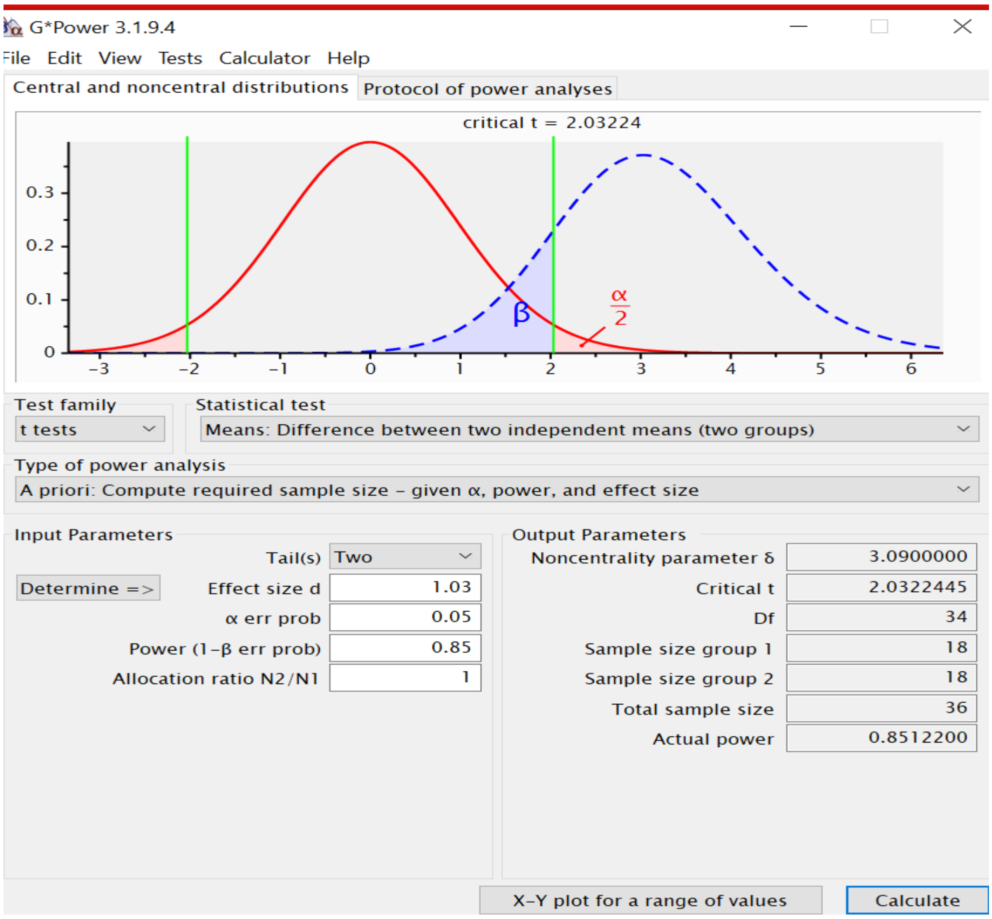
**KEYWORDS:** Athlete, Myofascial Release Therapy, Pain, Range of Motion, Shoulder Impingement Syndrome.

## INTRODUCTION

Subacromial shoulder impingement syndrome[1] is a prevalent musculoskeletal condition of athletes participating in repetitive overhead activities, including swimmers, tennis players, and weightlifters.[1] Subacromial shoulder impingement is a prevalent musculoskeletal ailment that occurs due to the pressing of the rotator cuff tendons and subacromial bursa in between the head of the humerus bone and acromion bone. It can arise from frequent elevation of arms, sedentary lifestyle, or possible imbalance of muscle strength, causing discomfort, debilitation, as well as curtailment of movement. Many athletes with shoulder pain are diagnosed with shoulder impingement syndrome, particularly those who engage in overhead or throwing exercises One of the most prevalent causes of shoulder discomfort in athletes is subacromial impingement syndrome. SIS is defined as pain, limited range of motion (ROM), and functional impairment, which usually results in compromised sports performance and elevated risk of chronic shoulder pathology.[2] Successful rehabilitation programs are paramount in the restoration of function and alleviation of pain in SIS-affected athletes.[3] The main etiologies are scapular dyskinesis, postural dysfunctions, muscle imbalances, and repetitive overhead activities.[4] Structural abnormalities, for example, acromial morphological variations, can also result in impingement by minimizing subacromial space, resulting in tendon inflammation and irritation.[5] Overhead sports participants such as weightlifters, tennis players, baseball players, and swimmers are more vulnerable to subacromial shoulder impingement because of repeated overhead motions. The motion imposes excessive strain on the rotator cuff and neighboring structures, creating inflammation, irritation of the tendon, and narrowed subacromial space. Compromised biomechanics, muscle imbalance are other contributing factors. Additionally, chronic repetitive stress may ultimately lead to tendinous degeneration, which can predispose individuals to injury. Precautions involve proper training and strength conditioning for shoulder mobility. SIS is the most common shoulder condition and is responsible for about 44–65% of all shoulder complaints in clinical practice.[6] It is found to be most common in overhead athletes, with a prevalence of up to 36–50% in swimmers, baseball players, and weightlifters.[7] Among the range of physiotherapeutic treatments, Myofascial Release (MFR) and Instrument-Assisted Soft Tissue Mobilization (IASTM) have become widespread in the aim of enhancing ROM and reducing pain. Although the two treatments are aimed at reducing myofascial limitations as well as tissue mobility, their relative efficacies are research focuses that continue to evolve. The purpose of this study is to compare and assess the effectiveness of MFR and IASTM in raising ROM and pain scores in athlete subjects with subacromial shoulder impingement.[8] In addition, SIS development risk increases with age because of degenerative changes in the rotator cuff tendons and subacromial tissues. MFR and IASTM have been effective soft tissue mobilization methods to enhance tissue pliability, alleviate pain, and restore ROM in musculoskeletal disorders, including SIS.[9] Designed as a manual treatment method, MFR is grounded on the release of fascial restrictions through sustained pressure and stretching. It increases tissue mobility, decreases pain sensitivity, and enhances vascular perfusion to the affected tendons and muscles. The current literature indicates that MFR might significantly enhance shoulder ROM and pain sensitivity in SIS patients.[10] Myofascial release (MFR) is a highly effective manual therapy instrument applied to regain pain and range of motion (ROM) in sportsmen with subacromial shoulder impingement. MFR is applied by applying long-lasting, gentle pressure on the myofascial tissue to release tension, enhance circulation, and restore elasticity to the tissues. MFR removes the shoulder's adhesions and trigger points, reduces muscular restriction, and enables movement. Through the treatment of engaged fascia and muscles, MFR facilitates relaxation, inflammation reduction, and neuromuscular coordination improvement required for pain abolition and restoration of function. Evidence exists to recommend the application of MFR with strength training as an adjunct to glenohumeral mobility and recurrence prevention. MFR tends to target significant structures like the pectoralis, upper trapezius, and rotator cuff muscles for equitable muscle activation. Regular MFR sessions, in combination with correction exercises, can significantly enhance shoulder function and sports performance while reducing pain and stiffness.[11] Instrument-Assisted Soft Tissue Mobilization (IASTM) is a form of advanced manual therapy using ergonomic instruments to access soft tissue restriction, producing reduced pain and enhanced range of motion (ROM) in the athlete with subacromial shoulder impingement. Controlled microtrauma is caused in the affected tissue by the application of IASTM, triggering a healing response by promoting increased blood flow, disrupting scar tissue, and dissolving fascial adhesions. IASTM relaxes tension in the scapular, deltoid, and rotator cuff muscles, allowing greater flexibility and facilitate movement.[12] It also enhances neuromuscular activation, permitting better muscle coordination and minimizing compensation movement patterns leading to impingement. Studies reveal that IASTM incorporated with stretching and strengthening exercises accelerates recovery through lessened pain, normalization of tissue function, and enhanced joint mobility. Its repeated use can prevent recurrent injuries, and therefore it is a crucial aid in the rehabilitation of sportsmen suffering from shoulder impingement. IASTM represents an advancement of conventional soft tissue mobilization using specially designed instruments to break up myofascial adhesions, stimulate mechanoreceptors, and promote collagen remodeling. Studies have shown that IASTM can improve significantly shoulder function and pain by enabling neuromuscular adaptation and tissue repair.[13] Although both procedures have been shown to yield satisfactory outcomes, the relative advantage of each procedure is controversial. The purpose of this study is to determine which procedure yields superior results in subacromial shoulder impingement athletes.[14,15]

## MATERIAL AND METHODS

A experimental study was conducted on 36 athletes having subacromial shoulder impingement. Sample size was calculated using G.power version 3.1.9.4.




Data was gathered from university athletes of Agriculture and Government university Faisalabad through non probability convenient sampling technique.20-35 year old male athlete were included, having positive Hawkins kennedy test, Pain during throwing movement and stiffness in shoulder from last 4 weeks were included.[16] Having shoulder fracture, shoulder arthritis and having shoulder surgery were excluded. Study ran march 2022 to September 2022. Two treatment groups were made group A received Myofascial Release group B received Instrument-Assisted Soft Tissue Mobilization therapy 3 session per week up to 4 weeks**.** Ethical consideration was followed throughout study. Shoulder pain and disability index and goniometer were used as assessment tools.

**Statistical Analysis**

SPSS version 21 was used for statistical analysis. Shapiro-Wilk test was applied to find normality of data P > 0.05 indicated data was normally distributed. The independent sample t test was employed for comparisons between groups. Paired sample t test was used for between group comparison.

## RESULTS

**Table 1: Demographic.**

| Variables | Group A (Myofascial Release) N=18 | Group B (Instrument-Assisted Soft Tissue Mobilization) N=18 | P Value |
|---|---|---|---|
| | Mean ±SD | Mean ±SD | |
| Affected side | | | .095 |
| Right | 7(38.9%) | 12 (66.7%) | |
| Left | 11(61.1%) | 6(33.3%) | |
| Age (years) | 27.5 ± 4.33 | 27.8 ± 4.23 | .686 |

Age in Group A patients was 27.5 ± 4.33 years and in Group B was 27.8 ± 4.23 years with a p-value of 0.686 showing no difference between the two groups regarding age. Among the participants of Group A with right-side involvement, 38.9% had affected involvement, while 61.1% had left-side involvement. But Group B consisted of 66.7% of participants with right-side involvement and 33.3% with left-side involvement.

**Table 2: Independent Sample T Test between group comparison.**

| | | Treatment Groups | | | |
|---|---|---|---|---|---|
| | | Group A | Group B | | |
| **Outcome Measure** | **Assessment** | **Mean ±SD N=18** | **Mean ±SD N=18** | **Mean Difference** | **P value** |
| **SPADI Pain** | Pre Intervention | 37.511±7.641 | 35.904±5.986 | -.330 | .868 |
| | Post Intervention | 24.821±7.142 | 19.416±5.922 | 6.057 | .007 |
| **SPADI Disability** | Pre Intervention | 58.600±13.018 | 56.441±10.529 | 2.101 | .562 |
| | Post Intervention | 39.464±12.337 | 31.601±8.434 | 7.823 | .033 |
| **SPADI Total** | Pre Intervention | 95.878±18.734 | 93.300±15.902 | 2.388 | .663 |
| | Post Intervention | 64.398±17.331 | 50.400±10.077 | 13.989 | .008 |
| **ROM Shoulder Flexion** | Pre Intervention | 88.444±8.438 | 86.222±6.982 | 3.11222 | .231 |
| | Post Intervention | 99.954±7.658 | 120.676±10.893 | -31.82222 | .000 |
| **Shoulder Extension** | Pre Intervention | 38.001±10.345 | 33.611±8.538 | 3.37778 | .317 |
| | Post Intervention | 59.368±3.482 | 58.401±1.465 | -2.16111 | .034 |
| **Shoulder Abduction** | Pre Intervention | 58.656±10.361 | 57.047±8.160 | -1.38689 | .668 |
| | Post Intervention | 89.207±7.614 | 136.765±7.302 | -38.71111 | .000 |
| **Shoulder Adduction** | Pre Intervention | 39.737±5.441 | 37.402±5.703 | 1.28778 | .489 |
| | Post Intervention | 50.828±4.673 | 50.777±2.109 | .22223 | .813 |
| **Shoulder Internal Rotation** | Pre Intervention | 53.823±6.370 | 48.866±6.398 | 1.11114 | .513 |
| | Post Intervention | 78.141±7.498 | 83.294±5.284 | -6.16767 | .002 |
| **Shoulder External Rotation** | Pre Intervention | 48.741±6.532 | 48.954±7.098 | .83233 | .652 |
| | Post Intervention | 77.897±4.909 | 84.040±5.177 | -7.22422 | .000 |

Pain scores following SPADI Pain were not significantly different at baseline ($p = 0.868$). Group B, however, declined more in pain post-treatment ($p = 0.007$). Likewise, the post-intervention SPADI Disability scores varied significantly ($p = 0.033$) and were enhanced to a larger extent in Group B. Even the overall SPADI score was significantly different post-treatment ($p = 0.008$). All three shoulder movements including flexion, abduction, and external rotation showed post-treatment improvement to a significant extent in Group B ($p < 0.001$). Shoulder internal rotation ($p = 0.002$) and extension ($p = 0.034$) also indicated significant differences in favor of Group B. Shoulder adduction, however, did not indicate a statistically significant difference after the intervention ($p = 0.813$).

**Table 3: Paired Sample T test used within group difference.**

| | | Assessment | | | |
|---|---|---|---|---|---|
| | | Pre | Post | | |
| **Outcome Measure** | **Treatment Group** | **Mean ±SD N=18** | **Mean ±SD N=18** | **Paired difference** | **P value** |
| **SPADI Pain** | Group A | 37.511 ± 7.641 | 24.821 ± 7.142 | 12.666±4.043 | <.001 |
| | Group B | 35.904 ± 5.986 | 19.416 ± 5.922 | 6.057 | <.001 |
| **SPADI Disability** | Group A | 58.600 ± 13.018 | 39.464 ± 12.337 | 18.055±6.448 | <.001 |
| | Group B | 56.441 ± 10.529 | 31.601 ± 8.434 | 23.777±8.149 | <.001 |
| **SPADI Total** | Group A | 95.878 ± 18.734 | 64.398 ± 17.331 | 31.500±10.939 | <.001 |
| | Group B | 93.300 ± 15.902 | 50.400 ± 10.077 | 43.000±9.652 | <.001 |
| **ROM Shoulder Flexion** | Group A | 88.444 ± 8.438 | 99.954 ± 7.658 | -9.500±7.485 | <.001 |
| | Group B | 86.222 ± 6.982 | 120.676 ± 10.893 | -45.444±13.191 | . <.001 |
| **Shoulder Extension** | Group A | 38.001 ± 10.345 | 59.368 ± 3.482 | -20.388±10.982 | <.001 |
| | Group B | 33.611 ± 8.538 | 58.401 ± 1.465 | -25.777±8.004 | <.001 |
| **Shoulder Abduction** | Group A | 58.656 ± 10.361 | 89.207 ± 7.614 | -31.611±14.163 | . <.001 |
| | Group B | 57.047 ± 8.160 | 136.765 ± 7.302 | -68.833±9.942 | <.001 |
| **Shoulder Adduction** | Group A | 39.737 ± 5.441 | 50.828 ± 4.673 | -12.111±6.163 | <.001 |
| | Group B | 37.402 ± 5.703 | 50.777 ± 2.109 | -13.166±5.170 | . <.001 |
| **Shoulder Internal Rotation** | Group A | 53.823 ± 6.370 | 78.141 ± 7.498 | -25.166±8.219 | <.001 |
| | Group B | 48.866 ± 6.398 | 83.294 ± 5.284 | -32.444±5.158 | <.001 |
| **Shoulder External Rotation** | Group A | 48.741 ± 6.532 | 77.897 ± 4.909 | -29.111±5.789 | . <.001 |
| | Group B | 48.954 ± 7.098 | 84.040 ± 5.177 | -37.166±5.543 | <.001 |

Statistical improvement was noted in SPADI Pain, Disability, and Total scores for both groups ($p < 0.001$), with greater improvement in Group B. Statistical improvement in all ROM parameters ($p < 0.001$) was noted in both groups, with Group B demonstrating greater rise in shoulder flexion (-45.444 ± 13.191), abduction (-68.833 ± 9.942), and external rotation (-37.166 ± 5.543), reflecting greater effectiveness of Instrument-Assisted Soft Tissue Mobilization.

## DISCUSSION

Current study conducted on 36 subjects having sub acromial impingement. Between group comparison was conducted using sample t test SPADI scale was used to find shoulder pain and disability level. Pain scores following SPADI Pain were not significantly different at baseline ($p = 0.868$). Group B, however, declined more in pain post-treatment ($p = 0.007$) these findings suggested means instrument-assisted soft tissue mobilization showed more improved results as compare to myofascial release these results were accordance to Coviello and Maniatakis A et al. study results suggested instrument-assisted soft tissue mobilization improve pain level among shoulder impingement patients.[17,18]

Likewise, the post-intervention SPADI Disability scores varied significantly ($p = 0.033$) and were enhanced to a larger extent in Group B. Even the overall SPADI score was significantly different post-treatment ($p = 0.008$) these results were compatible to Li Y et al and Aksan Sadikoglu et al. study findings showed instrument-assisted soft tissue mobilization improved overall function of shoulder.[19,20]

ROM measured by goniometer pre and post treatment which revealed All three shoulder movements including flexion, abduction, and external rotation showed post-treatment improvement to a significant extent in Group B ($p < 0.001$). Shoulder internal rotation ($p = 0.002$) and extension ($p = 0.034$) also indicated significant differences in favor of Group B. Shoulder adduction, however, did not indicate a statistically significant difference after the intervention ($p = 0.813$) these results were consistent with previous studies.[21,22]

Current study concluded IASTM relieve pain among shoulder impingement athlete after 4 week treatment these findings were consistent with Aksan et al. study finding which showed IASTM showed effect on relieving pain among shoulder pain patients.[20]

## LIMITATIONS

The research was conducted on the short-term measures concerning Myofascial Release and IASTM techniques. However, long-term symptom relapse and persistent functional changes were not examined.

## RECOMMENDATIONS

Future researcher should evaluate the effectiveness of Myofascial Release and IASTM on patients with subacromial shoulder impingement who do eccentric exercises or neuromuscular training as part of their rehabilitation.

Researchers should also pursue long-term follow-up studies to assess the chronic effects of these interventions on pain, range of motion, and performance measures in athletes.

## CONCLUSION

Both myofascial release and instrument-assisted soft tissue mobilization showed improved results in improving range of motion and pain in athletes with subacromial shoulder impingement but instrument-assisted soft tissue mobilization showed more superior results.

## AUTHORS' CONTRIBUTIONS

Aisha Ansari contributed to the conception, study design, and data collection. Maria Riaz contributed to data analysis and interpretation, and Mohammad Shahid Ali contributed to article drafting and proofreading. All authors have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.

## ETHICAL APPROVAL

The study received approval from the Institutional Review Board of "Government college university Faisalabad" on September 10, 2022.

## DECLARATION OF PARTICIPANT CONSENT

The authors attest to having acquired all necessary consent forms from participants. The participants have consented on the form to the journal's publication of their photos and other clinical data. The participants were aware that while every attempt will be made to hide their identities. Their names and initials will not be published.

## USE OF ARTIFICIAL INTELLIGENCE (AI)

The authors confirmed that no artificial intelligence (AI)-assisted technology were used.

## CONFLICTS OF INTEREST

No conflict of interest.

## FINANCIAL SUPPORT AND SPONSORSHIP

This study did not received any financial support.

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