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# Effects of Scapular Stabilization Exercises on Pain and Functional Recovery in Subacromial Impingement Syndrome- A Literature Review

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**ABSTRACT**

Background: the present review was conducted to critically evaluate the existing body of literature on the effects of scapular stabilization exercises on pain and functional recovery in patients diagnosed with subacromial impingement syndrome.

Methods: Data basis including Pubmed, Cochrane library and Pedro were searched for published papers from 2014 – 2025. We evaluated the effect of various scapular stabilization techniques on pain and functional recovery in subacromial impingement patients.

Results: Six articles described the results of the following application of various scapular stabilization techniques namely kinetic chain techniques, eccentric exercises, and range of motion exercises on scapular dyskinesis, shoulder pain and functional recovery of shoulder. The results indicated that pain and functional recovery can be improved scapular stabilization techniques.

Conclusion: The results of this study corroborate the idea that scapular stabilization techniques have the potential to become an effective adjunct to routine rehabilitative treatments for improving proving pain and functional recovery in patients with subacromial impingement syndrome.

**Keywords:** Subacromial impingement syndrome, Subacromial pain syndrome, Scapular stabilization exercises, Scapular control exercises.

## Introduction:

Shoulder pain is the second most prevalent musculoskeletal pain, with almost 67% of individuals experiencing discomfort in their shoulders. The impingement of rotator cuff tendons, bursa, or ligament alterations in the subacromial region are the causes of subacromial syndrome (SS), which accounts for 45–65% of shoulder discomfort patients. Shoulder pain is the third most common reason patients seek medical attention for musculoskeletal disorders, with a prevalence of 47%. an incidence of about 2.8% among participants who were over 30 and 15% in those who were over 70. Neer coined the phrase "subacromial impingement syndrome" to describe shoulder pain caused by the acromion mechanically straining the rotator cuff tendon as the arm is elevated. To provide a more accurate and comprehensive description for persistent shoulder pain with a variety of aetiologies, Diercks et al. coined the term "subacromial pain syndrome." (Azar Moezy et al., 2014 and Ziyi Zhong et al.,2024)

Subacromial impingement syndrome (SIS) has a multifactorial etiology involving anatomical variations, repetitive overhead activities, eccentric overload, and poor posture. Abnormal scapular kinematics, scapular dyskinesis, rotator cuff dysfunction, and tightness in the pectoralis minor or posterior capsule can alter the scapulohumeral rhythm, leading to poor centralization of the humeral head. Mechanical compression under the coracoacromial arch is a common theory. Individuals with SIS often show overactivity of the upper trapezius and underuse of the middle/lower trapezius and serratus anterior. Posterior capsule stiffness, tight scapular retinaculum, and pectoralis minor tightness are key biomechanical contributors to SIS risk**. (**Elif Turgut et al., 2017, Azar Moezy et al., 2014 and Ziyi Zhong et al., 2024)

(SSEs) Scapular Stabilization Exercises are a kind of exercise treatment that aim to improve scapular kinematics, strengthen muscles, and restore scapular posture and movement. Dynamic stabilization of the scapula is a critical component of therapy because the ability to position and regulate the movements of the scapula is vital for proper upper limb function. The shoulder joints are not subjected to undue force during stabilization exercises on a scapular plane. Exercises like lawnmower with diagonal squat, wall slides with squats, wall push-ups with ipsilateral leg extension, scapular-retraction exercises, and robbery with squat are examples of SSE, which emphasizes coordinated activation and co-activation of dynamic constraints. Exercises for external and internal rotation, inferior glide, and eccentric supraspinatus are examples of scapular stabilization exercises.

This study's primary objective is to provide conclusive evidence on the effects of scapular stability exercises on pain and functional recovery in individuals with subacromial impingement syndrome.

## Materials and Methods:

**Study design:** Literature review

**Study setting:** St John's Medical College Hospital, Bangalore

**Study criteria**

The review's inclusion criteria include studies that particularly address scapular stabilizer exercises and include participants with a subacromial impingement syndrome diagnosis. All chosen publications must be written in English and have complete texts available online; only research published after 2014 will be considered. Systematic reviews, meta-analyses, and randomized controlled trials are examples of acceptable study designs.

Conversely, exclusion criteria will exclude research conducted before 2014, publications published in languages other than English, articles that are not related to the topic of scapular stabilization or subacromial impingement syndrome, and articles lacking full texts or online availability.

**Search strategy**

We looked over published publications from 2014 to 2024 in several electronic sources, such as PEDro, PubMed, and the Cochrane Library. We thoroughly reviewed the collections references for additional pertinent research. We looked at the authors, titles, and abstracts to evaluate if the research satisfied the preset inclusion criteria.

## Results:

**Table-1:**

**Demographic Characteristics of Population**

| **Author** | **Population with Subacromial Impingement syndrome** | **Intervention Group** | **Control Group** |
|---|---|---|---|
| Azar Moezy et al. (2014) | The study included 68 SIS patients aged 18–75 with chronic unilateral shoulder pain, positive impingement signs, and pain during shoulder flexion or abduction, meeting specific clinical examination criteria. | N=33 Exercise Therapy group performed thrice-weekly supervised sessions for 6 weeks, including treadmill warm-up, flexibility, strengthening, scapular stabilization, and posture correction exercises to improve shoulder mobility and function. | N=35 Physical Therapy group received pendulum and specific ROM exercises—including scaption, rotations, and horizontal movements—combined with infrared, ultrasound, and TENS therapies, delivered thrice weekly for six weeks to treat SIS. |
| Elif Turgut et al (2017) | The study includes 30 participants with SIS and unilateral shoulder pain >6 weeks, confirmed by clinical tests and type 1 or 2 scapular dyskinesis with positive scapular assistance or reposition test, ensuring symptoms are linked to scapular dysfunction. | N=15 The intervention group underwent a 12-week supervised program with closed/open kinetic chain scapular stabilization, followed by rotator cuff strengthening and self-stretching for posterior shoulder, pectoralis minor, levator scapulae, and latissimus dorsi. | N=15 The control group participated in a 12-week supervised program that included rotator cuff strengthening and self-stretching exercises for the posterior shoulder, pectoralis minor, levator scapulae, and latissimus dorsi |
| Eva Vallés-Carrascosa et al. (2018) | The study included 22 patients (both men and women) aged between 25 and 70 years. Diagnosed subacromial syndrome (SS) and a painful arc during active upper limb elevation between 60° and 120° of abduction. | N=11 Not-painful EE group (G0)<br>Participants were instructed to follow an exercise protocol that included eccentric exercises (EE) of the rotator cuff using a load that induced pain no greater than 40 mm on the | N=11 the painful EE group (G1) Group G0 carried out the same supervised exercise protocol—eccentric rotator cuff strengthening, scapular stabilization, and upper trapezius stretching—but using a load that maintained a pain-free response, ensuring a |

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| | | Visual Analog Scale (VAS), complemented by scapular stabilization exercises and upper trapezius stretching. | Visual Analog Scale (VAS) score of 0mm during implementation. |
| Hariharasudhan Ravichandran et al.<br>(2020) | This systematic review analyzed seven clinical trials (228 participants) assessing scapular stabilization, rehabilitation, or targeted exercises as interventions for subacromial impingement syndrome, confirming reductions in shoulder pain and disability. | N=119 Intervention Group-Scapular stabilization exercises | N=109 Control Group – Conventional Physiotherapy |
| Ertugrul Yuksel et al.<br>(2023) | 64 Adults with 18 years or older with ≥12 weeks of shoulder pain, stage II SPS diagnosis via clinical tests, and scapular dyskinesis confirmed by the Scapular Dyskinesis Test were included. | The intervention group (N=32) performed strengthening, stretching, and shoulder mobilization exercises, plus additional scapular stabilization training, performed five supervised sessions weekly over four weeks. | The control group (N=32) received glenohumeral and scapular mobilization, pendulum drills, stretching, ROM, strengthening, and proprioceptive exercises five times weekly over four weeks to treat SPS. |
| Ziyi Zhong et al.<br>(2024) | This systematic review and meta-analysis evaluated eight RCTs including 387 adults diagnosed with SAPS—confirmed by Neer or Hawkins–Kennedy tests—were analyzed to evaluate the impact of scapular stabilization exercises on shoulder pain and functional outcomes. | N=220 It is mainly focused on SSE-Scapular Stabilization Exercises. The length of the training varied from four weeks to twelve weeks. | N=167 Traditional physical therapy<br>Includes of flexibility exercises, physical modalities, and strengthening exercises. |

| **Author** | **Outcome measure** | **Results** | **P-value significant/non-significant** | **Effect of Subacromial Impingement Syndrome** |
|---|---|---|---|---|
| Azar Moezy<br>et al. (2014) | VAS and ROM | The study's results show that the exercise regimen considerably reduced pain, enhanced scapular protraction, corrected head and back posture, and increased shoulder mobility during a 6-week supervised scapular stabilization exercise therapy. | Significant | Impaired Scapulothoracic motions.<br>Pain and Dysfunction in Shoulder. |
| Elif Turgut et al (2017) | Three -dimensional Scapular Kinematics. | Both groups displayed better disability status and less discomfort. Kinematics improved marginally but not | Significant | Poor Scapular Kinematics.<br>Scapular Dyskinesis. |

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| | Shoulder Pain and Disability Index at baseline of 6 weeks and 12 weeks follow up. | significantly when stability exercises were included. | | Shoulder Pain and Disability. |
| Eva Vallés-Carrascosa et al. (2018) | Primary outcome-(VAS)Shoulder Pain<br>Secondary outcome-Shoulder Function (CMS)Constant Murley Score | The outcomes demonstrated that these therapies enhanced function and AROM while also reducing pain in an equivalent measure. Short-term benefits were shown whether workouts were performed with or without pain (VAS < 50 mm). The results encourage the use of safe activity during rehabilitation, especially in cases of mild pain. | Significant | Impaired Shoulder Range of Motion and Function.<br>Shoulder Pain. |
| Hariharasudhan Ravichandran et al. (2020) | Ten validated tools—including VAS, shoulder ROM, Constant score, SPADI, Western Ontario rotator cuff Index, 3D scapular kinematics, posture, strength, flexibility, and proprioception—quantified pain, biomechanics, and functional disability in SIS patients. | This review concludes that incorporating scapular stabilization exercises—either independently or within comprehensive shoulder rehabilitation—yields the most favourable outcomes for reducing pain and dysfunction in subacromial impingement. | Significant | Shoulder Disability and Pain. |
| Ertugrul Yuksel et al.<br>(2023) | VAS score, ROM measurement, SPADI Score and Scapular Dyskinesis Test (SDT) | This study proves superior improvements in scapular dyskinesis, shoulder pain, muscle strength, and disability compared to standard rehabilitation alone in patients with subacromial pain syndrome accompanied by scapular dyskinesis | Significant | Shoulder Pain and Disability<br>Impaired Shoulder Function, Range of Motion, Muscle Strength and Scapular Kinematics.<br>Scapular Dyskinesis. |
| Ziyi Zhong et al.<br>(2024) | VAS score, SPADI score, ROM measurement | This Study outperforms conventional rehabilitation in improving pain and function, but not shoulder ROM in Subacromial pain syndrome. | Significant | Impaired Shoulder Function.<br>Shoulder Disability and Pain. |

## DISCUSSION

This literature review aimed to incorporate the recent evidences that scapular stabilization exercises are effective on pain and functional recovery in subacromial impingement syndrome (SIS). Six articles that matched the inclusion criteria were included in this review. The articles reviewed are 2 systematic review, 4 randomized control trail.

Association of Scapular stabilization exercise and Pain in Subacromial impingement syndrome:

Articles exploring the influence of Scapular stabilization exercises (SSE) on pain suggested that SSE might be more beneficial than conventional physical therapy interventions. The VAS scale and the SPADI pain score scale, which were utilized depending on the study, both displayed great reproducibility and validity of follow-up assessment of pain(Ziyi Zhong et al., 2024). The scapular stabilization exercise regimen significantly improved pain in individuals with subacromial impingement syndrome (Elif Turgutet al., 2017). The findings provide support to the idea that exercise therapy is a reliable and effective approach to alleviating pain. This study provides evidence in support of scapular stabilization-based exercise treatment for SIS recovery. It needs to be highlighted that exercise therapy works effectively for alleviating pain.(Azar Moezy et al., 2014)

Association of Scapular stabilization exercise and Functional recovery in Subacromial impingement syndrome:

The research articles investigating if scapular stabilization exercise (SSE) improves functional recovery in subacromial impingement syndrome reported that SSE might provide more effective outcomes. The VAS scale, CMS scale, and SPADI disability score scale, which were used as part of the study, all shown good validity and reliability during follow-up functional assessments. (Elif Turgut et al.,2017). A safe and efficient method for improving disability status is exercise therapy (Ziyi Zhong et al.,2024) According to studies, scapular stabilization exercises should be an essential part of therapeutic interventions aimed at reducing disability in individuals with subacromial impingement syndrome.

Association of Scapular stabilization exercise and other physical therapy approach:

The articles exploring the impact of scapular stabilization exercises in conjunction with other physical therapy approaches on pain and functional recovery in subacromial impingement syndrome results in the conclusion that (Elif Turgut et al., 2017) results are marginally better when scapular stabilization exercises are added to shoulder girdle stretching and strengthening regimens (Eva Vallés-Carrascosa et al., 2018.). Short-term pain relief, function improvement, and increased active range of motion (AROM) are all achieved with this combination of exercises and stretching the upper trapezius (Azar Moezy et al., 2014).Exercises for flexibility that focus on stretching the shoulder capsule and lengthening the pectoralis major and minor also have a beneficial effect. Because of the combined analgesic effect of TENS and the thermal effects of US and IR, a therapeutic package consisting of high frequency TENS and superficial heat (IR) was used in conventional pain treatment. This combination proved effective in reducing pain both before and after the intervention. In general, it works very well to combine shoulder mobilization, stretching, and strengthening exercises with scapular stabilization exercises. (Ertugrul Yuksel et al., 2023)

The results of this review suggest that, in comparison to employing the physical therapy intervention alone, adding scapular stabilization exercises to a physical therapy approach can lead to significant improvements in severity of pain and functional recovery all through the short- and mid-term in contrast to depending mainly on conventional physical therapy intervention.

## CONCLUSION

Scapular stabilization exercises (SSE) have been shown in the literature to be effective in lowering pain and enhancing function in individuals with subacromial impingement syndrome.

**CONFLICT OF INTEREST**:

The authors of this work have disclosed no relevant conflicts of interest.

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