International Journal of Health Sciences and Research
[Indexed, Peer-Reviewed Journal]
Volume 15; Issue: 11; November 2025
Website: www.ijhsr.org
Original Research Article *ISSN: 2249-9571*

Development and Content Validation of a Structured Exercise Program for Patients with Subacromial Impingement Syndrome

Reshma Gurav[1], Bhavana Mhatre[2]

[1]Physiotherapy Specialist, Hamad Medical Corporation, Doha, Qatar.
PhD Scholar, PT School and Centre, Seth G.S. Medical College and KEM Hospital, Parel, Mumbai.
[2]Professor (Contract), PT School and Centre, Seth G.S. Medical College and KEM Hospital, Parel, Mumbai.

Corresponding Author: Reshma Gurav

DOI: https://doi.org/10.52403/ijhsr.20251115

ABSTRACT

Background: Subacromial Impingement Syndrome (SAIS) is marked by structural impairments of rotator cuff tendon pathology and altered scapulothoracic kinematics, which contribute to functional limitations in upper limb activity and participation in society. These are influenced by contextual factors mainly environmental, personal and social factors. Inconsistencies in clinical approaches and variability in outcomes warrant a critical evaluation of the current evidence and identification
of future directions. The aim of this study was to to develop and validate a structured, evidence-based exercise program for SAIS that integrates diagnosing structural impairments, identifying contextual influences and the tissue healing phase to optimize outcomes through a novel and tailor-made rehabilitation approach.
Methods: The exercise program was structured in progressive phase based on the three stages of tissue healing. The aim was to improve the health and performance related fitness of the rotator cuff tendons along with the structural impairments of the scapulothoracic mechanisms of the shoulder complex and cervical and thoracic areas. A panel of 10 experts in musculoskeletal physiotherapy was recruited to assess the content validity of the exercise protocol. A 4-point Likert scale was used, and the content validity index and ratio were calculated.
Results: The overall content validity of the structured exercise program was evaluated using the Item-Level Content Validity Index (I-CVI) and the Scale-Level Content Validity Index, Average method (S-CVI/Ave). The S-CVI/Ave was calculated by averaging the I-CVI scores across the six assessed domains. The I-CVI values ranged from 0.87 to 1.00, resulting in an overall S-CVI/Ave of 0.94, indicating excellent content validity for the entire protocol.
Conclusion: The structured exercise program for SAIS demonstrated strong content validity, supporting its excellent clinical applicability. This validated structured exercise protocol can be used in further phases of research to evaluate its effectiveness and feasibility in clinical settings.

Keywords: Subacromial Impingement Syndrome, Exercise Therapy, Content Validity, Rehabilitation, Shoulder Pain

INTRODUCTION

Subacromial Impingement Syndrome (SAIS) is a multifactorial shoulder condition that represents one of the most frequent causes of shoulder pain, accounting for 44–65% of all shoulder complaints in clinical practice. SAIS is characterized by mechanical compression of the rotator cuff tendons, long head of biceps, and subacromial bursa between the humeral head and the acromial arch during arm elevation [1]. The resulting pain and restricted movement impair activities of daily living and limit participation in occupational or recreational tasks, ultimately affecting an individual's quality of life.

Although the etiology of SAIS involves both intrinsic and extrinsic mechanisms, most conservative management strategies primarily focus on symptom modulation rather than the restoration of optimal shoulder mechanics [2]. Physiotherapeutic interventions, particularly exercise therapy, remain the cornerstone of conservative management. However, existing exercise programs often vary considerably in content, dosage, and progression, leading to inconsistent outcomes and limited clinical translation [3].

The literature highlights the heterogeneity in the design and reporting of exercise interventions for SAIS. Conventional programs largely emphasize local muscle strengthening and endurance training while less emphasizing on scapular dyskinesis, cervical–thoracic contributions, and lumbopelvic control all of which play a crucial role in restoring normal shoulder function [4,5]. Furthermore, many studies fail to specify the rationale behind exercise selection or their alignment with specific phases of tissue healing, which restricts replication in clinical practice.

Recent systematic reviews emphasize the need for robust, precise, and standardized reporting of exercise interventions in line with the Template for Intervention Description and Replication (TIDieR) guidelines [6].The TIDieR framework promotes clarity and consistency by detailing the *why*, *what*, *when*, and *how* of each intervention, enabling clinicians and researchers to replicate, adapt, and apply protocols in diverse clinical settings.

To address these gaps, the present program was developed using the TIDieR-based approach as a guiding framework to ensure comprehensive, replicable, and clinically meaningful intervention design. This approach allowed explicit specification of all essential aspects of why, what, who, how, where, when, along with tailoring and modification to promote consistency and enhance clinical translation.

The design process considered multiple domains:

- Diagnosing the structural impairments of glenohumeral and scapulothoracic mechanism along with cervical, thoracic region and lumbo pelvic hip region.
- Contextual factors including faulty posture, occupational demands, activity levels, and ergonomic exposures.
- Functional limitations such as difficulty with overhead tasks and lifting.

Integrating these considerations ensured that the developed exercises addressed both intrinsic impairments and extrinsic contributors to dysfunction, providing a personalized and function-oriented rehabilitation approach.

A 12-week structured program was designed in accordance with the stages of tissue healing, facilitating progressive adaptation while minimizing overload. The intervention was divided into three distinct phases, each aligned with specific healing milestones and therapeutic objectives.

In this context, developing a structured exercise program grounded in current evidence and validated by expert consensus was essential. The current study, therefore, aimed to develop and validate a comprehensive 12-week exercise program for SAIS that is evidence-based, clinically feasible, and adaptable to diverse clinical populations.

METHOD

Study Design

The study comprised of two phases:

1. Development of the Structured Exercise Program, including literature synthesis, identification of clinical needs, and formulation of the exercise framework.
2. Content validation by a panel of experts using quantitative indices—the Item-Level Content Validity Index (I-CVI) and the Scale-Level Content Validity Index (S-CVI/Ave).

All participating experts provided informed consent before participation.

The 12-week program was structured to align with the timeline of tissue healing to prevent overload while promoting progressive adaptation. The program was divided into three distinct phases:

1. **Phase 1:** Focused on pain reduction, inflammation control, and maintenance of mobility in unaffected joints. Interventions included cryotherapy, ultrasound, postural correction education, and mobility exercises for proximal and distal segments.
2. **Phase II**- Subacute Phase (week 2-6) - Aimed at gradual restoration of movement, initiation of controlled strengthening, and correction of scapular mechanics.
3. Exercises included scapular setting, closed-chain stabilization, and rotator cuff activation in pain-free ranges. Neuromuscular control and proprioceptive exercises were emphasized.
4. **Phase III**-Remodelling Phase (week 6-12) - Focused on strengthening, endurance, and functional reintegration. Exercises were progressed to open-chain dynamic movements, resisted scapular and rotator cuff strengthening, kinetic chain integration, and functional retraining.

Development of the Exercise Program

A comprehensive literature review was conducted using databases including PubMed, PEDro, and Scopus to identify evidence-based exercises and rehabilitation principles for SAIS. Randomized controlled trials, systematic reviews, and meta-analyses were analyzed. The synthesis informed exercise selection, sequencing, and progression parameters.

The initial draft of the program included:

- Exercise title and description, specifying the movement pattern and position
- Rationale for the exercise
- Dosage parameters (sets, repetitions, hold duration, and rest intervals).
- Progression criteria, based on patient tolerance and symptom response.
- Precautions and contraindications for each phase.

Expert Panel Selection

A panel of ten experts was purposively selected to assess content validity. Inclusion criteria for experts were:

- Minimum 10 years of clinical experience in musculoskeletal physiotherapy or shoulder rehabilitation
- Willingness to participate and provide detailed feedback

Experts were contacted via email and provided with the complete structured exercise program and a content validity questionnaire.

Expert Review and validation process

Experts were asked to provide qualitative feedback and suggestions for improvement and fill the content validity questionnaire for quantitative feedback. This peer review process helped for identification of potential gaps, inconsistencies, and ambiguities, which were incorporated before finalizing the protocol.

Content Validity Questionnaire

A structured questionnaire was developed to assess each exercise across six domains:
clinically relevant, appropriate, clear, safe, evidence-based, and functional.

Each domain was rated using a 4-point Likert Scale

1= Not at all

2=Somewhat

3=Quite all
4= Highly
The content validity indices were computed as follows:

- Item-Level Content Validity Index (I-CVI): Proportion of experts rating the item as 3 or 4.
- Scale-Level Content Validity Index (S-CVI/Ave): Average of all I-CVI values across the scale.

An I-CVI ≥ 0.78 and S-CVI/Ave ≥ 0.90 were considered indicative of excellent content validity (8).

Data Analysis

Quantitative data from expert ratings were tabulated and analyzed using Microsoft Excel. For each item, the number of experts rating the item as 3 or 4 was divided by the total number of experts to yield the I-CVI. The average of all I-CVIs provided the S-CVI/Ave. Descriptive statistics were used to present findings, and qualitative feedback from experts was incorporated into the final revision of the program.

Finalization of the Program

After the validation process, exercises with an I-CVI below 0.78 were reviewed for potential modification or removal. Expert suggestions regarding dosage, positioning, and sequencing were integrated into the final structured program. The finalized version exercises were grouped across the three progressive phases, incorporating postural re-education, kinetic chain activation, and patient education.

RESULTS

Each of the six key domains of the structured exercise program-relevant, appropriate, clear, safe, evidence-based, and functional.
It was rated by ten experts using a 4-point Likert scale. The Item-Level Content Validity Index (I-CVI) was calculated for each domain as the proportion of experts who rated the item as either 3 or 4.
The I-CVI values for individual domains ranged from 0.87 to 1.00, indicating a high level of agreement among experts.
All domain scores exceeded the acceptable threshold of 0.78, demonstrating strong content validity at the item level.

Scale-Level Content Validity Index (S-CVI)

The overall content validity of the structured exercise program was assessed using the Scale-Level Content Validity Index, average method (S-CVI/Ave). This was calculated by taking the mean of the I-CVI scores obtained for each of the six evaluated domains.
The I-CVI values for these domains ranged from 0.87 to 1.00. The resulting S-CVI/Ave was 0.94, which indicates excellent content validity of the entire protocol. According to established standards, an S-CVI/Ave value ≥ 0.90 is considered to reflect a high level of agreement among experts and excellent validity at the scale level.
No domain scored below the acceptable threshold, and no major concerns were raised by the expert panel.

DISCUSSION

The present study aimed to develop and establish the content validity of a structured, evidence-based exercise program for patients with Subacromial Impingement Syndrome (SAIS), guided by the TIDieR framework and aligned with tissue-healing principles. The resulting program achieved an overall S-CVI/Ave of 0.94, indicating excellent expert agreement on content relevance, clarity, and clinical applicability. These findings support the program's potential as a standardized and comprehensive approach to SAIS rehabilitation.
The high level of expert consensus suggests that the developed exercise protocol addresses the multifactorial nature of SAIS rehabilitation more effectively than conventional protocols. Existing literature has identified several gaps in conventional exercise programs, including the absence of clear progression guidelines, poor integration of scapular control training, and minimal consideration of regional interdependence [1,2,3]. The structured program developed in this study systematically integrates these

elements through progression; each aligned with tissue-healing phases.

Experts rated items related to scapular retraction and stabilization with the highest I-CVI values, consistent with evidence indicating that restoration of scapular kinematics is central to reducing subacromial compression and improving shoulder function [4,5]. Similarly, exercises focusing on rotator cuff activation in neutral positions and closed-chain stabilization were rated as highly relevant, reinforcing their established role in early-phase rehabilitation to minimize mechanical stress while promoting controlled activation [6,7].

The outcomes of this study align closely with previous work emphasizing the need for well-structured, phase-based exercise interventions for SAIS. Ludewig and cook highlighted that alterations in scapular kinematics and muscle activation patterns are hallmark features of impingement syndromes, supporting targeted scapular and kinetic chain interventions [8]. Similarly, Kromer et al. demonstrated that individualized physiotherapy focusing on patient-specific impairments yields superior functional outcomes compared to generalized exercise protocols [9].

In contrast, earlier rehabilitation frameworks often emphasized rotator cuff strengthening alone, without systematically addressing thoracic mobility, cervical alignment, or lumbopelvic stability [10,11]. The current program bridges this gap by integrating regional interdependence principles, thereby promoting a holistic approach to shoulder function restoration.

Recent systematic reviews have also underscored the need for improved intervention reporting standards in musculoskeletal rehabilitation research. Pieters et al.and Shire et al. both emphasized that incomplete reporting and poor standardization hinder replication and clinical translation [12]. By employing the TIDieR framework, the present study ensures comprehensive documentation of each program component, addressing these long-standing limitations.

Also, the contextual factors such as occupational and ergonomic considerations the program supports a patient-centered rehabilitation approach, aligning with the International Classification of Functioning, Disability, and Health (ICF) model [13].

In summary, this study provides the content validity of a comprehensive, structured exercise protocol tailored for SAIS. The high S-CVI/Ave value confirms that the program's content aligns with both expert consensus and biomechanical rationale [14]. The incorporation of tissue-healing alignment and TIDieR-based approach establishes a new benchmark for designing, reporting, and implementing exercise interventions in shoulder rehabilitation.

CONCLUSION

The present study successfully developed and validated a structured exercise program for the management of Subacromial Impingement Syndrome (SAIS) through a systematic, evidence-based approach grounded in the TIDieR framework. The program demonstrated excellent content validity on its clinical relevance, clarity, and applicability.

Unlike conventional rehabilitation approaches that focus narrowly on rotator cuff strengthening, the developed protocol emphasizes scapular mechanics, trunk mechanism and tissue-healing alignment, thereby offering a functional rehabilitation pathway.

The structured progression across the acute, subacute, and remodeling phases provides a clear and clinically feasible guideline for physiotherapists, ensuring safety, optimal load progression, and patient-centered adaptation.

Future research should focus on evaluating the clinical effectiveness and implementation feasibility of the validated program in real-world physiotherapy settings. If proven effective, this structured model could form the foundation for a standardized rehabilitation protocol for SAIS, improving treatment consistency, outcomes, and

reporting quality across research and reproducibility in clinical practice.

Declaration by Authors
Ethical Approval: Approved
Acknowledgement: The authors sincerely acknowledge the expert panel members for their valuable time, insightful feedback, and constructive suggestions during the content validation process of the structured exercise program.
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Ludewig PM, Cook TM. Alterations in shoulder kinematics and associated muscle activity in people with symptoms of shoulder impingement. Phys Ther. 2000;80(3):276–91.
2. Michener LA, McClure PW, Karduna AR. Anatomical and biomechanical mechanisms of subacromial impingement syndrome. Clin Biomech. 2003;18(5):369–79.
3. Kibler WB, Ludewig PM, McClure PW, Michener LA, Bak K, Sciascia AD. Clinical implications of scapular dyskinesis in shoulder injury: the 2013 consensus statement. Br J Sports Med. 2013;47(14):877–85.
4. Cools AM, Dewitte V, Lanszweert F, Notebaert D, Roets A, Soetens B, et al. Rehabilitation of scapular muscle balance: which exercises to prescribe? Am J Sports Med. 2007;35(10):1744–51.
5. Holmgren T, Öberg B, Sjöberg I, Johansson K. Supervised strengthening exercises versus home-based movement exercises after arthroscopic acromioplasty: a randomized clinical trial. J Rehabil Med. 2012;44(1):12–8.
6. Littlewood C, Malliaras P, Bateman M, Stace R, May S, Walters SJ. The central nervous system--an additional consideration in "rotator cuff tendinopathy" and a potential basis for understanding response to loaded therapeutic exercise. Man Ther. 2013;18(6):468–72.
7. Ludewig PM, Braman JP. Shoulder impingement: biomechanical considerations in rehabilitation. Man Ther. 2011;16(1):33–9.
8. Kromer TO, de Bie RA, Bastiaenen CH. Effectiveness of individualized physiotherapy compared to a standard exercise protocol in patients with clinical signs of subacromial impingement syndrome: a randomized controlled trial. BMC Musculoskelet Disord. 2010; 11(1):114.
9. Lewis JS. Subacromial impingement syndrome: a musculoskeletal condition or a clinical illusion? Phys Ther Rev. 2011;16(5):388–98.
10. Littlewood C, Bateman M, Connor C, Gibson J, Horsley I, Jaggi A et al. Physiotherapists' recommendations for examination and treatment of rotator cuff related shoulder pain: A consensus exercise. Physiotherapy Practice and Research. 2019 Dec 1;40(2):87-94. Epub 2019 Sept 13. doi: 10.3233/PPR-190129.
11. Pieters L, Lewis J, Kuppens K, Jochems J, Bruijstens T, Joossens L, et al. An update of systematic reviews examining the effectiveness of conservative physical therapy interventions for subacromial shoulder pain. J Orthop Sports Phys Ther. 2020;50(3):131–41.
12. Shire AR, Stæhr TAB, Overby JB, Dahl MB, Jacobsen JS, Christiansen DH. Specific or general exercise strategy for subacromial impingement syndrome—does it matter? A systematic literature review and meta-analysis. BMC Musculoskelet Disord. 2017;18(1):158.
13. Svestková O. International classification of functioning, disability and health of World Health Organization (ICF). Prague Med Rep. 2008;109(4):268-74. PMID: 19537677.
14. Polit DF, Beck CT, Owen SV. Focus on research methods: is the CVI an acceptable indicator of content validity? Appraisal and recommendations. Res Nurs Health. 2007;30(4):459–67.

How to cite this article: Reshma Gurav, Prof. Bhavana Mhatre. Development and content validation of a structured exercise program for patients with subacromial impingement syndrome. *Int J Health Sci Res.* 2025; 15(11):110-115. DOI: *10.52403/ijhsr.20251115*

******