



Clinical Implications of Scapular Dyskinesia in Adhesive Capsulitis: Observational Study

Vijaya Krishna Kumar^{1,2}, Prathap Suganthirababu¹, Ayesha Saniya²

¹Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences, Chennai, India

²Dr B.R. Ambedkar College of Physiotherapy, Bangalore, India

(Received: 16 February 2026

Revised: 14 March 2026

Accepted: 25 April 2026)

KEYWORDS

Adhesive capsulitis, Scapular dyskinesia, Scapular assistance test, Scapular retraction test, Lateral scapular slide test, Isometric scapular pinch test.

ABSTRACT:

Background: Adhesive capsulitis, often referred to as frozen shoulder, is defined by a gradual onset of pain, stiffness, and limited mobility in the glenohumeral joint. This condition typically impacts individuals aged 40 to 60 and is more frequently observed in those with diabetes and various metabolic disorders. Scapular dyskinesia, characterised by changes in scapular positioning and movement, can lead to compromised shoulder function in affected individuals.

Aim: The objective is to assess the occurrence of scapular dyskinesia in individuals diagnosed with adhesive capsulitis and to evaluate its influence on shoulder functionality and clinical presentation.

Materials & Methods: An observational study was carried out involving 30 participants who satisfied the inclusion and exclusion criteria. The assessment of scapular dyskinesia was conducted utilising the Scapular Assistance Test (SAT), Scapular Retraction Test (SRT), Lateral Scapular Slide Test (LSST), and Isometric Scapular Pinch Test (ISPT). Demographic variables such as age, gender, and side of involvement were documented.

Results: The predominant age group among participants was 45–54 years, comprising 46.7% of the total, with an average age of 49.87 ± 7.60 years. Women represented 60% of the sample, whereas men made up 40%. There was a noted equal involvement of both the left and right shoulders. The Scapular Assistance Test yielded a positive result in 73.3% of participants, while the Scapular Retraction Test showed a positive outcome in 40%, and the Isometric Scapular Pinch Test demonstrated a positive response in 30%. All participants exhibited a negative result in the Lateral Scapular Slide Test.

Conclusion: A significant occurrence of scapular dyskinesia was noted in individuals with adhesive capsulitis, especially as demonstrated by the Scapular Assistance Test. The findings underscore the significance of evaluating scapular mechanics in the assessment and rehabilitation of frozen shoulder.

1. Introduction

Adhesive capsulitis, often referred to as frozen shoulder, is a persistent shoulder condition marked by pain and a gradual limitation of both active and passive glenohumeral movement, along with capsular fibrosis. The condition was initially identified in 1872 as periarthrosis scapulohumeral and subsequently referred to as adhesive capsulitis by Neviasser in 1945[1]. The estimated prevalence in the general population ranges from 2% to 5%, with elevated rates observed in individuals with diabetes mellitus, thyroid dysfunction, or those experiencing prolonged immobilization¹. Individuals aged 40 to 65 years are predominantly impacted, with a typical progression of the condition lasting from months to years [2]. Histological findings reveal fibroblastic proliferation, collagen deposition, and capsular thickening, especially noted within the rotator interval and coracohumeral ligament [3]. The

pathophysiology of AC is regarded as multifactorial, encompassing an initial synovial inflammatory response succeeded by fibrotic contracture of the joint capsule [4].

Clinically, AC advances through three interconnected stages: the freezing phase (characterised by pain and increasing stiffness), the frozen phase (predominantly stiffness with diminished pain), and the thawing phase (gradual restoration of mobility). Although it is often regarded as a self-limiting condition, persistent pain, functional disability, and incomplete recovery of range of motion are frequently observed, highlighting the necessity for effective rehabilitation strategies. A substantial amount of evidence underscores the significance of scapular dyskinesia, characterised by abnormal scapular motion or positioning, in relation to shoulder pathologies, including AC [5].



Dyskinesia can manifest as excessive scapular elevation, altered upward rotation, winging, or an abnormal scapulothoracic rhythm. In adhesive capsulitis, the restriction of the capsule and associated pain frequently leads to compensatory scapular movement patterns during arm elevation. This results in a diminished contribution from the glenohumeral joint and an increase in scapulothoracic motion. These compensatory adaptations may temporarily sustain functional elevation; however, they can result in inefficient biomechanics, muscular imbalances, and the continuation of symptoms. The clinical implications of scapular dyskinesia in adhesive capsulitis encompass both diagnostic and rehabilitative aspects. The accuracy of diagnostics may be affected if clinicians do not distinguish between genuine glenohumeral restriction and compensatory scapular motion [5]. Likewise, Rehabilitation outcomes may not reach their full potential unless there is a focused approach to addressing scapular control and stability. Multiple clinical assessments, such as the Scapular Assistance Test (SAT), Scapular Retraction Test (SRT), Lateral Scapular Slide Test (LSST), and Scapular Pinch Test, have been validated to identify dyskinetic patterns, differentiate sources of pain, and inform treatment planning.

The Scapular Assistance Test (SAT) evaluates the impact of manual assistance on scapular upward rotation and posterior tilt during arm elevation, determining whether this intervention alleviates pain or enhances motion. A positive test indicates that scapular dyskinesia may be contributing to the symptoms [2]. The Scapular Retraction Test (SRT) involves the patient executing resisted elevation in the empty-can position, with the test being repeated as the examiner provides manual stabilisation of the scapula in retraction. An enhancement in strength or a decrease in pain signifies a favourable SRT, connecting scapular positioning to rotator-cuff function [5]. The Lateral Scapular Slide Test (LSST) assesses scapular asymmetry by measuring the distance from the inferior angle of the scapula to the spine across various arm positions. Differences measured side-to-side exceeding 1.5 cm could suggest the presence of dyskinesia [3]. The Isometric Scapular Pinch Test evaluates the endurance of periscapular stabilisers by directing the subject to sustain scapular retraction for a duration of 15 to 20 seconds. The reproduction of symptoms or the inability to sustain the position indicates a potential weakness or imbalance.

Based on the above context, the study was undertaken to assess the occurrence of scapular dyskinesia in individuals with adhesive capsulitis and to evaluate its influence on shoulder function and clinical presentation.

2. Objectives

The objective is to assess the occurrence of scapular dyskinesia in individuals diagnosed with adhesive capsulitis and to evaluate its influence on shoulder functionality and clinical presentation.

3. Methods

An observational study was conducted at the Department of Physiotherapy, B.R Ambedkar College of Physiotherapy, Bangalore. The study included both male and female patients diagnosed with adhesive capsulitis who are aged between 40 and 60 years and have been diagnosed with diabetes and other metabolic disorders. Patients with adhesive capsulitis (including stages I, II, and III of frozen shoulder) were included. Individuals with fractures and bony abnormalities of the scapula, clavicle or humerus. Individuals presenting with glenohumeral instability and labral tear, and those with rotator cuff repair, were excluded from the study

A total of 30 participants diagnosed with adhesive capsulitis were assessed by using the tests, which include the scapular assistance test, scapular retraction test, lateral scapular slide test and isometric scapular pinch test

PROCEDURE:

A total of 30 participants diagnosed with adhesive capsulitis were assessed

1) Scapular Assistance Test (SAT):

The patient actively elevates the arm in flexion or abduction, the examiner places one hand on the superomedial border and the other on the inferior angle of the scapula, assisting upward rotation and posterior tilt throughout the movement.

2) Scapular Retraction Test (SRT):

The patient performs resisted elevation in the empty-can position the therapist manually stabilises the scapula in retraction. Improvement in strength or reduction in pain indicates a positive scapular retraction test.

3) Isometric Scapular Pinch Test:

The patient is instructed to squeeze the scapulae together without moving the arms, while the examiner may apply gentle resistance, observing for inability to maintain contraction or asymmetry.

4) Lateral Scapular Slide Test (LSST):

With the patient standing, the examiner measures the distance from the inferior angle of the scapula to the nearest spinous process in three positions: arms at sides, hands on hips, and 90°



abduction with internal rotation, noting any side-to-side differences.



Figure:1 (Scapular assistance test)



Figure:2 (Scapular retraction test)



Figure:3 (Isometric scapular pinch test)



Figure:4 (lateral scapular slide test)

4. Results

Statistical Analysis

The statistical analysis was done using SPSS 23.0. Numerical variables were presented using mean and standard deviation. Categorical variables expressed using frequency and percentage.

Table 1: Distribution Based on Age

Age	Frequency	Percentage
35-44years	7	23.33
45-54years	14	46.67
55-64years	9	30
Total	30	100.0

The study included 30 participants, with the majority aged between 45 and 54 years (46.7%), followed by 55–64 years (30%) and 35–44 years (23.3%). The mean age of the participants was 49.87 ± 7.60 years, with a minimum age of 36 years and a maximum of 60 years

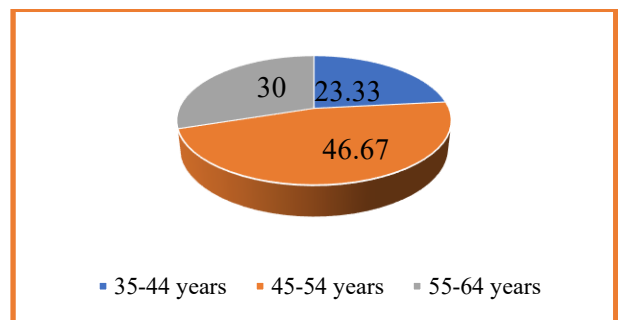


Figure 5: Representation based on age



		Frequency	Percent
Gender	Female	18	60.0
	Male	12	40.0
	Total	30	100.0

Table 2: Distribution based on gender

Regarding gender, 18 (60%) were female, and 12 (40%) were male

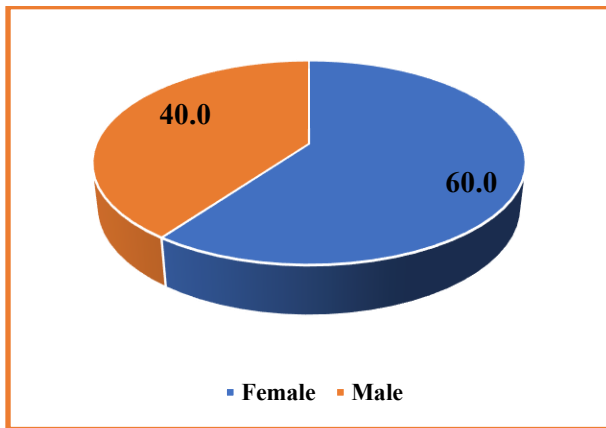


Figure 6: Representation based on gender

		Frequency	Percent
SIDE AFFECTED	Left	15	50.0
	Right	15	50.0
	Total	30	100.0

Table 3: Distribution based on side affected

Among the 30 participants, the side affected was equally distributed, with 15 (50%) having the left side affected and 15 (50%) having the right side affected.

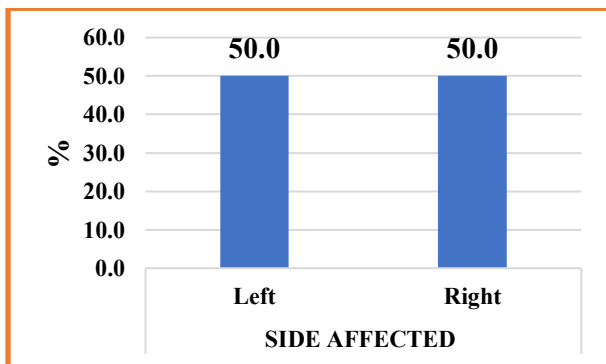


Figure 7: Representation based on the side affected

		Frequency	Percent
SCAPULAR ASSISTANCE TEST	Negative	8	26.7
	Positive	22	73.3
	Total	30	100.0

Table 4: Distribution based on scapular assistance test

Among the 30 participants, the Scapular Assistance Test was positive in 22 participants (73.3%) and negative in 8 participants (26.7%).

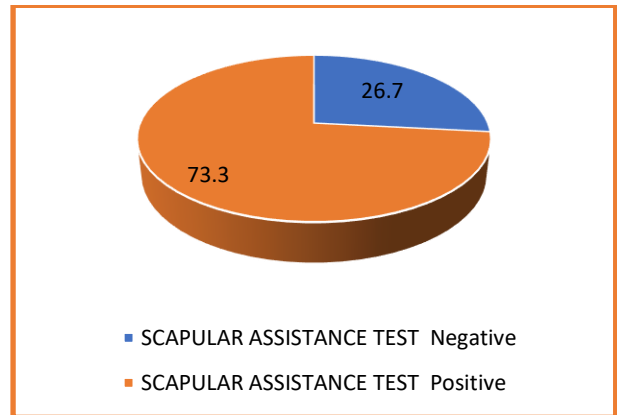


Figure 8: Representation based on scapular assistance test

		Frequency	Percent
SCAPULAR RETRACTION TEST	Negative	18	60.0
	Positive	12	40.0
	Total	30	100.0

Table 5: Distribution based on scapular retraction test

Among the 30 participants, the Scapular Retraction Test was negative in 18 participants (60%) and positive in 12 participants (40%).

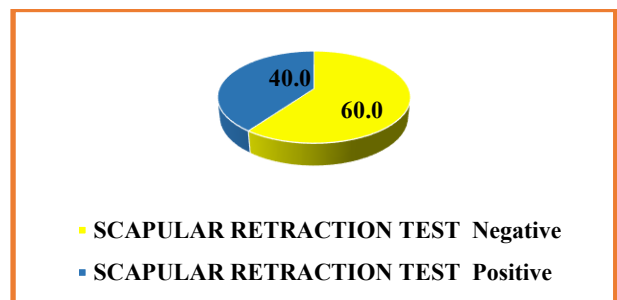


Figure 9: Representation based on scapular retraction test

		Frequency	Percent
ISOMETRIC SCAPULAR PINCH TEST	Negative	21	70.0
	Positive	9	30.0
	Total	30	100.0

Table 6: Distribution based on the Isometric scapular pinch test

The Isometric Scapular Pinch Test was negative in 21 participants (70%) and positive in 9 participants (30%).

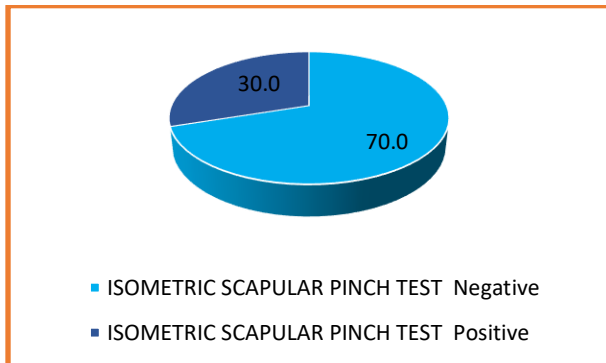


Figure 10: Representation based on the Isometric scapular pinch test

		Frequency	Percent
LATERAL SCAPULAR SLIDE TEST	Negative	30	100.0

Table 7: Distribution based on the lateral scapular slide test

The Lateral Scapular Slide Test was negative in all participants (100%).

A total of 30 participants diagnosed with adhesive capsulitis were incorporated into the study. The average age of the participants was 49.87 ± 7.60 years, with an age range of 36 to 60 years, suggesting that the condition primarily impacted middle-aged individuals. The age distribution indicated that the largest proportion of participants was in the 45–54 years age group (46.7%), followed by those aged 55–64 years (30%) and 35–44 years (23.3%). This suggests a greater prevalence of adhesive capsulitis among the late middle-aged population.

The gender distribution revealed that females represented a greater proportion at 60%, while males accounted for 40%, suggesting a potential gender predisposition. The distribution of involvement was balanced, with 15 participants (50%) exhibiting left shoulder involvement and 15 participants (50%) demonstrating right shoulder involvement, indicating an absence of side dominance in the incidence of adhesive capsulitis.

The evaluation of scapular dyskinesia was conducted through various clinical assessments. The Scapular Assistance Test (SAT) yielded positive results in 22 participants (73.3%), suggesting a significant prevalence of altered scapular motion associated with shoulder dysfunction. This test yielded the highest frequency of positive results among all the assessment methods employed. The Scapular Retraction Test (SRT) yielded positive results in 12 participants (40%), indicating a moderate degree of dysfunction in the scapular stabilising

muscles. The Isometric Scapular Pinch Test (ISPT) yielded positive results in 9 participants (30%), indicating a relatively lower yet significant impairment in scapular muscle strength and endurance.

The Lateral Scapular Slide Test (LSST) yielded negative results in all participants (100%), suggesting that static scapular positioning abnormalities were not present in this cohort, and indicating that dynamic dysfunction may have a more substantial impact in cases of adhesive capsulitis.

The findings indicate a significant prevalence of scapular dyskinesia, especially when evaluated using dynamic functional tests like the Scapular Assistance Test. The differences in positivity across various tests indicate that scapular dyskinesia in adhesive capsulitis is likely more related to functional movement rather than being structural or static.

The findings underscore the significance of integrating a thorough scapular evaluation in patients with adhesive capsulitis. The prevalence of positive results in dynamic assessments highlights the necessity for specialised physiotherapy approaches that emphasise scapular mobility, neuromuscular control, and muscle activation to enhance overall shoulder function and patient outcomes.

5. Discussion

The objective of the study was to examine the prevalence and functional implications of scapular dyskinesia in individuals with adhesive capsulitis, aiming to improve clinical evaluation strategies. The findings demonstrate that scapular dyskinesia is frequently observed within this population, underscoring its possible influence on shoulder functionality and rehabilitation results.

The present study indicates that the largest group of participants fell within the age range of 45 to 54 years (46.7%), with those aged 55 to 60 years comprising 30%. This distribution is consistent with existing epidemiological data that demonstrate adhesive capsulitis primarily impacts middle-aged adults [6-8]. The prevalence associated with age can be linked to degenerative changes in the shoulder capsule, decreased tissue elasticity, and modifications in scapular kinematics that arise as one ages [9-10].

The analysis of gender distribution indicated a marginally higher prevalence among females relative to males, aligning with existing literature that documents a greater incidence of adhesive capsulitis in women [11-14].

The predominant side was more often impacted, indicating that repetitive use or overuse of the shoulder may play a role in the development of both adhesive capsulitis and related scapular



dyskinesia. The evaluation of scapular assessment tests revealed differing levels of positivity among participants [15].

The Lateral Scapular Slide Test demonstrated the highest positivity, highlighting its effectiveness in identifying scapular dyskinesia within this population. Additional tests indicated reduced positivity rates, implying that employing a variety of assessment methods may be essential for the precise identification of dyskinetic scapular patterns [16-18].

The study emphasises that scapular dyskinesia is a significant clinical characteristic in patients with adhesive capsulitis.

6. Conclusion

This study illustrates that scapular dyskinesia is a common clinical characteristic observed in individuals with adhesive capsulitis, especially among middle-aged adults and more frequently in females. The most commonly affected shoulder was the dominant one, indicating that repetitive use may contribute to its development. The evaluation conducted through various scapular tests indicated that specific assessments, including the Lateral Scapular Slide Test, demonstrated greater sensitivity in identifying dyskinesia. Clinically, the presence of scapular dyskinesia can contribute to reduced shoulder function, pain, and impaired activities of daily living, emphasising the importance of early assessment and targeted rehabilitation interventions. These findings endorse the incorporation of scapular assessment and corrective approaches in the treatment of adhesive capsulitis to enhance functional results.

References

1. St Angelo, J. M. *Adhesive Capsulitis (Frozen Shoulder)*; Stat Pearls Publishing, 2023.
2. Seitz, A. L.; McClure, P. W.; Finucane, S.; et al. The Scapular Assistance Test Results in Changes in Shoulder Pain and Function in Patients with Shoulder Impingement Syndrome. *J. Ortho. Sports Phys. Ther.* 2012, 42 (10), 893–903.
3. Curtis, T.; McCluskey, G.; McCreesh, K. The Lateral Scapular Slide Test: A Reliability Study. *Physiotherapy* 2006, 92 (3), 158–163.
4. Kelley, M. J.; Cummings, T. M.; Strube, M. J.; et al. Shoulder Pain and Mobility Deficits: Adhesive Capsulitis. *J. Ortho. Sports Phys. Ther.* 2013, 43 (5), A1–A31.
5. Chang, L. Shoulder Instability, Dysfunction and Scapular Dyskinesia. *Am. J. Phys. Med. Rehab.* 2017, 96 (1 Suppl), S1–S10.
6. McClure, P.; Greenberg, E.; Kareha, S. Evaluation and Management of Scapular Dysfunction. *Sports Med. Arthrosc. Rev.* 2012, 20 (1), 39–48. <https://doi.org/10.1097/JSA.0b013e31824716a8>.
7. Sanchez, H. M.; Sanchez, E. G. M. Scapular Dyskinesia: Biomechanics, Evaluation and Treatment. *Int. Phys. Med. Rehab. J.* 2018, 3 (6), 514–520. <https://doi.org/10.15406/ipmrj.2018.03.00157>.
8. Jildeh, T. R.; Ference, D. A.; Abbas, M. J.; Jiang, E. X.; Okoroa, K. R. Scapulothoracic Dyskinesia: A Concept Review. *Curr. Rev. Musculoskeletal. Med.* 2021, 14 (3), 246–254. <https://doi.org/10.1007/s12178-021-09705-8>.
9. Magee, D. J. *Orthopaedic Physical Assessment*, 6th ed.; Elsevier: St. Louis, MO.
10. Depreli, O.; Angin, E.; Yatar, L. G.; Kirmizigil, B.; Malkoc, M. Scapular Dyskinesia and Work-Related Pain in Office Workers: A Pilot Study. *Int. J. Phys. Ther. Rehab.* 2016, 2, 117.
11. Khazzam, M.; Gates, S. T.; Tisano, B. K.; Kukowski, N. Diagnostic Accuracy of the Scapular Retraction Test in Assessing the Status of the Rotator Cuff. *Ortho. J. Sports Med.* 2018, 6 (10), 2325967118799308.
12. Rabin, A.; Irrgang, J. J.; Fitzgerald, G. K.; Eubanks, A. The Intertester Reliability of the Scapular Assistance Test. *J. Ortho. Sports Phys. Ther.* 2006, 36 (9), 653–660.
13. Kibler, W. B.; Ludewig, P. M.; McClure, P. W.; Michener, L. A.; Bak, K.; Sciascia, A. D. Clinical Implications of Scapular Dyskinesia in Shoulder Injury: The 2013 Consensus Statement from the “Scapular Summit”. *Br. J. Sports Med.* 2013, 47 (14), 877–885.
14. Depreli, O.; Angin, E.; Yatar, I. G.; Kirmizigil, B.; Malkoc, M. Scapular Dyskinesia and Work-Related Pain in Office Workers: A Pilot Study. *Int. J. Phys. Ther. Rehab.* 2016, 8 (1), 12–18.
15. Panagiotopoulos, A. C.; Crowther, I. M. Scapular Dyskinesia, the Forgotten Culprit of Shoulder Pain and How to Rehabilitate. *SICOT-J* 2019, 5, 45.
16. Rajpurohit, B. R.; Anap, D. Scapular Dyskinesia among Patients with Shoulder Dysfunction: A Cross-Sectional Study. *VIMS J. Phys. Ther.* 2021, 2 (1), 22–28.
17. Ribeiro, L. P.; Barreto, R. P. G.; Fernandes, R. A. S.; Camargo, P. R. What Factors Contribute to the Scapular Assistance Test Result? A Classification and Regression Tree Approach. *PLoS One* 2022, 17 (5), e0268570.
18. Sağlam, G.; Telli, H. The Prevalence of Scapular Dyskinesia in Patients with Back, Neck, and Shoulder Pain and the Effect of This Combination on Pain and Muscle Shortness. *Agri* 2022, 34 (2), 100–108.