ScientificScholar®
Knowledge is power
Publisher of Scientific Journals

https://jhas-nu.in/

Journal of Health and Allied Sciences NU

Article in Press

Original Article

Scapular Dyskinesis in Shoulder Pain Conditions: A Correlational Study

Pruthviraj Rudraswamy[1], Dhanesh Kumar K U[1], Anusha V Shenai[2], Stephiya Davis[3]

[1]Nitte Institute of Physiotherapy, NITTE (Deemed to be University), Deralakatte, Mangalore, [2]Departments of Musculoskeletal Sciences and [3]Sports Sciences, Rashtreeya Vidyalaya College of Physiotherapy, 4th Block, Jayanagar, Bengaluru, Karnataka, India

ABSTRACT

Objectives: Shoulder disorders, affecting 15-25% of patients seeking orthopedic and physiotherapy care, often involve scapular dyskinesia (SD), which is an abnormality in scapulothoracic rhythm. Altered scapular kinematics may contribute to or worsen conditions like rotator cuff tears, but the relationship between SD and shoulder pain remains unclear. This correlational study aims to explore the connection between SD and shoulder pain conditions, assess the prevalence of SD, and identify SD subgroups within these conditions.

Material and Methods: Thirty-five participants aged 40-60 years were enrolled over six months. Scapular dyskinesis was evaluated using the dynamic scapular dyskinesis test (SDT), and shoulder pain and disability were assessed with the Oxford shoulder score. Point biserial correlation analysis was performed on the collected data.

Results: The study found a moderate positive correlation between scapular dyskinesis and shoulder pain and disability, though this correlation was not statistically significant for either shoulder (left: r=0.277, P=0.108; right: r=0.286, P=0.096). These findings suggest an intermediate relationship between SD and shoulder pain/disability, but further research is needed to clarify whether improving SD leads to functional improvement.

Conclusion: The study concluded that there is an intermediate positive correlation between scapular dyskinesis and shoulder pain and disability in among the subjects having shoulder pain conditions but was not statistically significant for both the shoulders. Future studies should explore whether there is causal effect between improvement in scapular dyskinesis and function.

Keywords: Biomechanics, Dyskinesia, Scapula, Shoulder pain, Subacromial pain syndrome

INTRODUCTION

The shoulder is a complex region consisting of four coordinated joints: the glenohumeral, acromioclavicular, sternoclavicular, and scapulothoracic joints. The glenohumeral (GH) joint, with its large humeral head and small glenoid surface, is designed for maximum mobility.[1] The forelimb is critical for various of locomotor behaviours in nonhuman hominoids, from knuckle walking to suspension. Greater mobility is achieved at the cost of stability.[2,3] The scapula plays a vital role in shoulder function by linking the shoulder complex to the cervical spine, providing both mobility and stability to the neck and shoulder region.[4] The scapulohumeral rhythm (SHR), or synchronous coupled motion between the scapula and humerus, is required for effective arm movement and allows for GH alignment to optimize joint stability.[5]

Musculoskeletal disorders of the shoulder have been identified as the third most common reason for medical consultation with healthcare services.[6] Shoulder pain or disorders are widespread in the general population, with prevalence rates ranging from 19 to 31%, 5-47% for 1 year, and 7-69% for lifetime prevalence.[7] Among the shoulder pathologies, Rotator cuff disorders are the most frequent pathologies and represent 50-80% of shoulder conditions treated by health professionals.[8] Subacromial pain syndrome (SAPS) also has been the most frequent presentation, the prevalence of which is between 20 and 33% in the general population and may impact work productivity and healthcare expenses over time.[9] Diverse internal and external factors have been proposed as potential sources of shoulder discomfort stemming from isolated or combined origins.[10] Alterations in scapular biomechanics have often been linked with SAPS, which typically include increased scapular internal rotation,

***Corresponding author:** Dr. Dhanesh Kumar K U, Nitte Institute of Physiotherapy, Deralakatte, Mangalore, Karnataka, India. principal.nipt@nitte.edu.in

Received: January, 2025 **Accepted:** February, 2025 **Epub Ahead of Print:** March 28, 2025 **Published:** *** **DOI:** ***

decreased upward rotation & decreased posterior tilt.[11] The scapula is a critical link in the kinetic chain, allowing proper strength transfer from the body core to the arm. SD increases the risk of developing shoulder pain even if it is initially asymptomatic. There are uncertainties about the causal relationship between scapular alterations and shoulder pain.[5, 12-14]

Scapular dyskinesis is characterized by changes in the orientation of the scapula and patterns of scapular motion about the thoracic cage and can be seen[15,16]. Dyskinesia does not specify the exact dysfunction, as various factors can affect scapular position, including poor posture, thoracic and cervical curvature issues, clavicle fractures, joint injuries, instabilities, arthritis, and muscle imbalances. Scapular dyskinesis is seen in 68 percent of rotator cuff abnormalities patients, 94 per cent of labral tears patients, and 100 per cent of glenohumeral instability patients.[5,16,17] Scapular dyskinesis (SD) is classified into three types: Type 1 involves prominence of the inferior medial scapular border with abnormal rotation around a transverse axis; Type 2 features prominence of the entire medial scapular edge with abnormal rotation around a vertical axis; and Type 3 is characterized by superior translation of the scapula with a prominence of its superior medial border.[15]

Several clinical assessments for detecting scapular dyskinesis include visual examinations—both static and dynamic—and symptom modification tests.[18] One key method is the scapular dyskinesis test (SDT), a dynamic evaluation where the patient performs repetitive, active shoulder flexion and abduction movements against resistance while the clinician observes scapular and humeral coordination from behind.[19] This test has proven reliable and valid.

Patient reported outcome measures (PROMs) are commonly used in clinical practice and research to evaluate treatment effectiveness and changes in disease severity. The Oxford shoulder score (OSS) is a disease-specific PROM frequently used to assess pain and shoulder function.[20,21]

A review found that scapular dyskinesis increases the likelihood of developing shoulder pain by 43% in asymptomatic athletes, and it is also common in the asymptomatic general population. However, it remains unclear whether scapular dyskinesis directly contributes to shoulder pain.[22]

This study aims to explore the relationship between scapular dyskinesis and shoulder pain conditions, providing insights for diagnosis and treatment in orthopaedic and physiotherapy care. The hypothesis posits a potential correlation between scapular dyskinesis and various shoulder conditions. Specifically, the study seeks to determine this correlation, assess the prevalence of scapular dyskinesis among shoulder pain conditions, and identify subgroups of scapular dyskinesis within these conditions.

MATERIAL AND METHODS

Study design

A Correlational study and the study protocol were approved by the Institutional Ethics Committee (Ref: RVCP/RESEARCH/0210 dated 24-08-2021). The study was carried out in the outpatient department of Musculoskeletal Physiotherapy over 6 months between February 2022 and June 2022.

The study determined a total sample size of n=35 using a formula based on the estimated prevalence from a similar prior study with a prevalence rate of 22.9% used for the calculation without considering statistical power.[23] The formula utilized was $n=\{[(Z\alpha/2)^2 * p * q] \div d^2\}$, where $\alpha=0.05$, Z 0.025=1.96, p=22.9% (0.229), q=1-p=0.771, and d=15% (0.15).

Thus, $n=\{[(1.96)^2\times0.229\times0.771]\} \div (0.15)^2$, which rounded up to 30 with a 15% allowance for non-response error, resulting in a final sample size of n=35.[23]

The study employed purposive sampling as the chosen technique for sample selection.

Participant selection

The study's abbreviated duration constrained the study's sample size, the consideration of the calculated prevalence of shoulder patients in the study setting, and findings from previous studies in the same field.[24]

Inclusion criteria for this study are: subjects aged 40-60 years who are willing to participate as volunteers and sign a written informed consent form, have experienced unilateral or bilateral shoulder pain for more than three months, and exhibit at least one positive sign from the following tests: Neer's impingement test (sensitivity: 78%; specificity: 58%), Hawkins Kennedy test (sensitivity: 58%; specificity: 67%), painful arc (sensitivity: 53%; specificity: 78%), or drop arm test (sensitivity: 73%; specificity: 77%).[22,25] Participants must also be in the initial (painful) stage of a frozen shoulder. Exclusion criteria include a history of significant shoulder trauma, recurrent shoulder dislocation, shoulder surgery within the past year, shoulder pain originating from the cervical spine, and shoulder conditions resulting from disorders such as arthritis (e.g., rheumatoid arthritis) or neurological issues (e.g., stroke).

Data on the participants' sociodemographic characteristics, including age, gender, occupation, hand dominance, and the side and duration of their shoulder pain, were gathered and documented.

Scapular dyskinesis test (SDT)

Each subject performed five repetitions of bilateral active shoulder flexion and abduction, using 1.4 kg (3 lb) dumbbells for those under 68.1 kg and 2.3 kg (5 lb) dumbbells for those 68.1 kg or more[19]. Movements were executed on a 3-second count, and if pain prevented the use of weights, the test was completed without them. The examiner observed from behind and classified scapulohumeral rhythm as normal, subtle dyskinesis, or obvious dyskinesis based on movement consistency across trials. The ratings for the test movements included normal motion (no abnormalities), subtle abnormality (mild, inconsistent evidence of abnormality), and obvious abnormality (clear abnormalities evident in at least 3 out of 5 trials). The final rating combined both flexion and abduction test movements: normal (both rated as normal or one normal with the other as subtle), subtle abnormality (both rated as having subtle abnormalities), and obvious abnormality (at least one rated as having an obvious abnormality). After the test, subjects completed the Oxford shoulder score (OSS), consisting of 12 items evaluating pain, daily activities, and overall satisfaction. Each item is rated from 0 to 4, with higher scores indicating better shoulder function. The overall OSS score ranges from 0 to 48, where 48 indicates optimal function and quality of life.[21]

Statistical analysis

The data collected for the study was input into MS Excel and analyzed using R software version 4.1.0. Appropriate statistical tests were employed for analysis, and the findings were presented through bar graphs, tables, and scatter diagrams on subsequent pages. The analysis approach encompassed the following steps: Categorical variables were summarized in tabular format, presenting results in frequency and percentage. Quantitative variables were described using descriptive statistics, including mean, standard deviation, and a 95% confidence interval for the mean.

Graphical representations were used when deemed appropriate. To determine the correlation between the scapular dyskinesis test (SDT) and the Oxford shoulder score (OSS), a statistical test known as point biserial correlation was employed, with the scapular dyskinesis test values categorized as dichotomous variables and the Oxford shoulder score values treated as continuous variables. Statistical significance was attributed to results with a p-value of ≤ 0.05.

RESULTS

The present study involved 35 subjects with shoulder pain, averaging 51.93 years (SD=4.586). Of these, 12 (34.3%) were aged 40 to 50 years, and 23 (65.7%) were between 50 and 60 years. Gender distribution included 19 males (54.3%) and 16 females (45.7%). Most participants were homemakers (n=14, 40.0%), followed by business professionals (n=9, 25.7%), IT professionals (n=5, 14.3%), retirees (n=3, 8.6%), and others (n=4, 11.5%). Hand dominance was predominantly right (n=33, 94.3%), with 2 (5.7%) left-handed. Regarding pain localization, 17 (48.6%) reported right shoulder pain, and 13 (37.1%) had left shoulder pain. Pain duration varied, with 14 (40.0%) experiencing pain for ≤5 months, 16 (45.7%) for 6-10 months, and 5 (14.3%) for over 10 months. This comprehensive analysis provides valuable insights into the demographic and clinical characteristics of the study population.

Scapular dyskinesis was assessed using the scapular dyskinesis test (SDT), while shoulder pain and disability were evaluated using the Oxford shoulder score (OSS). Point biserial correlation analysis revealed a weak positive correlation between left SDT scores and OSS (r=0.277, p=0.108), indicating no significant correlation between scapular dyskinesis and shoulder pain. Although an intermediate positive correlation was observed between right SDT scores and OSS, it was not statistically significant. These findings indicate no significant correlation between scapular dyskinesis and shoulder pain.

Results from the scapular dyskinesis test showed that 18 subjects (51.43%) exhibited a normal scapular movement pattern on the left side, while 12 (34.29%) demonstrated normalcy on the right side. Subtle abnormalities were observed in 12 (34.29%) and 15 (42.86%) of subjects on the left and right sides, respectively, with obvious abnormalities found in 5 (14.29%) on the left and 8 (22.86%) on the right. These findings provide a detailed characterization of scapular dyskinesis distribution within the study population [Figures 1-4].

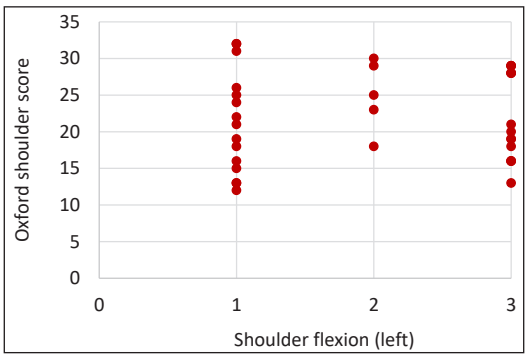

Figure 1: Scattered diagram-showing correlation between scapular dyskinesis test- Flexion (left) and Oxford shoulder score (OSS) in individuals with shoulder pain conditions. Note: 1 – Normal, 2 – OA, 3 – SA. OA: Obvious abnormality, SA: Subtle abnormality.

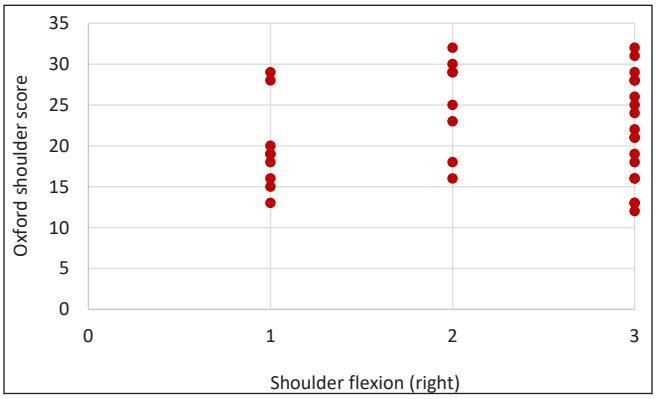

Figure 2: Scattered diagram-showing correlation between scapular dyskinesis test- Flexion (right) and Oxford shoulder score in individuals with shoulder pain conditions. Note: 1 – Normal, 2 – OA, 3 – SA. OA: Obvious abnormality, SA: Subtle abnormality.

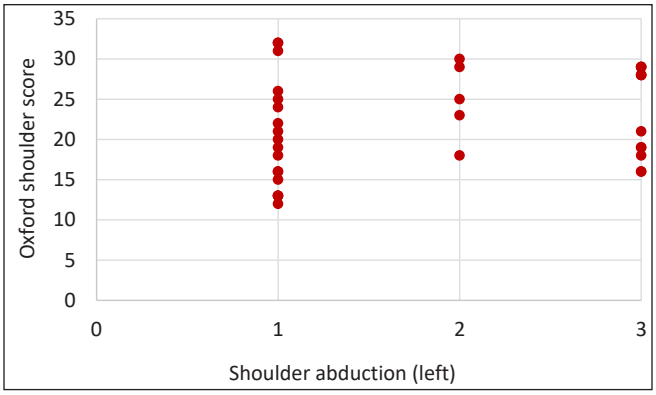

Figure 3: Scattered diagram-showing correlation between scapular dyskinesis test- Abduction (left) and Oxford shoulder score in individuals with shoulder pain conditions. Note: 1 – Normal, *2* – OA, 3 – SA. OA: Obvious abnormality, SA: Subtle abnormality.

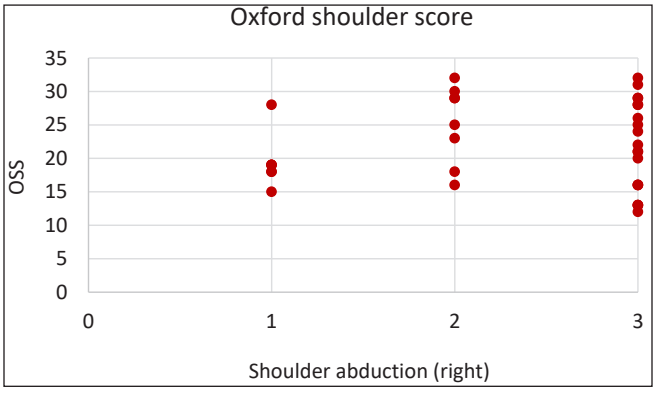

Figure 4: Scattered diagram-showing correlation between scapular dyskinesis test- Abduction (right) and Oxford shoulder score in individuals with shoulder pain conditions. Note: 1 – Normal, 2 – OA, 3 – SA. OA: Obvious abnormality, SA: Subtle abnormality.

DISCUSSION

This study aimed to analyse the relationship between scapular dyskinesis and shoulder pain conditions, focusing on the prevalence of dyskinesis among individuals with shoulder pain and identifying subgroups within this population. A total of 35 participants, screened based on specific inclusion and exclusion criteria, voluntarily consented to the study. Scapular dyskinesis was assessed using the scapular dyskinesis test (SDT), while shoulder pain and disability were evaluated with the Oxford shoulder score (OSS), providing a comprehensive analysis of their relationship in the participant group.

The scapular dyskinesis test revealed that 51.43% of subjects exhibited normal scapular movement on the left side and 34.29% on the right side. Subtle abnormalities were observed in 34.29% on the left and 42.86% on the right. Additionally, obvious abnormalities were found in 14.29% on the left and 22.86% on the right. Numerous studies have confirmed consistent scapular movement patterns, providing evidence of ongoing scapular upward rotation, posterior tilting, and external rotation when the arm is raised overhead.[26,27] Scapular dyskinesis is defined as altered scapular position at rest or during arm movements.[5,28] Modifications in scapular kinematics during arm movements are related to shoulder pain.[29]

The role of scapular dyskinesis in influencing shoulder symptoms has been a subject of ongoing debate in the literature. Some authors have posited that suboptimal scapular alignment could alter shoulder mechanics, leading to an increased risk of shoulder pain.[5,22,26]

Our study delves into this discourse by examining the prevalence of shoulder pathologies, particularly subacromial pain syndrome (SAPS), the most observed presentation in individuals experiencing shoulder pain.[30] As reported by a descriptive cross-sectional study, the prevalence of shoulder pathologies of 10.5%.[31] The patients analysed were mainly homemakers, retirees and housekeepers. In this study, 40 percent of the subjects were homemakers, 25.7 percent were in business, 14.3 percent were IT professionals, and the rest were both retired personnel and in other occupations. Shoulder pain becomes more common as individuals age, particularly in women. It ranges from a point prevalence of 6.9% to 26%, a 1-month prevalence of 18.6% to 31%, a 1-year prevalence of 4.7% to 46.7%, and a lifetime prevalence of 6.7% to 66.7%.[32,33,34]

Participants reported varying durations of shoulder pain, with 45.7% experiencing discomfort for 6-10 months, 40% for less than 5 months, and 14.3% for over 10 months. Right shoulder pain was more prevalent (48.6%) than left (37.1%),

and 14.3% had bilateral pain. A significant association was found between the dominant hand and the pain side, as 16 of the 17 individuals with right shoulder pain were right-hand dominant, with higher pain intensity linked to the dominant side.

Scapular dyskinesis (SD) can either result from shoulder pathologies or contribute to their development. Within SD, both underlying proximal and distal factors can be discerned.[35] Although scapular dyskinesis has already been associated with shoulder pain, direct relationships between shoulder symptoms and scapular dyskinesis are still uncertain.[5,22,36,37]

In the SDT, loading is applied to provoke abnormal scapular motion because muscular fatigue increases compensatory strategies.[38,39] Furthermore, most studies used a cross-sectional design, which cannot conclude the cause-and-effect relationship between scapulothoracic alterations and shoulder pain. It is unclear whether scapular alterations are compensatory (the result of an injury) or contributory (the subject is predisposed to injury) to shoulder pathology.

Limitations

Distinguishing subtle dyskinesis from normal scapular movement proved challenging despite the test's good concurrent validity against an electromagnetic motion tracking system. Additionally, the uncontrolled velocity of arm movements may have affected scapulothoracic kinematics, leaving the relationship between scapular dyskinesis and potential injuries to shoulder structures uncertain.

CONCLUSION

This study identified a weak positive correlation between scapular dyskinesis and shoulder pain/disability that was not statistically significant, emphasizing the complexity of their relationship. It highlights the need for larger, longitudinal studies and innovative approaches like wearable sensors to better understand and address these issues in individuals with shoulder pain.

Ethical approval: The research/study approved by the Institutional Ethics Committee at Rashtreeya Vidyalaya College of Physiotherapy, number RVCP/RESEARCH/0210, dated 24th August 2021.
Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent.
Financial support and sponsorship: Nil.
Conflicts of interest: There are no conflicts of interest.
Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The authors confirm that there was no use of Artificial Intelligence (AI)-Assisted Technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. Bakhsh W, Nicandri G. Anatomy and physical examination of the shoulder. Sports Med Arthrosc Rev 2018;26:e10-22.
2. Chang L-R, Anand P, Varacallo M. Anatomy, shoulder and upper limb, glenohumeral joint. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020. p.2.
3. Kadi R, Milants A, Shahabpour M. Shoulder anatomy and normal variants. J Belg Soc Radiol 2017;101:3.
4. Cools AMJ, Struyf F, De Mey K, Maenhout A, Castelein B, Cagnie B. Rehabilitation of scapular dyskinesis: From the office worker to the elite overhead athlete. Br J Sports Med 2014;48:692-7.
5. Kibler WB, Ludewig PM, McClure PW, Michener LA, Bak K, Sciascia AD. Clinical implications of scapular dyskinesis in shoulder injury: The 2013 consensus statement from the "Scapular Summit." Br J Sports Med 2013;47:877-85.
6. Greving K, Dorrestijn O, Winters JC, Groenhof F, van der Meer K, Stevens M, *et al*. Incidence, prevalence, and consultation rates of shoulder complaints in general practice. Scand J Rheumatol 2012;41:150-5.
7. Wærsted M, Koch M, Veiersted KB. Work above shoulder level and shoulder complaints: a systematic review. Int Arch Occup Environ Health 2020;93:925-54.
8. Doiron-Cadrin P, Lafrance S, Saulnier M, Cournoyer É, Roy JS, Dyer JO, *et al*. Shoulder rotator cuff disorders: A systematic review of clinical practice guidelines and semantic analyses of recommendations. Arch Phys Med Rehabil 2020;101:1233-42.
9. Hallman DM, Holtermann A, Dencker-Larsen S, Birk Jørgensen M, Nørregaard Rasmussen CD. Are trajectories of neck-shoulder pain associated with sick leave and workability in workers? A 1-year prospective study. BMJ Open 2019;9:e022006.
10. Navarro-Ledesma S, Fernandez-Sanchez M, Struyf F, Luque Suarez A. Association of both scapular upward rotation and scapulothoracic muscle lengths with shoulder pain, function, and range of movement. J Manipulative Physiol Ther 2020;43:824-31.
11. Ribeiro LP, Barreto RPG, Pereira ND, Camargo PR. Comparison of scapular kinematics and muscle strength between those with a positive and a negative Scapular Assistance Test. Clin Biomech (Bristol, Avon) 2020;73:166-71.
12. Kamonseki DH, Haik MN, Camargo PR. Scapular movement training versus standardized exercises for individuals with chronic shoulder pain: protocol for a randomized controlled trial. Braz J Phys Ther 2021;25:221-9.
13. Burn MB, McCulloch PC, Lintner DM, Liberman SR, Harris JD. Prevalence of scapular dyskinesis in overhead and nonoverhead athletes: A systematic review. Orthop J Sports Med 2016;4:2325967115627608.
14. Clarsen B, Bahr R, Andersson SH, Munk R, Myklebust G. Reduced glenohumeral rotation, external rotation weakness, and scapular dyskinesis are risk factors for shoulder injuries among elite male handball players: A prospective cohort study. Br J Sports Med 2014;48:1327-33.
15. Kibler WB, Sciascia A. Current concepts: scapular dyskinesis. Br J Sports Med 2010;44:300-5.

16. Kibler WB, Sciascia A, Wilkes T. Scapular dyskinesis and its relation to shoulder injury. J Am Acad Orthop Surg 2012;20:364-72.
17. Carnevale A, Longo UG, Schena E, Massaroni C, Lo Presti D, Berton A, *et al*. Wearable systems for shoulder kinematics assessment: A systematic review. BMC Musculoskelet Disord 2019;20:546.
18. Larsen CM, Juul-Kristensen B, Lund H, Søgaard K. Measurement properties of existing clinical assessment methods evaluating scapular positioning and function. A systematic review. Physiother Theory Pract 2014;30:453-82.
19. Christiansen DH, Møller AD, Vestergaard JM, Mose S, Maribo T. The scapular dyskinesis test: Reliability, agreement, and predictive value in patients with subacromial impingement syndrome. J Hand Ther 2017;30:208-13.
20. Revicki D, Hays RD, Cella D, Sloan J. Recommended methods for determining responsiveness and minimally important differences for patient-reported outcomes. J Clin Epidemiol 2008;61:102-9.
21. Dawson J, Fitzpatrick R, Carr AJ, Churchman D. Psu23 assessing the outcome of shoulder surgery: Development, validation and responsiveness of the patient-reported Oxford shoulder score (Oss). Value Health 2011;14:A90.
22. Hickey D, Solvig V, Cavalheri V, Harrold M, Mckenna L. Scapular dyskinesis increases the risk of future shoulder pain by 43% in asymptomatic athletes: a systematic review and meta-analysis. Br J Sports Med 2018;52:102-10.
23. Bhawna, Multani NK, Kundu ZS. Prevalence of shoulder pain among adults in Northern India. Asian J Health Med Res 2016;2:18-22.
24. Rajpurohit B, Anap D. Scapular dyskinesis among patients with shoulder dysfunction – A cross-sectional study. VIMS J Phys Ther 2021;3:39-46.
25. Sanchez HM, Sanchez EG, Tavares LI. Association between scapular dyskinesia and shoulder pain in young adults. Acta Ortop Bras 2016;24:243-8.
26. McClure PW, Michener LA, Sennett BJ, Karduna AR. Direct 3-dimensional measurement of scapular kinematics during dynamic movements in vivo. J Shoulder Elbow Surg 2001;10:269-77.
27. Keshavarz R, Bashardoust Tajali S, Mir SM, Ashrafi H. The role of scapular kinematics in patients with different shoulder musculoskeletal disorders: A systematic review approach. J Bodyw Mov Ther 2017;21:386-400.
28. McCreesh KM, Crotty JM, Lewis JS. Acromiohumeral distance measurement in rotator cuff tendinopathy: is there a reliable, clinically applicable method? A systematic review. Br J Sports Med 2013;49:298-305.
29. Plummer HA, Sum JC, Pozzi F, Varghese R, Michener LA. Observational scapular dyskinesis: Known-groups validity in patients with and without shoulder pain. J Orthop Sports Phys Ther 2017;47:530-7.
30. Jordan KP, Kadam UT, Hayward R, Porcheret M, Young C, Croft P. Annual consultation prevalence of regional musculoskeletal problems in primary care: An observational study. BMC Musculoskelet Disord 2010;11:144.
31. Jorge MG, Javier CA, Ariel TW, Matias V, Ali VS, Alfredo M, *et al*. Prevalence of musculoskeletal disorders of the shoulder in a hospital of the city of Buenos Aires- Retrospective study. Acta Shoulder Elbow Surg 2017;2:20-3.
32. Luime JJ, Koes BW, Hendriksen IJM, Burdorf A, Verhagen AP, Miedema HS, *et al*. Prevalence and incidence of shoulder pain in the general population; a systematic review. Scand J Rheumatol 2004;33:73-81.
33. Djade CD, Porgo TV, Zomahoun HTV, Perrault-Sullivan G, Dionne CE. Incidence of shoulder pain in 40 years old and over and associated factors: A systematic review. Eur J Pain 2020;24:39-50.
34. Engebretsen KB, Robinson HS, Vollestad NK. Shoulder patients in primary and specialist health care. A cross-sectional study. Scand J Pain 2021;21:345-54.
35. Longo UG, Risi Ambrogioni L, Berton A, Candela V, Massaroni C, Carnevale A, *et al*. Scapular dyskinesis: From basic science to ultimate treatment. Int J Environ Res Public Health 2020;17:2974.
36. Lopes AD, Timmons MK, Grover M, Ciconelli RM, Michener LA. Visual scapular dyskinesis: kinematics and muscle activity alterations in patients with subacromial impingement syndrome. Arch Phys Med Rehabil 2015;96:298-306.
37. Fayad F, Hoffmann G, Hanneton S, Yazbeck C, Lefevre-Colau MM, Poiraudeau S, *et al*. 3-D scapular kinematics during arm elevation: effect of motion velocity. Clin Biomech (Bristol, Avon) 2006;21:932-41.
38. Sanchez HM, Sanchez EGDEM, Tavares LI. Association between scapular dyskinesia and shoulder pain in young adults. Acta Ortop Bras 2016;24:243-8.
39. McClure P, Tate AR, Kareha S, Irwin D, Zlupko E. A clinical method for identifying scapular dyskinesis, part 1: Reliability. J Athl Train 2009;44:160-4.

How to cite this article: Rudraswamy P, Kumar K U D, Shenai AV, Davis S. Scapular Dyskinesis in Shoulder Pain Conditions: A Correlational Study. J Health Allied Sci NU. doi: 10.25259/JHS-2024-6-16-R2-(1433)