

# Scapular Dyskinesia: A Commonly Seen Mysterious Condition in Asymptomatic Adults - A Narrative Review

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## ABSTRACT

**BACKGROUND:** Scapular dyskinesia is defined as visible alterations in scapular positions and motion patterns and is believed to occur as a result of changes in activation of scapular stabilizing muscles. Scapular dyskinesia is not associated with pain and appears to be prevalent in asymptomatic population. The strength deficits or muscular imbalance of scapular muscles lead to disoriented scapular movement, which may contribute to future shoulder injuries. So, this study aims to collect evidence regarding whether scapular dyskinesia is present in asymptomatic adults or not.

**METHODS:** A computer-based literature search was done using various database with keywords. In this review all types of studies were found. Based on predetermined selection criteria, present study included articles between 2012 to 2022, In which 8 out of 46 articles were fitted in the study on the basis of inclusion criteria.

**RESULT:** Results of all the studies reviewed, concluded that scapular dyskinesia commonly seen in asymptomatic adults.

**CONCLUSION:** Strong evidence exists to show the presence of scapular dyskinesia in asymptomatic adults. Some study depicts the idea that asymptomatic individuals with scapular dyskinesia have strength deficits and require intervention to prevent future shoulder injuries.

**Keywords:** Scapular dyskinesia, Asymptomatic adults, Strength deficit, Scapular muscles imbalance

## INTRODUCTION

The scapula is a key part of the upper limb kinematic chain and is a vital component of the glenohumeral rhythm.<sup>1</sup> The scapula is the base of support for all shoulder function and serves as the link in the kinetic chain between the upper extremity and the trunk. Proper scapular motion is essential to the performance of efficient and injury free overhead activities.<sup>2</sup> The scapula performs several functions contributing to stability and mobility of scapula complex.<sup>3</sup> The scapular position in relation to the thorax is important because its abnormal position disrupts the normal bio-mechanics of the

shoulder joint, leading to injury or abnormal posture.<sup>4</sup>

Optimal shoulder function requires proper positioning and movement of the scapula on the thorax.<sup>5</sup> Altered scapular motion and position have been termed scapular dyskinesia. The definition of dyskinesia is the alteration of normal scapular kinematics. 'Dys' (alteration of) 'kinesis' (motion) is a general term that reflects the loss of normal control of scapular motion. Scapular Dyskinesia (SD) is defined as visible alterations in scapular positions & motion pattern and is believed to occur as a result of changes in activation of scapular stabilizing muscles.<sup>6</sup>

An abnormal position of the scapula is a sign of changes in the activity of surrounding muscles<sup>7</sup>, and an abnormal movement of the scapula interferes with its coordinated movement with the humerus, resulting in loss of scapulohumeral rhythm and increased scapula damage.<sup>3</sup>

Dyskinesia can be identified by alterations in a single plane or across multiple planes. Alterations include: prominence of the inferior angle, medial border prominence (winging), and dysrhythmia. Prominence of the inferior angle is indicative of excessive anterior tipping of the scapula and may be a result of tightness/dominance of the pectoralis minor and weakness of the serratus anterior. Medial border prominence (winging), is indicative of excessive protraction of the scapula, and may be a result of tightness/dominance of the pectoralis minor or

serratus anterior and weakness of the retractors which include the middle trapezius and rhomboid muscle group.

Dysrhythmia indicates a more general lack of dynamic control of the scapula and is visible with early shrugging during humeral elevation and/or rapid downward rotation during humeral lowering.<sup>8</sup>

Causes of scapular dyskinesia include soft tissue mechanisms for scapular dyskinesia involve inflexibility (tightness) or intrinsic muscle problems. Inflexibility and stiffness of the pectoralis minor and biceps short head can create anterior tilt and protraction due to their pull on the coracoid. In addition, the upper trapezius/lower trapezius force couple may be altered, with delayed onset of activation in the lower trapezius, which alters scapular upward rotation and posterior tilt.

Dyskinesia by itself is not an injury or a musculoskeletal diagnosis.<sup>12</sup> Dyskinesia has been hypothesized to relate to changes in GH angulation, AC joint strain, subacromial space dimension, shoulder muscle activation and humeral position and motion. Although it is typically associated with shoulder pain, dyskinesia also can be present in asymptomatic population.<sup>9</sup>

Scapular dyskinesia is also highly prevalent in the absence of shoulder pain.<sup>10</sup>

Scapular dyskinesia is also associated with abnormal posture and muscle tightness. Many authors have suggested that forward head posture and increased thoracic kyphosis may contribute to scapular protraction and lead to adaptive shortening of postural muscles or muscular strength imbalances.

More recent evidence suggests that scapular dyskinesia is a risk factor for shoulder pain that may warrant screening as a preventative measure.<sup>11</sup> Scapula dyskinesia should be evaluated and treated, as part of normal shoulder rehabilitation programme, because the untreated condition may exacerbate shoulder symptoms - or adversely affect treatment outcomes. So, the purpose of the study is to review the literature regarding presence of scapular dyskinesia in asymptomatic adults.

### **Aim Of The Study**

Study aims to review available literature to determine whether scapular dyskinesia is present or not in asymptomatic adults.

### **Objectives Of The Study**

All the available literatures were reviewed to determine whether scapular dyskinesia is present or not in asymptomatic adults

### **MATERIALS & METHODS**

A computer-based literature search was conducted using the Google Scholar, PubMed, PubMed Central, and ResearchGate, Cochrane from 2012 to 2022. Different combinations of the terms like Scapular dyskinesia, asymptomatic adults, strength, scapular muscle imbalance, posture, hand dominance were used for searching.

- Research Design: A Narrative Review
- Population: Scapular Dyskinesia
- Inclusion Criteria
  - Article published from 2012 to 2022

- Observational study, Case study, Cross-Sectional study, Reliability Study
  - Only full text articles are included.
  - Exclusion Criteria
    - Systemic Review and Meta- Analysis
    - Interventional Studies
  - Any study conducted prior to 2012
- The search was limited to journals published in English, 170 articles were obtained from the search out of which 124 were excluded directly on the basis of exclusion criteria, 38 excluded as the aim of the review did not match. Remaining 8 articles were reviewed.

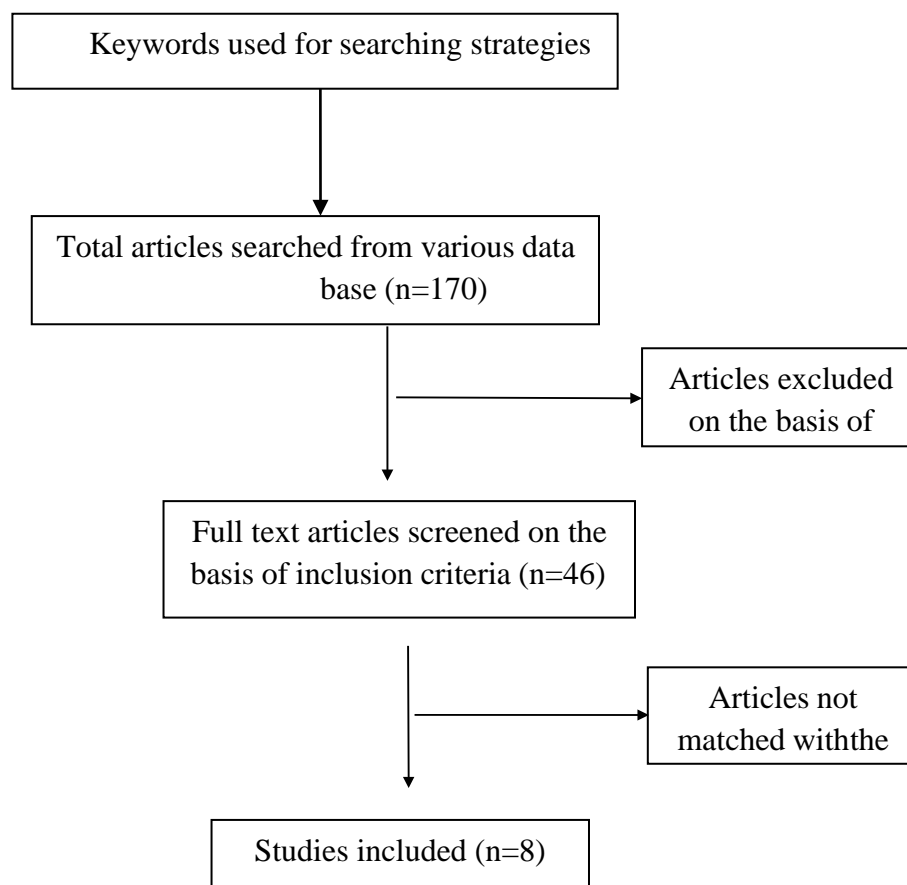


Figure 1 : Searching strategy used to review articles

## RESULT

Altogether, 170 records were identified from the selected databases. 124 studies were excluded on the basis of exclusion criteria. Forty-six full text articles were

screened on the basis of inclusion criteria. Out of which thirty-eight studies were not matched with the aim of the study. Finally, 8 studies were included in this review for the qualitative synthesis.

AUTHOR / YEAR OF PUBLICATION	AIM OF THE STUDY	RESEARCH DESIGN	SAMPLE CHARACTERISTICS	CONCLUSION
Rossi DM et al., (2022) <sup>12</sup>	To evaluate the effect of SD and its interaction with hand dominance and humerothoracic angles on 3D scapular kinematics in asymptomatic individuals in all planes of arm motion.	Cross-Sectional Study	45 Asymptomatic Participants (Male=17, Female=28) (22 with SD and 23 without SD) Age group: 18-30 years	The effects of dominant side as increased upward rotation, internal rotation, and anterior tilt at higher humerothoracic angles for all planes of arm motion, were greater in individuals without scapular dyskinesis.
Tooth C et al., (2020) <sup>13</sup>	To assess the activation profile of scapular	Observational Study	40 young volunteers (20 with SD and	An alteration of periscapular muscular activation (increase in

	stabilizing muscles in dyskinetic asymptomatic people		20 without SD) Age group: 23.12 ± 2.4 yrs	activity of UT and SA and decrease activity of LT) exists in dyskinetic asymptomatic adults.
Bayattork M et al., (2019) <sup>14</sup>	to evaluate intra-rater and inter-rater reliability and agreement of the scapular dyskinesia test in people with FHRSP	Reliability study	60 young men Mean Age group: 24.6±3.0 years,	Forward head and round shoulder posture (FHRSP) is to be related to scapular dyskinesia (SD).
Pires ED, Camargo PR (2018) <sup>15</sup>	Analysis of the kinetic chain in asymptomatic individuals with and without scapular dyskinesia	Cross-Sectional Study	44 individuals without shoulder pain (22 with SD and 22 without SD) Age Group: 18-26 years	SD group showed less strength and endurance in relation to the group without dyskinesia
Akodu AK et al. (2018) <sup>16</sup>	To determine the correlation among smartphone addiction, cervicovertebral angle, scapular dyskinesia	Cross-Sectional Study	77 Participants (Male=44, Female= 33) Age group: 19-24 years.	There was a significant relationship among smartphone addiction, cervicovertebral angle and scapular dyskinesia
Plummer HA et al.,(2017) <sup>17</sup>	To characterize the prevalence of scapular dyskinesia in participants with and without shoulder pain	Cross-Sectional Study	135 Participants (67 with Shoulder pain, 68 healthy controls) Age group: 18-60 years.	Scapular dyskinesia was observed in participants with shoulder pain as well as healthy controls.
Khare D et al., (2015) <sup>18</sup>	To assess the prevalence of scapular dyskinesia in gymers as compared to non gymers	Case-control Study	100 participants (50 gymers, 50 non-gymers) Age group: 18-40 years	The study shows that Scapular dyskinesia is present in gymers as compared to the non gymers.
Yeşilyaprak SS et al.,(2014) <sup>19</sup>	To evaluate the influence of Pectoralis Minor muscle tightness (PMMT) and Upper Trapezius muscle tightness(UTMT) on SD in an asymptomatic population.	Cross-Sectional Study	111 participants (Male=69, Female=42) Age group: 22.73±3.45 years	It was determined that people with PMMT and UTMT are more likely to exhibit SD than people who have normal muscle length in asymptomatic population

Table 1: Result of review of literature

## DISCUSSION

The scapula is a link between the trunk and arm, and is part of the kinetic chain. Deficits in the kinetic chain, such as inadequate muscle strength and improper muscle activation can lead to impaired function and injury. The result of the reviewed studies found that there is decrease in strength of the trunk flexors and hip extensors, and periscapular muscles in asymptomatic adults with Scapular dyskinesia. anterior tilt and protraction of the scapula as a result of their pull on the coracoid.<sup>20</sup> Uhl TL et al. did study on evaluation of clinical assessment methods for scapular dyskinesia, in their study authors found that that asymmetries are common in symptomatic and asymptomatic populations.<sup>21</sup>

Recent prospective studies have showed that individuals with scapular dyskinesia may present with higher risk of developing shoulder pain than those without dyskinesia. Scapular dyskinesia appears to be prevalent in asymptomatic populations. Scapular dyskinesia is not associated with pain and does not alter measures of shoulder function

in amateur adolescent. It is increasingly apparent that scapular dyskinesia exists in asymptomatic populations as well.<sup>22</sup> Scapular dyskinesia is also prevalent in gymers as well as in non gymers. Due to lack of strengthening of the scapular stabilizers and over strengthening of shoulder abductors in the gym leads to instability of scapular stabilizers to work efficiently and hence leading to presence of scapular dyskinesia.

Other studies done in asymptomatic adults with Scapular dyskinesia found that hand dominance may also have an impact on Scapular dyskinesia. The effects of dominant side as increased upward rotation, internal rotation, and anterior tilt at higher humero-thoracic angles for all plane of arm motion. Also, some studies shows that Postural variations such as forward head and rounded shoulder can also alter the scapular position which can lead to Scapular dyskinesia in young adults. A shortened pectoralis minor has been suggested to be a contributing cause of symptoms in patients with impingement, but has been shown to

alter three-dimensional scapular kinematics in healthy subjects only. This tight muscle creates a position of scapular protraction at rest and may limit scapular posterior tilt or external rotation upon arm motion, potentially predisposing patients to impingement symptoms. Many authors have suggested that forward head posture and increased thoracic kyphosis may contribute to scapular protraction and lead to adaptive shortening of postural muscles or muscular strength imbalances. A protracted scapular position may be associated with a narrowed subacromial space, upright posture with increased subacromial space and a flexed thoracic spine and forward shoulder position alters scapular motion and results in diminished force output with elevation.

Many people, including students, find it difficult to maintain the proper and correct sitting posture for long hours during the day (because of fatigue in the lumbar extensor muscles). Hence, most of them use the comfortable sitting or reclining position. Becoming accustomed to the reclining position can cause Rounded shoulder posture (RSP) deviation in those individuals. According to the studies, this postural deviation can impact scapular kinematics. Considering the larger incidence of scapular dyskinesis in individuals with RSP, it is recommended that in preventive and rehabilitation programs for persons with RSP, muscle strengthening, which is useful in scapula stability and movement, should be considered.

## CONCLUSION

This narrative review explains the presence of scapular dyskinesis in asymptomatic adults. Posture and other factors that are found to affect normal scapular position can lead to Scapular dyskinesis in asymptomatic individuals.

Some study depicts the idea that asymptomatic individuals with scapular dyskinesis have strength deficits and require intervention to prevent future shoulder injuries.

## Declaration by Authors

**Ethical Approval:** Not Applicable

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**Conflict of Interest:** The authors declare no conflict of interest.

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