



Association of neck pain with scapular dyskinesia among patients with mechanical neck pain - A correlational study

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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 miscellaneous condition and appeared to be prevalent in patient with neck pain and scapular muscle weakness. So, this study aims to collect evidence regarding whether neck pain is present in patient with scapular dyskinesia.

Methods: A purposive sample of 30 patients with neck pain, aged between 18 to 65 years were taken from SPB physiotherapy college. All the participants were assessed for demographics, anthropometric, side of neck pain, NPRS and type of dyskinesia.

Result: Scapular dyskinesia test when done on 150 patients with neck pain 100 (67%) were tested positive. Patient with unilateral neck pain were 130 (87%) in that 80 were right sided and 50 were left sided. Patient with bilateral neck pain were 20 (13%). There was no any statistically significant difference between the NPRS between the patient who had scapular dyskinesia and the patient without scapular dyskinesia.

Conclusion: Results of the present study concluded that there is an association of neck pain with scapular dyskinesia. There is no association between scapular dyskinesia with pain intensity.

Keywords: Scapular Dyskinesia, Neck Pain, Association.

Introduction

Neck is a complex structure which has many dynamic and stability functions, especially those connecting head to scapula and shoulder. Thus, any structural or functional change in these structures will lead to pain in neck. In turn, Neck pain can lead to neck disability. Disability refers to any limitation or inability to perform an activity due to an impairment^[1].

Mechanical neck pain is one of the common health problems found in population. Its pathology is considered to originate from mechanical dysfunction of various anatomical structures of the cervical spine that leads to restricted cervical range of motion and pain. It can result from hypertonic posterior cervical muscles that may occur due to sustained partial neck flexion while reading, writing or by holding a stooped posture^[2]. Postural neck pain is usually associated with sustained static loading of the cervical spine and shoulder girdle during occupational or leisure activities.^[3]

Multiple pathologies were identified as a causative factor for neck pain and one the common factors noted in recent years is poor posture. Occurrence of pain may be due to interference of surrounding tissues around the neck due to poor postural habits. When the head is pronounced forward, muscles around the neck were forced to abnormally stretched positions which predispose to pain. Studies identified that there was a strong adaptation with neck pain and disability, alteration in posture can also affects the range of motion of the cervical spine.^[4]

The scapula is the large triangular-shaped bone behind the thoracic region and an important link between the trunk and the shoulder complex with a key role for the upper limb kinematic chain. Many muscles in the neck, back, and shoulder area use the surfaces of the scapula for attachment

and the alignment of the scapula is related to proper cervical, thoracic, and shoulder functions.

Therefore, functional disorders of these muscles and the asymmetric alignment of the scapula can be seen in patients with a painful neck, back, and shoulder disorders^[5, 6]. Keeping your Scapula stable relies on certain muscles working together, like the upper and lower trapezius, serratus anterior, and rhomboids^[7].

Scapular dyskinesia (SDK) is defined as visible alterations in scapular positions & motion patterns & is believed to occur as a result of changes in activation of scapular stabilizing muscles.^[8] Scapular mobility is one of the prerequisites for proper shoulder motions and function. Scapula plays an important role in Glenohumeral kinematics and if any altered scapula motion may lead to Glenohumeral dysfunction. The altered position and the affected kinematics of the scapula will be termed as Scapular dyskinesia.^[9] The prevalence of scapular dyskinesia was significantly higher in overhead athletes (61%) compared with non-overhead athletes (33%)^[10].

There are three main types of SDK 1) The dorsal prominence observed over the inferior angle of scapula that is known as Type -1 scapula dyskinesia. 2) The dorsal prominence of the entire medial border is known as Type -2 scapula dyskinesia. 3) The elevated superior border of scapula represents Type -3 scapular dyskinesia^[9].

Clinical sign and symptoms of SDK are pain and or tenderness around the scapula when using the arm overhead or carrying heavy objects with the arm at the side, snapping or popping sensation around the scapula with shoulder movement, Loss of strength with shoulder and arm use. Asymmetrical posture (affected side usually sits lower), winging of the scapula and instability of the shoulder (feels like it moves out of place).^[11]

The commonest causative mechanisms of dyskinesia have a soft tissue component, involving either intrinsic muscle pathology or inflexibility or inhibition of normal muscle activation. Decreased flexibility of pectoralis minor has been shown to create anterior tilt and protraction of the scapula as a result of their pull on the coracoid. [8, 12] The discovery of dyskinesia with physical impairments but without obvious pathology should prompt an evaluation for kinetic chain or muscle inflexibility causative factors. [13]

During normal shoulder elevation, the scapula moves in the direction of upward rotation, posterior tilt, and external rotation. [14] These movements were examined by the coordinated shift analysis during both flexion and abduction. [15] Miura showed that the scapula abducted and upward rotated from 30° to 120° and adducted and upward rotated from 120° to 180° in shoulder flexion, whereas the scapula adducted and upward rotated from 0° to 90° and abducted and upward rotated from 90° to 180° in shoulder abduction. Therefore, scapulohumeral rhythm during elevation depends on the plane and elevation angle. Consequently, it is necessary to investigate the scapulohumeral rhythm in sagittal flexion and abduction in the coronal plane, respectively. [10]

Aim and Objectives

Aim: To study the association of neck pain with scapular dyskinesia among patients with mechanical neck pain.

Objectives

1. To find out the association between neck pain and scapular dyskinesia among patients with mechanical neck pain.
2. To find out the association between neck pain severity and scapular dyskinesia among patients with mechanical neck pain.

Methodology

- Study design: Correlational study
- Study duration: 6 months
- Study population: Patient with neck pain
- Study sample: 18-65 years of male and female
- Sampling design: Purposive sampling technique
- Sample size: 150
- Study setting: SPB physiotherapy college, Surat

Inclusion criteria

- Patients with neck pain aged 18-35 years
- Sex: male and female

Exclusion criteria

- Any previous history of surgery/trauma to the cervical spine.
- Known case of arthritis of shoulder.
- Presence of rotator cuff tear.
- Presence of any neurological/inflammatory disorder.
- Presence of any other disorder like fibromyalgia, rheumatoid arthritis or any cardiac, respiratory disorders.
- Any history psychiatric disorder.

Outcome measures

- Scapular dyskinesia test [16]
- Numerical pain rating scale (NPRS) [17, 18]

Procedure

Total 150 OPD patients, aged between 18-35 years were taken from SPB physiotherapy college, Surat. Participants were selected for study based on inclusion and exclusion criteria. Participants were asked to give and sign consent form prior to participation in the study. All the participants were assessed for demographics, anthropometrics and scapular dyskinesia as describe below.

Scapular dyskinesia test [16]:

Participants were evaluated for scapular dysfunction of the dominant shoulder utilizing the scapular dyskinesia test. The participants performed separate trials of bilateral shoulder flexion and abduction while holding either a 1.4 kg or 2.3 kg weight: 1.4 kg for body masses 68.1 kg. The test was modified by having the participants perform 10 repetitions for each movement. Movement velocity was standardized across all participants by way of a metronome set at 80 beats per minute resulting in a movement velocity of approximately 120 °/s; therefore, each trial lasted 30 seconds. Performance of the test. It was digitally recorded from a standardized distance and height for documentation purposes.

The presence of scapular dyskinesia was determined by scapular winging, dysrhythmia, or both as defined by McClure *et al.* Scapular winging was defined as any posterior displacement of the medial border and/or inferior angle of the scapula away from the thorax. Dysrhythmia was defined as any early or excessive elevation or protraction, non- rhythmic motion while raising or lowering the arm, or rapid downward rotation while lowering the arm. (Figure-2).

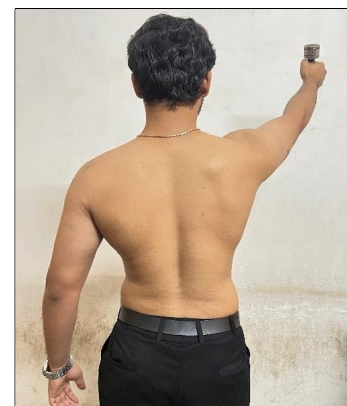


Fig 2: Scapular Dyskinesia Test

Statistical Analysis

Statistical analysis for this study was done using JAMOVI version 2.3.2.8 Software. Microsoft word 2016 and Excel 2016 was used to generate graph and table. This study include age, height, weight, BMI, NPRS, Scapular muscle strength (SA, MT, LT, RHMB). This study included gender, dominance, type of SD, side of affection of SD, onset of symptoms as a qualitative variable. Mean, Median and Standard deviation were calculated for all quantitative variable and qualitative variables were represented as percentage of total number of participants.

Result

Total 150 patients with neck pain from SPB Physiotherapy college OPD were participated in the study. Mean age of

participants was 26.8±7.7, Mean duration of symptoms of participants was 4.75±6.69. Out of 150 total number of OPD patients with neck pain who participated in study, 85 (57%) were females and remaining 65 (43%) were males. Most of participants 130 (87%) were right-handed and remaining 20 (13%) were left-handed.

Patient with positive SD were 100 (67%) and with negative SD were 50 (33%). 65 (43%) patients had positive right-side SD and remaining 85 (57%) had negative right-side SD. 60 (40%) patients had positive left side SD and remaining 90 (60%) had negative left side SD. Among right side SD type-I SD were 15 (23%), type-II SD 50 (77%), type-III SD were 0(0%). Patient with left side type-I SD were 25 (25%), type-II SD were 35 (58%), type-III SD were 10 (17%)

Total 100 patient, with positive right neck pain when compared with right SD, 60 were positive right SD and remaining 40 were negative right SD. Total 50 patient, with negative right neck pain when compared with right SD, 5 were positive right SD and remaining 45 were negative right SD.

Total 65 patient, with positive right SD when compared with right neck pain, 60 were positive right neck pain and 5 were negative right neck pain. Total 85 patient, with negative right SD when compared with right neck pain, 40 were positive right neck pain and remaining 45 were negative right neck pain.

Total 70 patients, with positive left neck pain when compared with left SD, 60 were positive left SD and remaining 10 were negative left SD. Total 80 patient, with negative left neck pain when compared with right SD, 0 was positive left SD and remaining 80 were negative left SD.

Total 60 patient, with positive left SD when compared with left neck pain, 60 were positive left neck pain and 0 was negative left neck pain. Total 90 patient, with negative left SD when compared with left neck pain, 10 were positive left neck pain and remaining 80 were negative left neck pain.

When compared NPRS at rest between positive and negative scapular dyskinesis test P value of was 0.212. When compared NPRS at activity between positive and negative scapular dyskinesis test P value of was 0.912, that means there is no association between NPRS at rest and at activity with scapular dyskinesis.

Table 1: Demographic Data

Sr no.	Variable	Mean±sd
1.	Age	26.8±7.7
2.	Height	1.63±0.0819
3.	Weight	61.5±9.37
4.	BMI	23.3±3.01
5.	Duration of symptoms	4.75±6.69

Table 2: Categorical Variable

Sr no.	Variable	Category	Number	Percentage	
1.	Gender	Male	65	43%	
		Female	85	57%	
2.	Dominancy	Right	130	87%	
		Left	20	13%	
3.	Neck pain	Bilateral	20	13%	
		Unilateral	Right	80	87%
			Left	50	
4.	Sd	Positive	100	67%	
		Negative	50	33%	
5.	Rt side sd	Positive	65	43%	
		Negative	85	57%	
6.	Lt side sd	Positive	60	40%	
		Negative	90	60%	

Table 3: Type of Scapular Dyskinesia

Sr no.	Variable	Category	Number	Percentage	
1	Rt sd	Total	Type - i	15	23%
		positive	Type - ii	50	77%
			Type - iii	0	0%
2	Lt sd	Total	Type - i	15	25%
		Positive	Type - ii	35	58%
			Type - iii	10	17%

Table 4: Comparison of Positive and Negative Right Neck Pain with Positive and Negative Right Sd

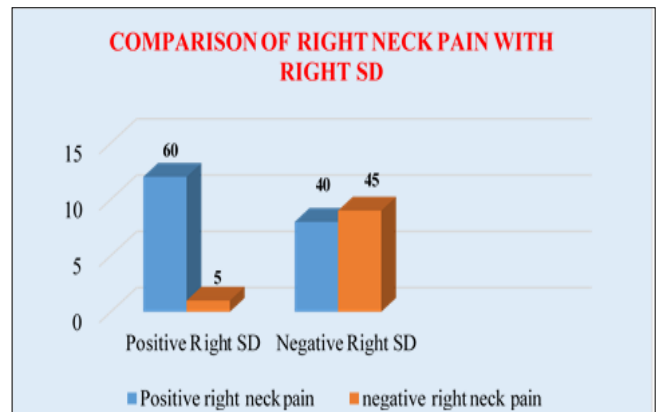
Right neck pain	Right scapular dyskinesia			P value
	Positive	Negative	Total	
Positive	60 (60%)	40 (40%)	100	0.009
Negative	5 (10%)	45 (90%)	50	
Total	65	85	150	

Table 5: Comparison of Positive and Negative Left Neck Pain with Positive and Negative Left Sd

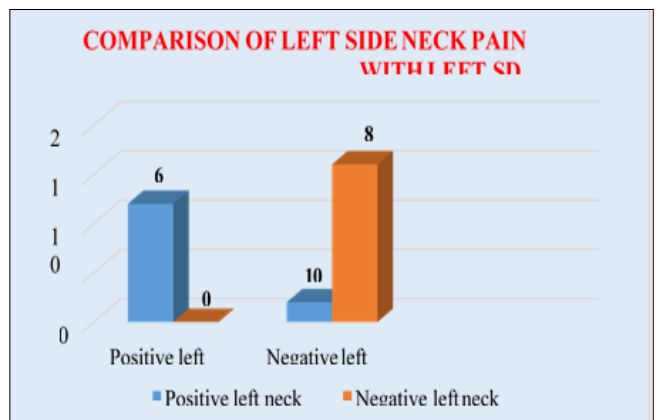
Left neck Pain	Left scapular dyskinesia			P value
	Positive	Negative	Total	
Positive	60 (85.71%)	10 (14.29)	70	<.001
Negative	0 (0%)	80 (100%)	80	
Total	60	90	150	

Table 6: Nprs At Rest and At Activity with Positive and Negative Sdt

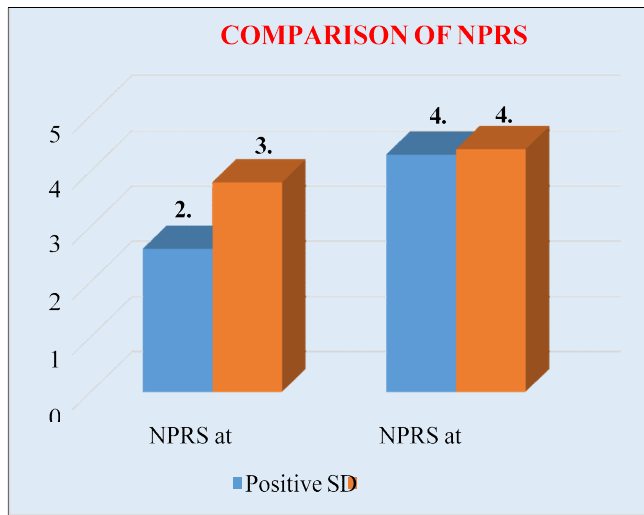
Sr no.	Variable	Sdt	Mean±sd	P value
1.	Nprs at rest	Positive	2.60±2.58	0.212
		Negative	3.80±2.04	
2.	Nprs at activity	Positive	4.30±2.18	0.912
		Negative	4.40±2.55	



Graph 10: Comparison of Right-Side Neck Pain with Right Sd



Graph 11: Comparison of Left Side Neck Pain with Left Sd



Graph 12: Comparison of Nprs With Sd

Discussion:

The present study included 150 OPD patient with neck pain as participants of the study. The purpose of present study was to find association between neck pain with scapular dyskinesia.

Out of 150 OPD patient with neck pain, aged between 18-85 years. Male were 43% and female were 57%. Out of which 87% were right-handed and 13% were left-handed. Patient with unilateral neck pain were 87% and patient with bilateral neck pain were 13%. Patient with positive SD were 67% in that right-side SD were 43% and left side SD were 40%. Patient with negative SD were 33%. Patient with right sided SD, 23% were TYPE I, 77% were TYPE II and 0% were TYPE III whereas patient with left sided SD, 25% were TYPE I, 58% were TYPE II and 17% were TYPE III. From the result obtained there is a strong association between neck pain with SD. Those who have right side Neck Pain have high prevalence (60%) of scapular dyskinesia on right side, also those who have left neck pain have high prevalence (60%) of left scapular dyskinesia. Those who does not have neck pain on right side there is very less prevalence (10%) of scapular dyskinesia on right side and who does not have neck pain on left side also does not have presence of scapular dyskinesia on left side. There is no association between pain intensity and scapular dyskinesia.

Onset of mechanical neck pain is gradually insidious and multifactorial in origin which includes poor posture, anxiety and neck strain. Previous study done by Priya S. *et al* (2022) [19] concluded that there is significant relation between mechanical neck pain and resting scapular position.

In recent study done by W Ben Kibler *et al* (2010) [6] describe that the scapula serves many roles in order for proper shoulder function to occur. These roles include providing synchronous scapular rotation during humeral motion, serving as a stable base for rotator cuff activation and functioning as a link in the kinetic chain. Each role is vital to proper arm function and can only occur when the anatomy around the shoulder is uncompromised. The presence of bony and soft tissue injury as well as muscle weakness and inflexibility can alter the roles of the scapula and alter scapular resting position or dynamic motion.

Previously Walled Khan *et al* (2024) [20] done research on 200 individuals, revealing a gender distribution of 41 females and 159 males. The findings underscore the

substantial impact of neck pain with staggering 94% prevalence among study population. Furthermore, a significant facet explored is SD, where 74% of individual exhibit alteration in scapular position and motion pattern during scapulohumeral movement. Importantly, the study establishes a statistically significant association between neck pain and scapular dyskinesia.

Previous study conducted by Ashani Kasodariya, Dharti Pansala (2023) [8] narrative review on scapular dyskinesia; A commonly seen mysterious condition in asymptomatic adults. Result of review support strong evidence regarding presence of scapular dyskinesia in asymptomatic adults. Which supports the result of present study and presence of scapular dyskinesia in this population.

Conclusion

Results of the present study concluded that there is an association of neck pain with scapular dyskinesia. There is no association between scapular dyskinesia with pain intensity.

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