Prevalence of Scapular Dyskinesia Among Information Technology Workers with Neck Pain in Kolhapur City

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***Abstract*— Background- Scapular dyskinesis is the term used to describe abnormalities in the scapula's typical posture and movement patterns when the arm and shoulder are moved. Changes in muscle activation or coordination and soft tissue tension have been identified as contributing factors to scapular dyskinesis. In particular, the coordination of key muscles—the upper trapezius, lower trapezius, and serratus anterior—is critical in orchestrating task-specific movements to regulate the position and movement of the scapula. Methodology- In the above study, ninety-seven male participants (age- 40.1 ±1.06) with neck pain were included. The scapular dyskinesis measurement and VAS (right and left side) were measured in three different position of hand 1. Hand on its rest position, 2. Hand on hip and 3. Hands in 90-degree abduction with internal rotation was taken. Vernier calliper was used to measure the scapular dyskinesis. Results- The result shows that there were 7% IT workers who were having scapular dyskinesis and 93% IT workers who were not having scapular dyskinesis. In three different hand position there was a significant different in scapular position and neck pain. Conclusion- There was a significant difference between all 3 positions i.e. Hands in rest, hands on hip and hands in 90degree abduction with internal rotation. The result showed that prevalence of scapular dyskinesis among IT workers was 7%. Scapular dyskinesis among IT workers was not much prevalent.**

Keywords: Scapular Dyskinesia, SD, Information Technology, IT Workers, Neck pain

I. INTRODUCTION

Neck discomfort stands as a pervasive musculoskeletal ailment afflicting a significant portion of the populace. In the context of India, empirical studies reveal a substantial prevalence, with approximately 67-71% of individuals encountering neck pain at some juncture in their lives. Prolonged periods of sitting, especially while craning the neck upwards or downwards, constitute a common trigger for such discomfort. Additionally, discomfort may manifest during sleep due to adopting uncomfortable positions, further exacerbating the strain on neck muscles. Moreover, the burdens of stress, both physical and emotional, can exacerbate neck pain, perpetuating the cycle of discomfort. In essence, the multifactorial nature of neck pain underscores the need for holistic approaches to its management. Interventions aimed at addressing posture, promoting ergonomic practices, and mitigating stress levels can play pivotal roles in alleviating the burden of neck discomfort within the Indian population.[1]

These alterations in scapular positioning further contribute to the biomechanical complexities associated with forward head posture, exacerbating the strain on the surrounding muscles and potentially leading to discomfort, pain, and long-term musculoskeletal issues. Therefore, understanding the intricate interplay between computer use habits, spinal alignment, and scapular positioning is crucial in addressing and preventing the development of forward head posture and its associated complications.[2] The scapula, plays a vital role in maintaining neck function and overall upper body movement. Its position is important for muscle balance and coordination. Ensuring adequate length, strength and sequential activation of the scapular muscles is critical to controlling scapular movement, especially when raising the arm (humerus). Optimal bone position is essential to maintain shoulder function. stability and correct biomechanics in the shoulder joint. Any

deviation from this optimal position can lead to an imbalance in muscle recruitment and potentially contribute to various shoulder pathologies. Changes in the function of the scapulothoracic muscles can disrupt the alignment and forces acting on the scapula. This in turn can affect the humerus (shoulder joint) causing conditions such as impingement, instability or rotator cuff injuries.[3] An imbalance in the way the scapula is positioned can cause problems for the cervical joints, which can cause pain in the neck area. The muscles and joints of the neck may experience asymmetrical stress and strain if the scapulae are not correctly balanced or positioned.

Scapular dyskinesis is the term used to describe abnormalities in the scapula's typical posture and movement patterns when the arm and shoulder are moved. In essence, it refers to aberrant scapula placement or motion in relation to the humerus, or upper arm bone, during different shoulder movements. These modifications to the normal scapular motion can have a big impact on shoulder mechanics and muscle function. Inefficient movement patterns and diminished muscular efficiency might result from the scapula's disruption of the coordinated activity of the muscles attached to it.[4] There are four main patterns of movement that can be associated with scapular dyskinesis (SD): symmetric patterns, inferior scapular border prominence, medial scapular border prominence, and other patterns. Every pattern represents unique variations from the scapula's typical range of motion and may have different effects on the biomechanics and function of the shoulder.[5] Variations in scapular kinematics, or the movement and orientation of the scapula, are not limited to simple changes in muscle function or recruitment patterns. A number of other factors may also affect scapular motion, in addition to variations in the recruitment patterns of particular scapular muscles, such as the serratus anterior, or imbalances in muscle strength between the upper and lower trapezius muscles. Treating altered scapular kinematics requires a comprehensive assessment to identify contributing factors and develop targeted interventions. Treatment strategies may include corrective exercises to improve muscle recruitment and strength, manual therapy techniques to correct muscle tensions or joint limitations, neuromuscular re-education to improve motor control, and postural training to promote optimal alignment. By addressing factors affecting scapular kinematics, individuals can restore normal movement patterns and reduce the risk of related musculoskeletal problems.[6]

Scapular dyskinesia, characterized by abnormal scapular movements and postural patterns, has been identified as a sport-specific adaptation not only in individuals with shoulder pathology but also in healthy elite athletes. This phenomenon highlights the complex interaction between biomechanics, functional demands and adaptations in the shoulder complex, especially in individuals who regularly engage in overhead activities such as throwing, serving or swimming. In conclusion, scapular dyskinesis observed in healthy upper limbs represents a sport-specific adaptation to the demands of that sport, allowing optimization of efficiency and effectiveness in the generation and transmission of forces through the upper limbs. It is critical for physicians and sports medicine professionals to understand the biomechanical principles underlying scapular dyskinesis in elite athletes in order to provide effective rehabilitation and injury prevention strategies tailored to the unique needs of this population.[7] Hence, more studies exploring prevalence of scapular dyskinesis in IT workers is required and so this study was conducted.

II. NEED FOR STUDY

The musculoskeletal system is commonly impacted in Information Technology workers due to prolonged chair use, maintaining a sitting posture in the office, or attending meetings. Due to this exertion, the effects on musculoskeletal system which further causes effect on spine and affects the upper portion of the body. Previous researches have explained correlation of scapular position and neck pain amongst drivers, swimmers, bank workers. Repetitive muscle fatigue and alteration in scapular position can have a huge impact on muscle function. The function of scapula is important in normal neck function in human body. The head moves forward as a result of a consequences of computer use of the musculoskeletal system, which results from prolonged looking at monitor that is below eye level, which causes exaggerated anterior curve in the lower cervical and posterior curve in the upper thoracic vertebra to maintain the balance. Hence, more studies exploring prevalence of scapular

dyskinesis in IT workers is required hence this study is been conducted.

III. PROCEDURE

The study was conducted at the D.Y. Patil College of Physiotherapy, Kolhapur for a period of 6 months. It was observational, cross-sectional study. The sample size taken for the study was 97 participants.

Inclusion Criteria-Patients belonging to 25-45 years of age, belonging to both the genders, having work experience of 2 years and working for more than 8 hours/ day.

Exclusion criteria- Participants who have undergone recent surgery within 6 months and with congenital deformity of scapula.

The study was started after getting ethical approval from the Institutional ethical committee and Protocol committee of D Y Patil Educational Society. Written consent was taken from the participants. Those fulfilling the inclusion criteria were given VAS (Visual Analogue Scale) for neck pain. Details regarding the study (three different hand positions) was explained to the participants which was as follows-
Hand in rest- For this position hand will be in rest. Patient will be instructed to keep the hand relax inside. The measurement will be taken from inferior angle of scapula to adjacent spinous process.

Hand on hip- For this position both hands will be on the hip. Patient will be instructed to keep the hand on ipsilateral hip consequently. The humerus will be positioned in medial rotation at 45 degrees of abduction in coronal plane. The measurement will be taken from inferior angle of scapula to adjacent spinous process.

Hand in 90-degree abduction with internal rotation- For the third position hand will be in 90-degree abduction with internal rotation. The patient will be explained to actively extend the elbows and to elevate the arms which will be in internal rotation (thumbs face down) with both upper extremities in 90 degrees in coronal plane. The measurement will be taken from inferior angle of scapula to adjacent spinous process.

The scapular dyskinesia measurement was taken, by the distance between the inferior angle of scapula and the corresponding spinous process by using vernier callipers. First measurement was taken at rest and then the hands-on hip and finally at 90-degree glenohumeral abduction with internal rotation. The mean value of scapular dyskinesia (right and left) and Visual Analogue Scale (right and left) was calculated to find any association between scapular dyskinesia and neck pain.

Prevalence of scapular dyskinesis with neck pain among IT workers was assessed through MS Excel 16 software. VAS and Vernier Calliper measurements are represented in the form of tables and bar diagrams.

III. STATISTICAL ANALYSIS

In our study we have calculated prevalence of scapular dyskinesis with neck pain among IT workers through MS Excel 16 software.

The variables age and no. of work experience are represented in the form of table of mean and SD with and without scapular dyskinesia.

Prevalence of scapular dyskinesia among IT workers is represented in the form of table and pie chart.

Mean and SD of outcome measures: VAS and Vernier Calliper measurements are represented in the form of tables and bar diagrams.

IV. RESULT

A total 97 male participants, IT workers with complaint of neck pain were selected for the study from an IT company in Kolhapur. Age of the participants were 25- 45 years with mean age 40.1±1.06 years. The participants any recent surgeries within 6 months or congenital deformity of scapula that caused neck pain were excluded.

Participants were included who were working for more than 8 hours and having experience of at least 2 years.

In our study, we found that the prevalence of scapular dyskinesis is 7% (7 participants out of 97), remaining 93% (93 participants) were normal. Hence, scapular

dyskinesis with neck pain among IT workers in Kolhapur city was not much prevalent.

IV. DISCUSSION

The age of the patient in the above study ranged from 25 – 45 years. The minimum age of the subject was 25 years and the maximum age was 45 years. The prevalence of ankle instability according to one study reported age group of 25-45 years.[8] Age of the participants were 25- 45 years with mean age 40.1 ±1.06 years.

In above study we included the participants working for more than 2 years. The minimum number of year's participants working experience in study was 2 years and maximum number of working experiences was more than 8 years.

The minimum number working hours in the study was 8 hours and maximum number working hours is more than 8 hours.

Participants with any recent surgeries or congenital deformity were excluded as it can be a causative factor for alteration in scapular position.

In the above study, the VAS scale was recorded in 3 different positions i.e., hands in rest, hands on hip and hands in 90-degree abduction with internal rotation. The minimum visual analogue score was 1 and maximum visual analogue score was 7. Many previous articles have used VAS to find out neck pain. The VAS for perceived neck pain can be used to diagnose neck pain in patients. The mean value of neck pain for right side hands in rest was recorded 2.85 ±0.34, for hands on hip 6.28 ±0.48, for hands in 90-degree abduction with internal rotation 4.57 ±0.53. For left side hands in rest 2.28 ±0.48, for hands on hip 5.28 ±0.48, for hands in 90-degree abduction with internal rotation 4.42 ±0.53.

Also, vernier calliper was used for scapular measurement. The measurements were taken in 3 different positions i.e., hands in rest, hands on hip and hands in 90-degree abduction with internal rotation for both sides. Distance between the spinous process of thoracic vertebra and inferior angle of scapula was measured in all three positions. Distance greater than 1.5cm was an indicative for scapular dyskinesis. The mean value for participants with scapular dyskinesis for right side hands in rest was recorded 6.87 ±0.39, for hands on hip 8.51 ±0.29, for hands in 90-degree abduction with internal rotation 6.5 ±0.59. For left side hands in rest 6.77 ±0.59, for hands on hip 7.17 ±0.51, for hands in 90-degree abduction with internal rotation 6.4 ±0.59.

A. Figures and Tables

Demographic data	Mean (SD) with Scapular Dyskinesia	Mean (SD) without Scapular Dyskinesia
Age (in years)	40.1 ± 1.06	34.3 ± 4.23
No. of working experience	12.28 ± 1.38	7.27 ± 3.69

SD: standard deviation

Table. 1 Demographic differences in IT workers with Scapular Dyskinesis and without Scapular Dyskinesia.

Outcome Measure	Hands in rest	Hands on hips	Hands in 90-degree abduction with IR
VAS	2.85 ± 0.34	6.28 ± 0.48	4.57 ± 0.53
Vernier Calliper for Scapular Measurements	6.87 ± 0.39	8.51 ± 0.29	6.5 ± 0.59

Table. 2 Prevalence of Scapular Dyskinesia among IT workers

Outcome Measure	Hands in rest	Hands on hips	Hands in 90-degree abduction with IR
VAS	2.28 ± 0.48	5.28 ± 0.48	4.42 ± 0.53
Vernier Calliper for Scapular Measurements	6.77 ± 0.59	7.17 ± 0.51	6.4 ± 0.59

Table. 3 Mean and SD of VAS and Vernier Calliper for Scapular Measurements of right side in IT worker with Scapular Dyskinesia.

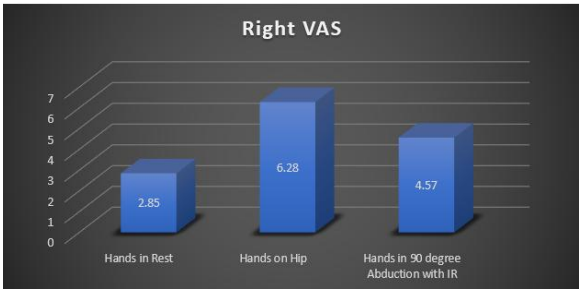

Fig 1. Mean of VAS score for right side

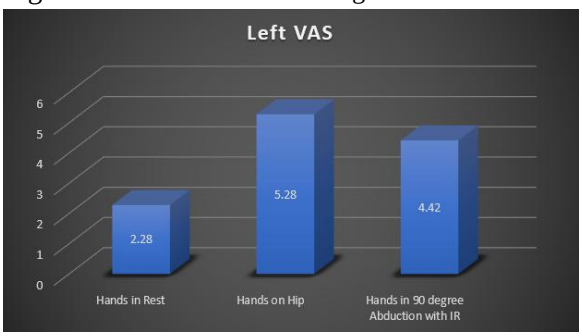

Fig. 2 Mean of VAS score for left side

B. Abbreviations and Acronyms

SD	Scapular Dyskinesis
IT	Information Technology
VAS	Visual Analogue Scale
No.	Number
SD	Standard Deviation
No.	Number

VII. CONCLUSION

This study conducted among IT worker of age 25-45 years in and around Kolhapur region resulted that there is a significant difference between all 3 positions i.e. Hands in rest, hands on hip and hands in 90degree abduction with internal rotation. After completion of the study, the result showed that prevalence of scapular dyskinesis among IT workers was 7%. Hence, our study concluded that scapular dyskinesis among IT workers was not much prevalent.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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