

Prevalence of Shoulder Pain and Scapular Dyskinesia in Carpenters

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Abstract: **Background:** Carpenters job involves these activities where most muscle work is done at upper limb mainly at shoulder joint. These activities comprise of manual screw driving, manual sawing on saw horse and nailing upward into ceiling repetitively. Repetitive movement and adapted posture while working may leads to increase pain in shoulder joint. Due to these activities alteration of scapular movements occurs. **Purpose:** To find out prevalence of scapular dyskinesia and shoulder pain in carpenters. **Method:** The observational study consist of 120 participants chosen according to inclusion and exclusion criteria. Lateral scapular slide test was done. Positive test was noted. **Result:** The result showed that prevalence of shoulder pain in carpenters was 84% with mild pain, 8% with moderate pain, and 1 % with severe pain and the study showed high prevalence of scapular dyskinesia at 90° in carpenters. **Conclusion:** The study concludes that there is 41% prevalence of scapular dyskinesia in carpenters.

Keywords: Carpenters, Scapular Dyskinesia, Shoulder pain, Lateral scapular slide test.

1. Introduction

Scapular dyskinesia is defined as visible alteration in scapular position and motion patterns and is believed to occur as result of change in activation of scapular stabilizing muscle¹⁻⁶. Scapula is a key part of the upper limb kinematic chain & is a vital component of the glenohumeral joint. Serratus anterior, rhomboids, levator scapulae, trapezius are important scapular stabilizers. Muscles imbalance in Scapular Dyskinesia include Serratus anterior, latissimus dorsi and lower trapezius.

Carpenter's job involves those activities where most muscle work is done at upper limb mainly at shoulder joint. These activities comprise of manual screw driving, manual sawing on a saw horse and nailing upward into the ceiling repetitively. Muscles for these activities –Upper and lower trapezius, supraspinatus, infraspinatus, teres minor, teres major, rhomboid minor and major, levator scapulae

Repetitive overhead tasks are also performed by carpenters which uses especially more than 60% of shoulder elevation, sustained overhead work, and higher loads raised above shoulder height. These repetitive muscle work leads to fatigue of shoulder and scapular stabilizers and pain at shoulder joint These alterations in scapular positions leads to changes in the kinesiology of scapular stabilizers. It alters scapulohumeral rhythm and so the scapular and shoulder kinetics and kinematics.

2. Need of Study

Carpenters have to constantly work in confined indoor environment. Scapular problems are very common in carpenters which alters the scapular kinetics and kinematics which leads to fatigue of the scapular muscles, it becomes very difficult in carpenters to work for prolong period and sometimes they even lose their jobs. On the extensive review

of literature, there is lack of data available which emphasizes mainly on scapular dyskinesia and shoulder pain in carpenters.

Aim: To find the prevalence of shoulder pain and scapular dyskinesia in carpenters.

Objective: To determine the prevalence of scapular dyskinesia in carpenters by using lateral scapular slide test. To determine the prevalence of shoulder pain in carpenters by using visual analogue scale

Methodology

Study Design - Observational Study. Sampling - Purposive Sampling.

Sample Size - 120

Study Duration - 6 Months.

Study Material - Pen And Notepad Study Location - PCMC

Inclusion Criteria

- Carpenters who are working continuously for at least 7 to 8 hours per day. Age – 20 - 40 years.

Exclusion Criteria

- Carpenters involved in any other kind of heavy work like labour work etc Carpenter with any musculoskeletal or systemic condition.
- Any congenital disorders. Metabolic diseases.
- Neuromuscular disorders.
- Carpenters with recent history of any upper limb musculoskeletal trauma / surgery

Outcome Measure

Lateral scapular slide test and Visual analogue scale 9.

3. Data Analysis and Result

Table 1: No of carpenters of shoulder pain on the basis of VAS

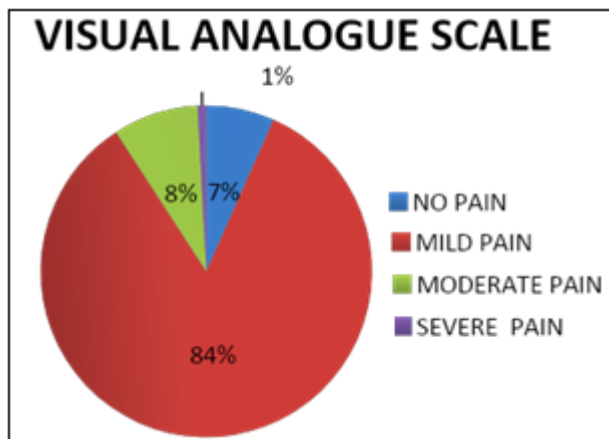


Figure 1

Table 1: Total frequency of pain is explained in the above table.

No Pain	Mild Pain	Moderate Pain	Severe Pain
8	101	10	1

Result: The Pie diagram demonstrates the population which falls into four categories namely no pain, mild pain, moderate pain and severe pain on the basis of visual analogue scale. It shows the number of participants having shoulder pain while their carpentry work on the basis of VAS total 120 males have participated in the study in which 7% of the male have no pain, 84% of the having mild pain, 8% are having moderate pain and 1% are having severe pain in shoulder.

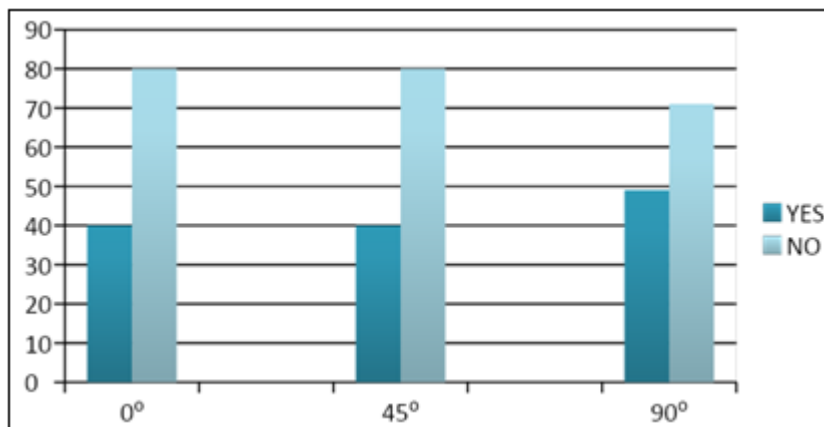


Figure 2: Prevalence of Scapular Dyskinesia in carpenters by using lateral scapular slide test:

Table 2: No of carpenters having difference in lateral scapular slide test:

°	Yes	No
0°	40	80
45°	40	80
90°	49	71

Result: The Bar graph shows the number of participants having difference while their carpentry work according to lateral scapular slide test. Total 120 males participated in this study in which at (0°) 40 participants show differences in the test. At (45°) 40 participants show differences in the test. At (90°) 49 participants show differences in the test.

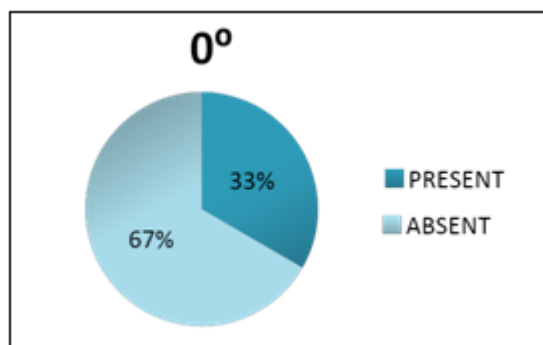


Figure 3: Result: The pie diagram shows that at 0° there is 33% participants show differences in the test.

Table 3: No. of Carpenters Show Difference at 0°

°	Present	Absent
0°	40	80

Table 4: No. of Carpenters Show Difference at 45°

°	Present	Absent
45°	40	80

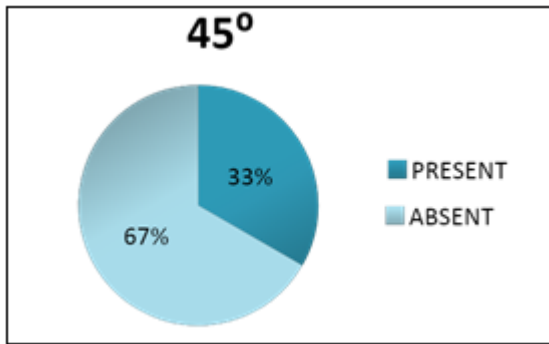


Figure 4: Result: The pie diagram shows that at 45° there is 33% participants show differences in the test.

Table 5: No. of Carpenters Show Difference at 90°

°	Present	Absent
90°	49	71

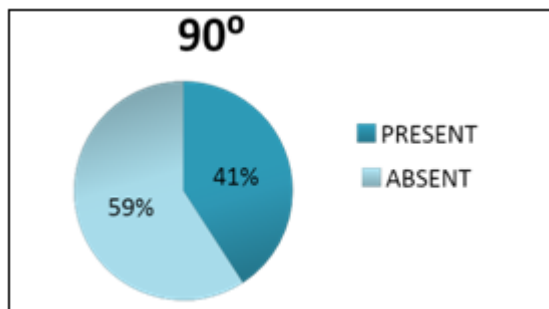


Figure 5: Result: The pie diagram show that at 90° there is 41% participant show differences in test.

4. Discussion

The aim of present study was to find out the prevalence of shoulder pain and scapular dyskinesia in carpenters. Result of the present study showed that prevalence of shoulder pain in carpenters was 84 % with mild pain, 8% with moderate pain and 1% with severe pain and the study showed high prevalence of scapular dyskinesia at 90° in carpenters.

Carpenters have excessive work like manual screw driving, sawing on a saw horse, nailing upward into ceiling repetitively. Repetitive overhead task also performed by the carpenters. This movement involves action of serratus anterior which upwardly rotates the scapula. Trapezius: upper fibers that elevate and upwardly rotate the scapula. Middle fibers which adduct or retract the scapula. Lower fibers which depress and rotate the scapula.

In the present study, Prevalence of scapular dyskinesia was observed at 90° in carpenters. Carpenters generally work in dynamic position with forward head posture, greater shoulder elevation, protraction and retraction, asymmetric body, doing work in one position for longer duration, repetitive movements and working with lifted shoulders.

Carpenters work include 1) sawing on saw horse which required protraction and retraction of the scapula. The serratus anterior, pectoralis major, and pectoralis minor muscles are responsible for protraction. The trapezius, rhomboids, and latissimus dorsi muscle are responsible for retraction. While sawing activity scapula goes away from

midline. Serratus anterior and trapezius muscles are lengthened while pectoralis and levator scapulae are contracted while sawing. Scapular protraction may cause the trapezius to experience a substantially higher tensile load.2) Installing which required shoulder abduction, adduction, and flexion. The pectoralis major, latissimus dorsi, teres major, and triceps muscles are responsible for shoulder adduction. The muscles involved in the action of abduction include supraspinatus, trapezius, and serratus anterior. and The anterior deltoid, pectoralis major, and coracobrachialis muscles are responsible for flexion. When performing an installation, carpenters must lift wood and place it in the designated location. The supraspinatus and deltoid contract concentrically at the shoulder joint in the up phases. and carpenters abduct their shoulder the middle deltoid contract concentrically, but then latissimus dorsi eccentrically to slow the movement change direction to shoulder adduction.3) Nailing upward into the ceiling required shoulder abduction and scapular elevation. The lower and upper trapezius, as well as the rhomboid major, minor, and serratus anterior. The muscle responsible for scapular elevation and shoulder abduction. These muscles must be working eccentrically to control the change in position of the scapula produced by the trapezius and serratus anterior muscle.4) Shoulder abduction, scapula elevation, and depression are required during dry walling. Carpenters must polish the wood before working on dry wall so that scapular depression and elevation can occur.

Lower and middle trapezius, as well as serratus anterior and levator scapulae are used when elevating and depressing the scapula. Forceful downward motion is a component of depression. Levator scapulae lengthening and pectoralis muscle shortening happen when doing upward activity, whereas rhomboid major and minor muscular contraction and pectoralis muscle stretching happen while doing downward activity.5) Forceful use of screw guns required scapular elevation, scapular protraction and shoulder abduction. Carpenters must raise screw guns while their work. Lifting screw guns is difficult, And as they lift the screw guns their arm is stuck due to weight bearing from the screw guns. upper and lower trapezius muscles as well as serratus anterior, pectoralis minor and major are needed for these activities. Due to weight bearing while lifting screw guns, the deltoid and supraspinatus muscles shorten while the subscapularis and biceps brachii muscle lengthen. Along with stretching of the lower and upper trapezius and shortening of the pectoralis major muscle.

Carpenters are involved in repetitive use of upper extremity muscles with long working hours, because of which, there is over use of scapular muscles which may get fatigue and leads to altered scapular biomechanics as scapular stabilizers might show muscle imbalance.

As a result shows the number of participants having shoulder pain while doing the carpentry work on the basis if VAS 84%. **Kibler, Ben W. MD; McMullen John ATC.** Scapular dyskinesia and Its relation to shoulder pain this study suggest that It frequently results from injuries that induce the inhibition or disruption of activation patterns in the scapular stabilizing muscles and occurs in a significant number of accidents and trauma involving shoulder pain. By

changing the scapular function during coupled scapulohumeral motion, it may worsen the functional impairment brought on by shoulder pain. Combining the serratus anterior muscle with the upper and lower trapezius, rhomboid muscle is necessary for scapular stabilization⁶.

The serratus anterior, lower trapezius, upper trapezius, and

rhomboid muscle work together to raise the scapula. In order to keep the immediate center of scapular motion moving along its usual course during arm elevation, the lower trapezius must be activated. This is the result of the straight line of pull it exerts when the arm elevates and the scapula rotates⁶.

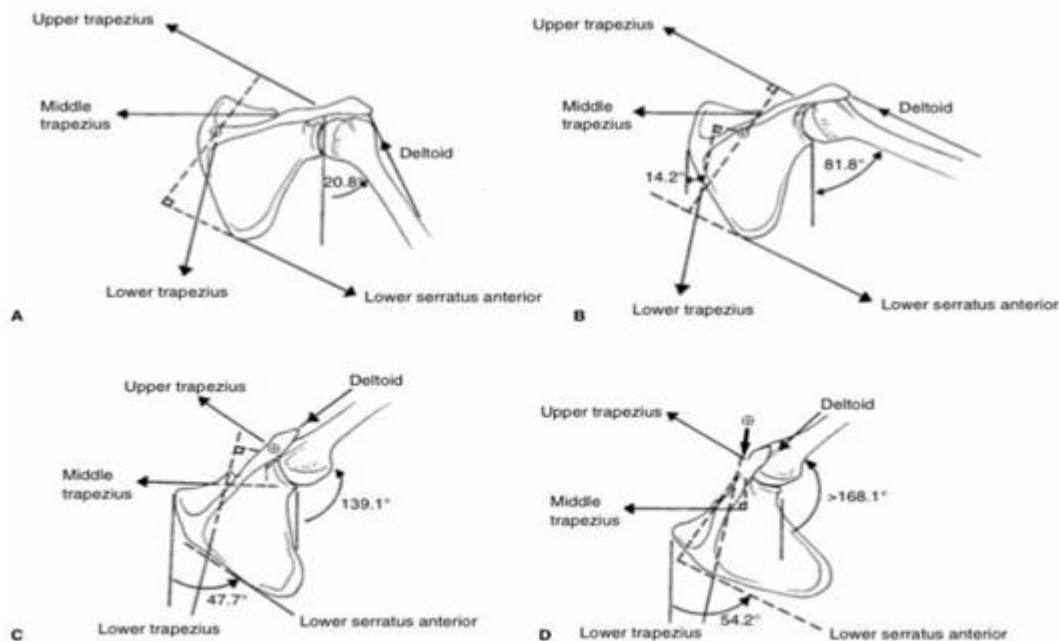


Figure 1 Force couples for scapular rotation. In early coupled arm elevation/scapular rotation (A and B), the upper and lower trapezius and serratus anterior muscles have long moment arms and are effective rotators and stabilizers. With higher arm elevation (C), the upper trapezius moment arm is shorter, while the lower trapezius and serratus anterior moment arms remain long and continue to rotate the scapula. With maximum arm elevation (D), the lower trapezius is ideally placed to maintain scapular position and pull along its long axis. As a result of these activities, the scapular instant center of rotation (⊙) moves from the medial border of the spine to the acromioclavicular joint. (Adapted with permission from Bagg SD, Forrest WJ. A biomechanical analysis of scapular rotation during arm abduction in the scapular plane. *Am J Phys Med Rehabil* 1988;67:238-245.)

In carpenters installing, ceiling and drywall demands regular, forceful use of screw gun which are frequently held in an awkward position. **G K Lemasters, M R Atterbury 1998** Jan researcher have done study on Prevalence of work related musculoskeletal disorder in active union carpenters found that high prevalence of upper extremity work related musculoskeletal disorders is not surprising concrete form tasks had the highest prevalence of shoulder pain among carpenters while performing activities that due to repetitive movement carpenters shows milder pain according to Visual Analogue Scale¹¹.

Another study was done by **Lopes AD, Timmons MK 2015 Feb** Visual scapular dyskinesia: kinematics and muscle activity alterations in patients with subacromial impingement syndrome this study suggests that the trapezius and the serratus anterior muscle have been linked to the development of dyskinesia in both shoulder impingement and instability. In impingement upper and lower trapezius along with the serratus anterior has altered their activation pattern with the trapezius showing a greater strength of activation in serratus anterior.

5. Conclusion

This study concludes that 84% carpenters shown prevalence of mild shoulder pain, 8% shown moderate shoulder pain and 1% shown severe shoulder pain. This study concludes that 41% carpenters shown prevalence of scapular

dyskinesia at 90°, 33% shown at 0 degree and 33% 45 degree.

6. Limitation of Study

Hand dominance is not included in the study.

7. Clinical Implication and Future Scope

The study can be conducted on a larger population. Correct ergonomics changes can prevent scapular dyskinesia. Strengthening exercise of shoulder, upper back muscles can be taught to prevent muscle weakness.

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