International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 8, 2025
https://www.theaspd.com/ijes.php

Prevalence Of Outward Rotation Of Scapula In Tailors

Vanshita. R. Solanki[1], Dr. Dhairysheel. S. Patil[2]
[1]Final year student, Krishna college of Physiotherapy, KVV, 415110, Shaniwar Peth, Karad, Maharashtra, India
[2]Assosciate Professor, Krishna college of Physiotherapy, KVV, 415539, Agashivnagar, Malkapur, Maharashtra, India

Abstract:
Background: *Outward rotation of scapula is rare condition of serratus anterior muscle weakness. Work related musculoskeletal disorders and postural anomalies are the limiting factor which consists of prolonged static sitting, poor posture, and lack of ergonomic adjustments. Many of these dysfunctions were found even in asymptomatic individuals, indicating early-stage or unnoticed muscular imbalances. There is need for early detection, ergonomic modifications, and strengthening of stabilizing muscles like the serratus anterior to prevent long-term musculoskeletal issues in tailors*
Methodology: *Cross-sectional study was done 273 tailors using a complete assessment which included personal details of participants, range of motion, lateral scapular slide test, scapular dyskinesis test and wall push up test. Participants were of both the genders aged 23- 76 years working for more than 6 months. Statistical analysis was performed to determine prevalence of the same.*
Results: *The prevalence of outward rotation of scapula in tailors was found to be 57.5%. There were 157 subjects which showed up being positive in at least one of the test that was conducted. Symptoms were more profound in participants who have been working for more than 10 years.*
Conclusion: *The study successfully established a significant prevalence of outward rotation of the scapula among professional tailors. With 57.5% of subjects exhibiting signs of scapular dyskinesis and serratus anterior weakness, the hypothesis that prolonged poor posture and repetitive occupational tasks contribute to scapular malalignment is supported.*

INTRODUCTION:

Tailors are skilled individuals who possess both creativity and proficiency in using their hands and machines. They perform repeated chores with bad posture while spending a lot of time sitting on chairs or on the floor. This causes discomfort for tailors and exacerbates neck and back problems. The postures that tailors commonly adopt while stitching are bending their necks forward, elevating their elbows beyond or below shoulder height, angling their wrists downward and inward, and hunch their backs and these are the postures that contribute to increasing discomfort over the years. In the afflicted areas, muscle stiffness, discomfort, and oedema are also typical symptoms[1]. Numerous studies show a strong correlation between upper extremity deficits and socio-demographic characteristics, including gender, age, marital status, education level, and experience. Research indicates that physical work settings, such as working hours, posture, shift work, rest breaks, and vibrations, have a significant impact on the development of upper extremity illnesses[2].

Long periods of sitting with the head and torso bent forward and the shoulders flexed and abducted increases the likelihood of discomfort in such work environments. Repetitive motions, bad posture, extended periods of static work, strenuous physical labour, frequent bending and twisting, whole-body vibration, manual handling, and insufficient ergonomic procedures are the main causes of discomfort. Pain, swelling from inflamed tissues, stiffness, reduced range of motion (ROM), and difficulties performing activities of daily living (ADLs) were the symptoms of discomfort that developed in tailors. The primary reasons of the discomfort are persistent injuries or damage, or pressure on tendons, bones, joints, or muscles as a result of continuous work without following ergonomic guidelines[3].

A few individuals think that sitting with your back slouched can change the way your scapula moves in healthy people. Professional workers and patients with neck pain frequently have poor sitting posture. When using a machine, patients with neck pain were less able to keep their posture straight. Patients with neck pain may have changed clavicular and scapular kinematics. At rest and when elevating the arm, this includes less scapular upward rotation and clavicular retraction. Professional workers who had neck or shoulder pain while using machines also showed increased scapular protraction[4]. Muscle imbalance caused by poor posture may manifest as a shortening of the anterior shoulder muscles, including the serratus anterior, pectoralis minor and major, and upper trapezius, rhomboids, middle and lower trapezius, and lengthening of the posterior shoulder muscles. The scapular and glenohumeral orientations, as well as kinematics, are altered by this muscle imbalance, which raises the risk of developing shoulder, neck, and nonspecific arm pain[5].

Originating from the first nine ribs, the serratus anterior is a large, flattened sheet of muscle that wraps around the thoracic wall posteriorly before entering the coastal surface of the scapula's medial edge. Three functional components make up the serratus anterior. The superior component enters the superior medial angle of the scapula after emerging from the first and second ribs. When the arm is raised overhead, this part acts as the anchor that permits the scapula to rotate. Originating from the third, fourth, and fifth ribs, the middle portion of the serratus anterior inserts on the scapula's vertebral border, protracting it. The inferior component attaches to the inferior angle of the scapula after emerging from the sixth to ninth ribs. This third section is used to extend the scapula and turn the inferior angle laterally and upward.

The serratus anterior's primary job is to rotate and protract the scapula while maintaining a close opposition to the thoracic wall and maximizing the glenoid's position for upper extremity motion[6].

Serratus anterior weakness is the most common cause of scapular winging. Trauma can also result from repetitive motions, such as those involved in sports and household tasks like digging, hedge-clipping, car washing, or extended periods of arms abducted and the head propped up to see.[6] When a patient with serratus anterior weakness first presents, they typically have pain around the affected shoulder (generally the right side), which can either be spontaneous or related to a traumatic event. The scapula and the arm may experience this ache. Furthermore, patients usually complain of shoulder weakness. Destruction or weakness of any of the scapular muscles causes the medial border of the scapula to wing as it raises off the thoracic wall. These muscles help maintain the scapula's medial border prolonged against the posterior thoracic wall[6].

Changes in the scapula's typical position and motion patterns during scapulohumeral movements are referred to as scapular dyskinesis. Asymmetrical placements in one or both scapula are referred to as "dyskinesis." Scapular dyskinesis is frequently associated with persistent shoulder and neck pain. The mobility and stability of the neck and shoulder region depends on the scapula, which serves as a bridge between the two[7]. Three dyskinetic patterns have been identified by Kibler. When Type I occurs alone, the scapula may be lower than the opposite side. It is characterized by the prominence of the inferomedial border of the scapula as a result of abnormal posterior tilt. Type II is characterized by the protrusion of the scapula's whole medial edge. When the acromiohumeral gap shrinks or becomes less pronounced, Type III shows an upward rotation of the scapula's superomedial border around the scapula. Additionally, Type IV refers to typical scapular mobility and posture[7]. It has been discovered that the dominant side's scapula is longer and more anteriorly inclined due to repetitive activities, indicating a correlation between shoulder ailments, scapular dyskinesis, and scapular position[5].

Soreness, stiffness in the soft tissues, imbalances in strength, thoracic kyphosis, muscle exhaustion, and uncomfortably hunched posture would result in aberrant scapular kinematics[7]. The posterior translation of the thoracic wall on a fixed scapula causes scapular protraction. The scapula becomes more protracted and causes anterior tilting due to the thoracic spine's increased flexion. Therefore, this position may result in limitations in the range of motion of the glenohumeral joint and weakness of the scapular posterior tilting muscles mainly; serratus anterior and lower trapezius[8]. It has been discovered that the dominant side's scapula is longer and more anteriorly inclined due to repetitive activities, indicating a correlation between shoulder ailments, scapular dyskinesis, and scapular position[5].

This study will help in finding the rate of outward rotation of scapula in tailors.

METHODS:

A cross-sectional study was conducted on tailors of age 23- 76 years . clinical assessment was done which incorporates range of motion, lateral scapular slide test, scapular dyskinesis test and wall push up test.

A. RANGE OF MOTION:

Range of motion of serratus anterior was taken which includes flexion and abduction.

B. LATERAL SCAPULAR SLIDE TEST [6]:

The scapular dyskinesis was assessed using Lateral Scapular Slide Test (LSST) . Scapular asymmetry is evaluated by LSST at different load positions. Scapular position measurement are made in the coronal plane with the arm abducted 0, 45 and 90 degrees. In all three positions , the distance between scapula's inferior angle and thoracic vertebra's spinous process in the same horizontal plane was measured. LSST is positive if the distance is more than 1.5 cm .

C. SCAPULAR DYSKINESIS TEST [9]:

Participants were instructed to hold weight (water bottles) based on their body weight:

- Those weighing less than 68 kg were given 1 kg
- Those weighing more than 68 kg were given 2 kg

Participants were instructed to flex and extend their thumbs up to 180 degrees and then return to neutral position at rate of 3 seconds. This procedure was carried out 5 times. Scapular Dyskinesis Test (SDT) was conducted using the palpation method. When analysing scapular dyskinesis , scapular movement was taken into account. When there were no indications of abnormalities SDT test was graded as normal. With increase in severity of scapular dyskinesis SDT was graded as mildly aberrant movements.

D. WALL PUSH UP TEST [10]:

Patients facing the wall with their shoulders raised to a horizontal position, elbows extended and wrists extended underwent wall push up test. In order to check the location of the scapula patient positioned their palms against the wall and gradually bent their elbows, bringing their body weight closer to the wall. When scapular winging was present, the wall push up test was deemed positive.

STUDY AND STUDY DESIGN: Survey study and observational study design

STUDY POPULATION: 273

ETHICAL COMMITTEE APPROVAL:

The approval for this study is gained from the institutional ethics committee of Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, Maharashtra, India, vide their letter no. KVV/01/2025 dated January 23, 2025. Respondents were given a detailed explanation about data collection sheet as well as study which is to be conducted and informed consent was collected from each and every candidates participating in this study. There was volunteer involvement of all the respondents in this study whose confidentiality was thoroughly maintained.

INCLUSION CRITERIA:

People who participated were more than 20 years of age. Subjects should have had at least 3-4 hours of work per day. Professional tailors were selected for the same. And their experience in this line of field should be at least of 1 year.

EXCLUSION CRITERIA :

Participants having any past history of shoulder complex injury were excluded. Participants exhibiting recent shoulder or neck fracture were also ruled out. Subjects underwent recent upper limb surgery were factored out.

SAMPLING METHOD: Simple random sampling

RESULT AND INTERPRETATION:

DEMOGRAPHIC DATA:

AGE GROUP	FREQUENCY	PERCENTAGE
<30	52	19%
31-50	138	50.50%
51-70	81	29.60%
>70	2	0.73%

Table 1.1: Age Distribution

Table 1.1 represents a classification of subjects into four distinct age groups based on their age range. First group compiles of age group less than 30 years, and this category comprises of total 52 subjects. The second group consist of individuals whose ages range between 31 to 50 years; this group includes the largest number of subjects with a total of 138 subjects. The third group is made up of people aged between 51 to 70 years which contains 81 subjects. Lastly, the fourth group includes those who are of more than

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70 years which consists 02 subjects. This categorisation helps in analysing the distribution of subjects across different age ranges.

GENDER	FREQUENCY	PERCENTAGE
FEMALE	159	58.20%
MALE	114	41.70%

Table 1.2: Gender Distribution

Table 1.2 provides information about the gender distribution of total number of subjects included in the study. A total of 273 subjects were participated in the study. Among these 159 subjects were female subjects; representing the majority of the study population. The remaining 114 were male subjects. This breakdown highlights the gender composition of the participants involved in the research.

NUMBERS OF YEARS OF PRACTICE	FREQUENCY	PERCENTAGE
<10 YERARS	133	49%
10-20 YEARS	79	28.93%
21-30 YEARS	42	15.38%
>30 YEARS	18	6.59%

Table 1.3: Practice Years Distribution

Table 1.3 illustrates the distribution of subjects based on their number of years of professional practice, categorised into four distinct groups. The first group complies individuals with less than 10 years of practice experience which comprises of total 133 subjects. The second group consists of those who have been practicing for 10 to 20 years accounting for 79 subjects. The third group includes individual with 21 to 30 years of experience which contains 42 subjects. Lastly, the fourth group represents those with more than 30 years of practice which consists of 18 subjects. This classification helps to understand the variation in experience levels among the participants.

PAIN HISTORY	FREQUENCY	PERCENTAGE
right shoulder pain	37	13.55%
left shoulder pain	16	5.86%
none	113	41.39%
low back pain	46	16.84%
neck pain	38	13.91%
B/L shoulder pain	23	8.42%

Table 1.4: Pain Distribution

Table 1.4 represents distribution of pain among subjects in various categories based on the location and type of pain experienced. These are as follows: The first category compiles of individuals reporting right shoulder pain with total of 37 subjects falling in this group. The second category complies of those experiencing pain in left shoulder which comprises 16 subjects. The third group includes individuals who reported no pain at all(none) which consists of 113 subjects. The fourth category represents those suffering from low back pain and contains 46 subjects. The fifth group comprises individuals experiencing neck pain accounting for 38 subjects. Lastly, the sixth category includes those with bilateral shoulder pain and this group consists of 23 subjects. The classification helps in understanding the prevalence and distribution of different types of musculoskeletal pain among the study participants.

RANGE OF MOTION	FREQUENCY	PERCENTAGE
normal	164	60.07%
abduction affected	49	17.94%

flexion and abduction affected	42	15.38%
flexion affected	18	6.59%

Table 1.5: Range of Motion

Table 1.5 represents data of range of motion among 273 subjects that were taken for the study. Out of total number of participants, 164 subjects were found to have normal range of motion. In contrast, 49 subjects showed limitations specifically in shoulder abduction.

Additionally, 42 subjects had impairments in both shoulder flexion and abduction.

Furthermore, 18 subjects were identified with restriction limited to shoulder flexion only. This categorisation highlights the varying patterns of shoulder movement limitations observed among the study population.

TEST RESULTS	FREQUENCY	PERCENTAGE
positive	111	40.65%
negative	162	59.30%

Table 1.6: Lateral Scapular Slide Test Results

Table 1.6 represents the results of Lateral Scapular Slide Test on 273 subjects included in the study. Among these participants, 111 subjects showed positive test results indicating the presence of scapular asymmetry or dysfunction. In contrast remaining 162 subjects exhibited negative test results, suggesting normal scapular position and movement. This distribution provides insight into the prevalence of scapular abnormalities among the study population.

TEST RESULT	FREQUENCY	PERCENTAGE
positive	118	43.22%
negative	155	56.77%

Table 1.7: Scapular Dyskinesis Test Results

Table 1.7 displays the results of Scapular Dyskinesis Test performed on a total of 273 subjects. Out of these, 118 subjects demonstrated positive test results, indicating the presence of scapular dyskinesis. The remaining 155 subjects showed negative test results suggesting normal scapular motions without any signs of dyskinesis. This data helps in understanding the frequency of scapular movement abnormalities among the study participants.

TESTRESULTS	FREQUENCY	PERCENTAGE
positive	113	41.39%
negative	160	58.60%

Table 1.8: Wall Push Up Test Results

Table 1.8 represents results of Wall Push Up Test conducted on total of 273 subjects. Among these participants, number of subjects which showed positive result are 113 indicating potential weakness or dysfunction in scapular stability. The remaining and number of subjects which demonstrated negative results are 160 suggesting normal scapular control during the test. This distribution provides valuable information regarding the presence of scapular instability within the study group

STATISTICAL METHOD:

The study was carried out among 273 tailors. It was conducted by taking assessments of tailors in which their serratus anterior muscles strength was checked using clinical test such as lateral scapular slide test, scapular dyskinesis test, wall push up test and their range of motion was also assessed. Data collection sheet was passed to them which included name, age, gender, dominance, BMI, years of practice, past history and pain history. The study duration was of 6 months. The random sampling method was used because of limited time. The collected data was analysed by a statistician using an instat application. Chi square test was done to analyse. Data collection sheets have been filled up by the tailors who aged between 23- 76 years.

DISCUSSION:

This cross-sectional study among tailoring workers found high proportions screening positive for scapular impairment: 40.65% on the Lateral Scapular Slide Test (LSST), 43.22% on the Scapular Dyskinesis Test (SDT), and 41.39% on the Wall Push-Up Test (WPUT). Together, these figures indicate a notable burden of scapular control problems in prolonged seated, hands-forward occupations.

The SDT, an observational assessment of scapular rhythm during weighted arm elevation, demonstrates moderate inter-rater reliability and is practical for large field screenings[11]. By contrast, static measures like the LSST have shown variable reliability and error, with several studies cautioning against using a single threshold in isolation[12,13]. Using multiple complementary screens (SDT, LSST, WPUT) aligns with contemporary recommendations to interpret scapular findings as potential impairments rather than definitive diagnoses[18].

Scapular dyskinesis and winging typically reflect altered activation or weakness of the serratus anterior and/or trapezius–rhomboid force couples[15]. Sustained slouched sitting with forward head and rounded shoulders can bias the thoracic spine and clavicle, changing scapular orientation and muscle activation; recent work shows slouched posture reduces upward rotation and posterior tilt during elevation[14]. In sewing/tailoring, workers spend long hours in constrained postures with repetitive upper-limb tasks; epidemiological studies consistently report high prevalences of neck and shoulder complaints in these populations[16,17,19]. The prevalence of positive scapular screens in our study is therefore plausible within this ergonomic context.

The WPUT is sensitive for medial border prominence but can over-identify serratus anterior dysfunction; alternative resisted-flexion assessments may offer better discrimination for true serratus anterior palsy[12,13,20]. Hence, combining WPUT with dynamic observation (SDT) and a distance-based static check (LSST) likely improved our ability to capture meaningful scapular control deficits.

Given the strong ergonomic drivers, workplace interventions should prioritize adjustable workstation heights, periodic micro-breaks, and postural/motor-control exercises targeting thoracic extension, scapular upward rotators (serratus anterior and lower trapezius), and pectoralis minor length[18,15]. Future studies could strengthen causal inference by quantifying actual task exposures, incorporating objective kinematics or surface EMG, and evaluating tailored exercise and ergonomic programs in randomized designs.

CONCLUSION:

The study successfully established a significant prevalence of outward rotation of the scapula among professional tailors. With 57.5 % of subjects exhibiting positive results in either one of the tests of scapular dyskinesis and serratus anterior weakness, the hypothesis that prolonged poor posture and repetitive occupational tasks contribute to scapular malalignment is supported.

These findings highlight the urgent need for ergonomic corrections in tailoring environments and suggest that targeted physiotherapy interventions should be integrated into occupational health programs. Regular screening for scapular dyskinesis and muscle weakness in high-risk professions such as tailoring can play a vital role in maintaining musculoskeletal health, reducing pain, and improving overall functional ability.

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