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Correlation of the Scapular Position and Neck Pain in Auto Drivers

Vincent JD* and Yamuna K

SRM College of Physiotherapy, SRM University, Chennai, Tamil Nadu, India

***Corresponding author:** Vincent Jeyaraj D, SRM College of Physiotherapy, SRM University, Chennai, Tamil Nadu, India, Tel: 044-27417833; E-mail: vincentjeyaraj.d@ktr.srmuniv.ac.in

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Abstract

Background: Drivers who work for long hours there mainly complaint about pain in shoulder, neck and lower back. A sitting position of driver is non neutral spinal posture commonly decrease in neutral lumbo lordosis and increase or decrease in flexion of neck.

Objectives: The aim of the study is to determine whether the scapular position and neck pain are correlated in auto drivers.

Study design: Non-experimental design PROCEDURE: Totally hundred participants are taken who have VAS in 5 or more than 5 depends on the inclusion criteria. The scapular protraction measurement and VAS (right and left) are measured in three different positions of hand. (1) Hands on its rest position. (2) Hands on hip. (3) Hands in 90-degree abduction with internal rotation. Vernier caliper is used to measure the scapular protraction.

Results: In three different position there is significant different in hand position.

Conclusion: Depends upon the analysis, scapular protraction and VAS for neck pain (right and left) is low when hand in rest, high in hand in hip, followed that hand in 90 degree abduction with internal rotation.

Keywords: Neck pain; Scapular protraction; Kyphosis; Ergonomics

Introduction

The scapula commonly referred as two flat triangle bones one on each side of shoulder present at posterior part of thorax between the ribs of second to seventh, approximately 2 inches or 5 cm from midline. The scapula is rotated internally on vertical, and is rotated upward 10 to 20 degrees from vertical [1].

For a muscle balance a scapula position is most important. There is a significant relationship present in muscle contraction abilities in shoulder region and position of scapula [2].

Auto rickshaws are otherwise known as three-wheelers. It's a popular mode of transportation in low- to middle-income countries [3]. They represent 14% of overall traffic in the country, making them the second most common vehicle on the road. Musculo skeletal trouble is more for drivers due to involve of fixed poor posture, prolonged sitting, vibration and mechanical shocks [4].

Work related musculo skeletal disorder affect both physical and psychological risk factors. The common physical factors are: increase physical loading in musculo skeletal system, vibration, prolonged sitting, mismatch with driver and seat. The habitual posture of the person in sitting and standing leads to impact on the spinal vertebras during prolonged sitting and driving [5].

The discomfort is caused by some identified factors: the seat shape, the thermal environment, exposure of whole body vibration, length of time sitting in the same seated position. The presents of vibration more in auto drivers because beneath a driver seat a vehicle engine is present [6].

Griffin et al. described how vibration, in combination with seated posture and increase a discomfort level, mainly in driving for long duration. In driving environments, the vibration at the seat surface and backrest are transmitted through the body and interact with vibration from the steering wheel and pedals to form the sensation of vibration, which can lead to discomfort with increased vibration dose.

The harmful factors associated with gastro intestinal, musculo skeletal, cardio vascular, respiratory, hearing and other problem which can have driving safety implication [7]. Developing of high risk for professional drivers is due to vibratory exposure and prolonged sitting [8].

Mansfield et al. showed that vibration and duration of sitting both are increase the discomfort. The rate of discomfort onset gets increased by presence of vibration [9].

Rebiffe expelled the position and sitting posture of the driver in correct posture, fit and comfortable. Porter et al.

augmented this theoretically with observe driving postures [10].

Forward head posture is the forward structural positioning of the head away from the center of the body. This forward head posture that causes rounded shoulder and neck pain due to an imbalance between the curvature of the spine and muscles that are attached to the neck bone, is correlated with problems in the neck bone. While several interventional studies are underway to improve forward head posture, research on the correlation between scapular position and neck pain remains incomplete [11].

Hence, the present study aimed to specifically examine the correlation between scapular positions and neck pain in auto drivers [12].

Aim of the study

To observe the correlation of scapular position, neck pain among auto drivers.

Need for the study

Lot of studies on scapular position correlations with neck pain were done concentrating only on heavy duty vehicles. The purpose of the study is to describe how scapular position correlate with neck pain among auto drivers.

Review of Literature

Selvam et al. study expelled that in all the three different hand positions, scapular protraction value differs but the scapular protraction is high when the samples place their hands on the hip the VAS scale is also high.

Kim et al. study demonstrated that a correlation was detected between FHP and neck pain and disability. However, no correlation was observed between the angle of FHP (measured by CVA) and RSP.

Mansfield et al. study shown that there is an acute step change in reported discomfort when exposure to vibration starts or stops. Small changes to foam composition were shown to affect the overall discomfort in the seat, but the differences were only significant after 40 min. This highlights the importance of long-duration dynamic testing when developing vehicle seats.

Smith et al. study shows that the elevated driving posture don't adversely affect the drivers discomfort or performance

Noda et al. study shows that LBP is common among drivers of three-wheelers in Sri Lanka. Long work hours and two-stroke engines were significantly associated with LBP. Results from this study point towards a role for educational, behavioral health, and policy interventions to help prevent and reduce LBP among these drivers.

Paine et al. study shows about the anatomy and biomechanics of the scapula and surrounding musculature, and describes the pathomechanics of scapular dysfunction. The focus is upon the assessment of dysfunction and retraining of the scapular musculature [13].

Lee et al. study shows that bus drivers are exposed to physical and chemical risk factors such as vibration and exhaust emissions. Furthermore, they are heavily stressed by having to continuously concentrate on road conditions and by staying alert for unexpected incidents [14].

JP et al. study shows, the driving sitting position is featured by non-neural spinal postures, generally a reduction in natural lumbar lordosis and an increased or decreased neck flexion.

Kim et al. study states that the effect of stretching on VDT (visual display terminal) workers upper extremity pain also reported a decrease in upper limb pain after the performance of stretching [15-19].

Kim et al. study states that, the pain level of the most painful part of the neck and shoulders also significantly decreased [20, 21].

Grace et al. study shows that high prevalence rates of WMSD among bus drivers in Hong Kong which warrants further investigation [22-25] **(Figure 1)**.

Methodology

- Study design: Non-experimental design.
- Study type: Observational study.
- Study method: Convenient sampling.
- Sample size: 100 subjects.
- Study setting: Kattankulathur, Thiruverkadu.

Inclusion criteria

- Age group between 25 to 45 years.
- VAS score: 5 or more.
- Only men's included in the study.
- Working hours should be 8 or more than 8 hours.
- During experience of 3 years and above.

Exclusion criteria

- Any recent surgeries.
- Congenital deformities of scapula.
- Sprengel deformity.
- Cervical radiculopathy.

Materials used

Vernier caliper, Pen, Paper

Figure 1 Materials used.

Procedure

Total Hundred (100) participants who met the inclusion criteria were taken with neck pain VAS 5 or more than 5. Participants were explained about full details of the study. In three different of hand positions a scapular protraction and neck pain VAS score (right and left) are measured. Three different hand positions are 1) Hand in rest 2) Hand in hip 3) Hand in 90-degree abduction with internal rotation [26-28]. The scapular protraction measurement is done by the use of vernier caliper. The measurement of scapular protraction (right and left) is from the inferior angle of scapula to the adjacent spinous process.

Hand in rest

For the position one the hand in rest, the subjects are instructed to keep the hand in relax at their sides. The measurement is done from inferior angle of scapula to adjacent spinous vertebra.

Hand in hip

For the position two hand in hip the participants are instructed to place both hands on the ipsilateral hips consequently the humerus was positioned in medial rotation at 45 degrees of abduction in the coronal plane.

Hand in 90-degree abduction with internal rotation

For the third position hand in 900 abductions with internal rotation the participants were instructed to actively elbows extension and to elevate and arms were in internally rotate (thumbs faced down) both upper extremities in 90 degrees in the coronal plane **(Figures 2-4)**.

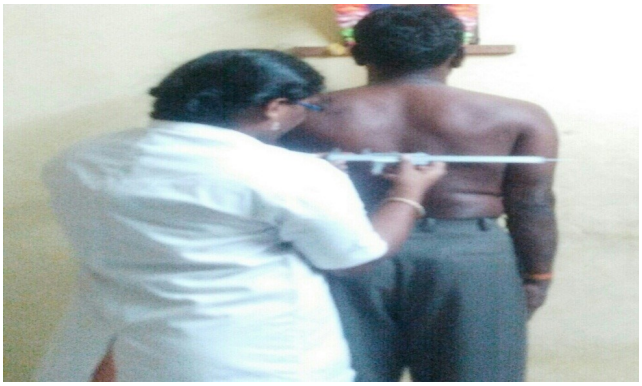


Figure 2 Hands in rest.

Figure 3 Hands on hips.

Figure 4 Hands in 90-degree shoulder abduction with internal rotation.

Outcome measures

- Visule analogue scale.
- Scapular positions.

Visule analogue scale: VAS typically consist of 10 cm line. The extreme left side of the line equals no pain; the extreme right-side equals to worst pain. Participants place a vertical mark on the line indicating the severity of pain that they feel.

- **Scapular positions:** Scapular positions is measured by use of vernier caliper from the inferior angle of scapula to the adjacent spinous process in 3 different positions. The positions are:
- Hands at rest.
- Hands in hip.
- Hands in 900 abductions with internal rotation.

Data Analysis

Data was analyzed using SPSS 22 for Microsoft Windows 7. Descriptive Statistical analysis was used to find the mean values for the variables included in the study. The scapular protraction and visual analogue scale for neck pain the both mean values are calculating and correlate to find any correlation in scapular position and neck pain.

Results

Analysis was done using SPSS 22 for Windows 7. Descriptive Statistical analysis was used to find the mean values for the variables included in the study.

Table 1 described the scapular protraction right side mean value of hands in rest 6.463, hands in hip 7.682, hand in 90-degree abduction with internal rotation 7.105. And also, its show mean value of visual analogue score for neck pain on

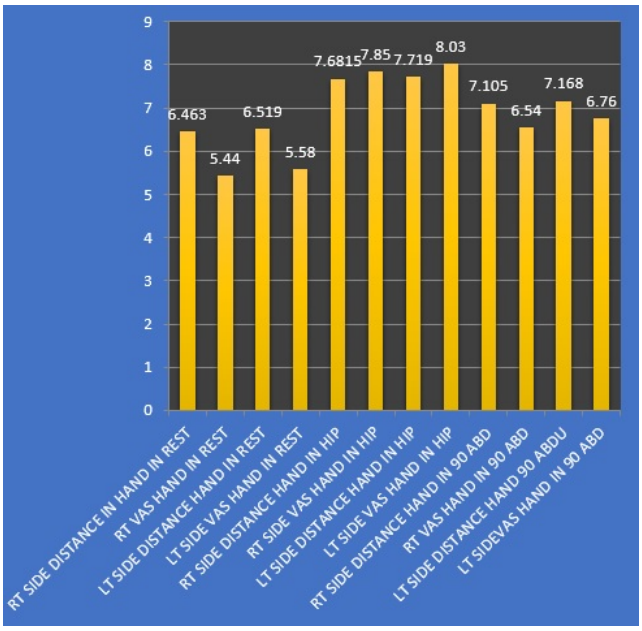
right side hand in rest 5.440, hand in hip 7.850, hand in 90-degree abduction with internal rotation 6.540. As so as its explain the scapular protraction left side mean value in hand in rest 6.519, hand in hip 7.719, hand in 90-degree abduction with internal rotation 7.168. And its show a mean value of a visual analogue scoring for neck pain on left side hand in rest 5.580, hand in hip 8.030, hand in 90-degree abduction with internal rotation 6.760.

Graph 1 described the correlation of VAS for neck pain and scapular protraction measurement (right and left). Whether a visual analogue score for neck pain is high in hand placed in hip, similarly a measurement of scapular protraction is high when hand placed in hip for both right and left side [26-29] **(Table 1; Graph 1)**.

Table 1 Correlation of scapular position and neck pain vas (n=100).

Variables	Mean value	Age	Gender	df	R value	Significant
Right distance hand in rest	6.46	25-45	Male 100	100	0.397	0
Right side vas hand in rest	5.44	25-45	Male 100	100		
Left distance hand in rest	6.51	25-45	Male 100	100	0.289	0.004
Left side vas hand in rest	5.58	25-45	Male 100	100		
Right distance hand in hip	7.68	25-45	Male 100	100	0.552	0
Right side vas hand in hip	7.85	25-45	Male 100	100		
Left side distance hand in hip	7.71	25-45	Male 100	100	0.625	0
Left side vas hand in hip	8.03	25-45	Male 100	100		
Right side distance hand in abduction with internal rotation	7.1	25-45	Male 100	100	0.429	0
Right side vas hand in abduction with internal rotation	6.54	25-45	Male 100	100		
Left side distance hand in abduction with internal rotation	7.16	25-45	Male 100	100	0.52	0
Left side vas hand in abduction with internal rotation	6.76	25-45	Male 100	100		

Table 1 infers that mean value of scapular distance and neck pain vas for hand in rest,hand in hip,hand in 900 abduction with internal rotation and age of the subjects and significant difference. R value <0.005.



Graph 1 Correlation of scapular position and neck pain vas.

Discussion

This study explains that there is a significant difference in hand in three different scapular positions and neck pain.

Table 1 shows that mean value of scapula protraction and VAS (right and left) in three different position hands in rest and hand in hip and hand in 90-degree abduction with internal rotation in this hand in rest position the distance and VAS is less compare to all other different positions.

Graph 1 explained that the mean value of scapula protraction and VAS (right and left) in three different positions: hand in rest, hand in hip and hand in 90-degree abduction with internal rotation. In this the distance and VAS score high in hand placed at hip. Followed that hand placed in 90-degree abduction with internal rotation. The smallest value is hand placed at rest.

The drivers who worked for long hours they more prone to poor posture. For a present of poor posture, a scapular position gets altered from a normal position. While drive for long hours in poor posture lead to forward head posture and protracted shoulder this lead to thoracic kyphosis increases.

The poor posture result to cause neck pain. Normally a head upright position and weight of head is hold by a spinal vertebra. When the head in forward flexion the spinal vertebras not support to hold the weight of the head. To compensate that the ligaments, muscles and tendons are work more to hold and place in position of the head.

Forward head posture is the structural forward positioning of the head away from the centerline of the body, where lower cervical vertebra is bent, and upper cervical vertebra are extended, and the weight of the head supported by the neck is increased. The bending moment of the head applies pressure on muscles and joints around the cervical vertebra, in addition to myofascial trigger points of the suboccibital muscle which may induce tension type headache, neck pain and cervical headaches, while reducing the mobility of the neck.

As a compensatory action for the postural deformity of forward head posture, severe extension arises between the upper cervical joint and atlanto-occipital joint, and the upper cervical vertebra relatively protrude forward while the face directs upwards. Changes in the curvature of the neck bone causes upper crossed syndrome due to an imbalance in muscular pattern which subsequently leads to rounded shoulder posture.

Rounded shoulder is a protrusion of the shoulder joint relative to the centerline gravity of the body causing stooped posture along with elevation, protraction, and downward rotation of the scapula, and an increased angle between the lower neck bone and upper spine.

Therefore, forward head posture that causes the rounded shoulder and neck pain due to an imbalance between the curvature of the spine and muscles that are attached to the neck bone, is correlated with problems in the neck bone.

The soft tissues and muscle are become tight due to excessive workload to hold a head in proper position.

The over tightness of soft tissues and prolonged overload lead to reduce the blood flow and oxygen on the soft tissues of neck.

The anterior neck flexor muscles become weak from being in shortened position and neural structures are kept in less than optimal position.

To avoid ergonomical discomfort to increased awareness about the correct posture. Easily adjustable steering wheels are provided for avoid unwanted movements of shoulder joint and wrist joint.

Change the size of steering wheel will avoid the unwanted movements of upper extremities. To prevent a more extension and rotation of cervical an outside mirror on two sides should be in properly positioned.

To improve the driving posture, the driving seat will maintain a trunk joint angle in a range of 90 degree to 110 degrees. To reduce the more extension of trunk joint in driving to avoid more than 90 degree of hip joint extension and more than 60 degree of knee joint flexion.

Conclusion

This study explains that there is significant difference on hand in different of three positions in drivers who worked for long hours in abnormal posture. Scapular protraction is high when hand placed at hip, also a VAS for neck pain is high in both right and left side. Followed that the hand placed in 900 abductions with internal rotation.

The lowest value of scapular protraction and VAS for neck pain is when the hand placed at rest position.

Limitations and Recommendations

Limitations

- Only male auto drivers for study.
- Presents of neck pain in visual analogue scoring 5 or more then 5.
- The age considered in this study were around 25-45 years.

Recommendations

- The correlation can be done for comparing of with and without neck pain to relate with scapular positions.
- Study can be done for different age groups.
- The future research done large samples.
- To prevent a discomfort a rest time should be important.
- Future studies can be done including both gender.

References

1. Senthil P, Selvam S, Arun B (2016) A Study of Neck Pain and Position in Drivers Role of Scapular. J Phys Ther Sci 6: 125-136.

2. Kim EK, Kim JS (2016) Correlation between rounded shoulder posture, neck disability indices, and degree of forward head posture. J Phys Ther Sci 28: 2929-2932.

3. Mansfield N, Sammonds G, Nguyen N (2015) Driver discomfort in vehicle seats e Effect of changing road conditions and seat foam composition. Appl Ergon 50: 153-159.

4. Smith J, Mansfield N, Gyj N, Pagett M, Bateman B (2012) Driving performance and driver discomfort in an elevated and standard driving position during a driving simulation. J Phys Ther Sci 27: 75-87.

5. Noda M, Malhotra R, DeSilva V, Sapukotana P, DeSilva A (2015) Occupational risk factors for low back pain among drivers of three-wheelers in Sri Lanka. Int J Occup Environ Health 21: 216-222.

6. Bhavya R (2014) Comparing the effectiveness of movement with mobilization versus mobilization in neck pain among working population. J Phys Ther Sci 25: 865-871.

7. Paine R, Voight ML (2013) Invited clinical commentary the role of the scapula. Int J Sports Phys Ther 8: PMC3811730.

8. Sinha AK (2012) Morbidity profile of auto-rickshaw drivers from randomly selected drivers unions in bangalore city.

9. Karthikeyan S (2013) The impact of computer use of neck muscle strength among the enginner college students. J Phys Ther Sci 4: 42-54.

10. Suselarayudu (2009) Effect of neck retraction excersise on mechanical neck pain. Cochrane Database Syst Rev 20: CD004250.

11. Raj M (2009) Efficacy of positional release technique on neck pain due to postural syndrome. J Phys Ther Sci 27: 2461-2464.

12. Szeto GP, Lam P (2007) Work-related Musculoskeletal Disorders in Urban BusDrivers of Hong Kong. J Occup Rehabil 17: 181-198.

13. Ariens G, van Mechelen W, Bongers PM, Bouter M, Wal G (2000) Physical risk factors for Neck pain. Scand J Work Environ Health 26: 7-19.

14. Barr AE, Barbe MF (2004) Inflammation reduces Physiological tissue tolerace in the development of work-related musculoskeletal disorders. J Electromyography Kinesiol 14: 77-85.

15. Canerio JP, Sullivan P, Burnett A (2010) The Influence of different sitting postures on head/ Neck posture and muscle activity. J Manual Thera 9: 54-60.

16. Giombini A, Di Cesare A, Quaranta F (2013) Neck balance system in the treatment of chronic Mechanical neck pains: a prospective randomized Control study. Eur J Physio Rehabi Medi 8: 283-290.

17. Hagberg M (1948) Occupational musculoskeletal Stress on shoulder disorders of the neck and Shoulder: a review of possible pathophysiology. Int Arch Occupatenviron Health 7: 269-278.

18. Issever H, Onen L, Sabuncu H, Altunkaynak A (2002) Personality characteristics, psychological symptoms and anxiety levels of drivers in charge of urban transportation in Istanbul. Occupational Medicine 52: 297-303.

19. Kim TH (2008) The effects of stretching exercise on workers with neck and shoulder pain. Korean J Spor Sci 17: 981-992.

20. Kim YM (2009) Effects of the use of the hold relax technique to treat female VDT workers with work related Neck-shoulder complaints. Korean J Occupenviro Med 21: 18 27.

21. Kompier MAJ, Dimartino V (1995) Review of bus drivers, occupational stress and stress prevention. Stress Medicine 11: 253-262.

22. Lee SY, Lee SC (2011) Mediating effect of coping behavior on the relationship between driving stress and traffic accident risk. Korean Indus Organ Psychol 24: 673-693.

23. Ludewig PM, Cook TM (2000) Alternations in shoulder kinematics and associated muscle activity in people with symptoms of shoulder impingement. World J Sport Sci 3: 276-291.

24. Magnusson M, Pope M, Wilder D, Areskoug B (1996) Are occupation drivers at an increased risk for developing musculoskeletal disorders? Physiothera 21: 710-717.

25. Ohlsson K, Attewell RG, Palsson B, Karlsson B, Balogh I, et al. (1995) repetitive industrial work and neck and upper limb disorders in females. Am J Ind Med 27: 731- 47.

26. Pavan EE, Frigo CA, Pedotti A (2013) Influence Indian Journal of Physiotherapy and Occupational Therapy. Physiothera 10: 951-955.

27. Ragland DR, Winkleby MA, Schwalbe J, Holman B, Morse L, et al. (1987) Prevalence of hypertension in bus drivers. Int J Epidemiol 16: 208-214.

28. Rehn B, Lundström R, Nilsson T, Bergdahl I, Ahlgren C, et al. (2002) Musculoskeletal symptoms among drivers of all-terrain vehicles. J Sound Vib 253: 21-29.

29. Sluiter J, Rest K, Frings-Dresen M (1997) A Critical review of epidemiologic evidence for work Related musculoskeletal disorders of the neck, Upper extremity, lower back. In: Bernard BP (ed.), Musculoskeletal Disorders and Workplace Factors. NIOSH Publication, Columbia Pkwy, Cincinnati, OH, USA, pp: 97-141.