



P-ISSN: 2394-1685  
E-ISSN: 2394-1693  
Impact Factor (ISRA): 5.38  
IJPESH 2020; 7(2): 125-127  
© 2020 IJPESH  
[www.kheljournal.com](http://www.kheljournal.com)  
Received: 10-01-2020  
Accepted: 12-02-2020

**Priya S**  
Associate professor, Department of physiotherapy, Laxmi memorial college of Physiotherapy, Mangalore, Karnataka, India

**Padmanabhan Suresh Babu Roshan**  
Assistant professor, Department of physiotherapy, Laxmi memorial college of Physiotherapy, Mangalore, India

**Shruti G Lakkumane**  
Intern, Department of physiotherapy, Laxmi memorial college of Physiotherapy, Mangalore, Karnataka, India

**Corresponding Author:**  
**Shruti G Lakkumane**  
Intern, Department of physiotherapy, Laxmi memorial college of Physiotherapy, Mangalore, Karnataka, India

## Relation between mechanical neck pain and scapular position

**Priya S, Padmanabhan Suresh Babu Roshan and Shruti G Lakkumane**

### Abstract

Globally incidence of mechanical neck pain has increased over the years due to common musculoskeletal problem like prolonged static posture and repetitive movements. It has been suggested that there is broader involvement of scapula position in neck pain. An observational study was conducted to find relationship between neck pain, disability and scapular position. A sample of 30 adults was screened and was included based on inclusion criteria. NPRS and neck disability index were assessed for pain and disability. Measurement of scapular position at rest was assessed using lennie test. Statistical analysis was done using descriptive statistics was used. The study found that increase in pain and disability could relate with scapular position in rest. So, the study concluded that there was significant relation between mechanical neck pain and scapular position.

**Keywords:** Mechanical neck pain, neck disability index, scapular position

### 1. Introduction

Cervical spine is the most complicated articular system in the body, there are 37 separate joints that function to carry out the movements of head and neck [1]. It is estimated that the Osseoligamentous system contributes to 20% of the mechanical stability of the cervical spine, while the 80% is provided by the surrounding neck musculature [2]. Neck pain is a common musculoskeletal disorder in population surveys as it poses a significant health and economic burden and a frequent source of disability [3].

Neck pain occurs commonly throughout the world and causes substantial disability and economic cost [4]. In a Indian study, 67-71% of the general population has experienced neck pain during lifetime [5].

Mechanical neck pain is one of the common health problem 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 [6]. 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 [7].

Postural neck pain is usually associated with sustained static loading of the cervical spine and shoulder girdle during occupational or leisure activities [8]. 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 [9].

However, there are so many studies and researches indicating that there is a broader involvement than only the cervical musculoskeletal system in mechanical neck pain one muscle group that has gained specific interest is the scapular muscle group. Our human body is the main evidence which supports the theory that the functions of scapula is important in normal neck function and might be disturbed in patient with neck pain.

Scapular muscle including trapezius muscle (upper, middle and lower parts) the serratus anterior, levator scapulae, rhomboids muscles (minor and major), the pectoralis minor have an important role as transferring loads between the upper limb and the vertebral column,

including the cervical spine. Disturbances in the function of scapular muscle can result in the increase of load on the cervical spine. Compressive loading of the cervical spine can increase the intradiscal pressure and zygapophyseal joint surface, which can lead to neck pain<sup>[10]</sup>. So the scapular region has attracted much attention because of its close relationship with the cervical region that is disturbed scapular muscle function may leads to neck pain, so scapular dyskinesia is ought to be one of the risk factors for NNP. So researches have started to focus on scapular region in patient with neck problems<sup>[11]</sup>. The literature that evaluates relation of mechanical neck pain and scapular position is limited in number. Thus there is need to establish the relation of scapular position in neck pain. This study evaluates the relationship between mechanical neck pain and scapular position.

## 2. Methodology

This observational study was conducted in Dakshina Kannada Mangalore. Total of 30 subjects was collected with an age group between 18-45 years including both genders. Subjects having any recent surgeries to neck or upper back, history of whiplash injury, open wounds in neck region, congenital deformity of scapula, psychological illness were excluded. Subjects fulfilling the inclusion and exclusion criteria were enrolled for the study. Prior to the beginning of testing, the purpose and procedure of the study was explained to all participants and provided written formed consent. Numeric pain rating scale (NPRS) was used to rate the subjects neck pain and neck disability index (NDI) was used to measure functional disability. Scapular measurement was assessed by using lennie test.

### 2.1. Scapular measurement at resting position was checked by using lennie test by the following procedure

The subjects were instructed to keep the hand in relax position at their sides. The lennie test which has been found to have moderate to high reliability to provide accurate measure of scapular position was performed by the examiner at three levels (right and left) i.e. from superior angle to T2 spinous process, root of spine to T4 spinous process, inferior angle to T8 and was measured using tape.

### 2.2. Numeric pain rating scale

The participants were assessed with their pain intensity using NPRS scale which is has a high reliability and validity to measure pain intensity<sup>[12]</sup>. The scale ranges from zero(0) representing 'no pain' to ten (10) representing 'pain as bad as one can imagine' or 'worst pain imaginable'<sup>[13]</sup>.

### 2.3. Neck disability index

Participants also completed the neck disability index, a questionnaire to assess neck pain and disability which has been found to be reliable and valid tool in measuring the pain and associated disability<sup>[14]</sup>. The questionnaire has 10 items which includes pain, personal care, lifting, reading, headache, concentration, work, driving, sleep and recreation each section scored from 0-5, 0 being no pain, 5 being worst imaginable pain. Total score was taken out of 50

## 3. Result

Data was analyzed using SPSS v.16. Descriptive statistical analysis was used to find mean values for the variables included in the study.

**Table 1:** The table 1 shows the descriptive statistics of the numeric pain rating scale (NPRS), neck disability index (NDI) and scapular measurement of superior angle (SA), root of spine (RS) and inferior angle (IA) of both side right and left.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
NPRS	30	6.00	9.00	7.0333	.76489
NDI	30	24.40	98.80	52.5833	16.60168
SART	30	6.00	11.00	7.7500	1.16523
SALT	30	7.00	12.00	9.1500	1.37182
RSRT	30	8.00	14.00	10.9667	1.47352
RSLT	30	6.00	11.00	7.7500	1.22298
IART	30	7.00	12.00	9.1800	1.44661
IALT	30	9.00	14.00	11.0333	1.37674
Valid N (listwise)	30				

## 4. Discussion

Neck pain is a second most common pain after low back pain. Onset of mechanical neck pain is generally insidious and is multifactorial in origin which includes poor posture, anxiety and neck strain. The altered activation of upper trapezius and combined with weakness of scapular muscles might contribute to neck pain. Normally scapula rests at a position on the posterior thorax approximately two inches from the midline, between the second and seventh ribs. The scapula is internally rotated from vertical and is upwardly rotated 10 to 20 degrees from vertical. For a muscle balance a scapula position is important as there is a significant relationship between the contraction abilities of the muscles in the position of scapula which can be developed due to poor posture that creates disadvantage in muscle function.

Present study was done to find relation between mechanical neck pain and scapula position in rest and it shows there is a significant relation between neck pain and scapula at resting position.

Previously Su-Rim Kim<sup>[15]</sup> concluded that scapular asymmetry indicates imbalance of surrounding muscles of the scapula and is related to neck pain. In another study, Cagnie found that scapula thoracic muscle function was disturbed in patients with neck pain in resting position.

The possible reason for the change can be alteration in scapula muscle function can cause mechanical strain to cervical spine structures because of shared muscle attachments between the scapula and the cervical spine. The uppermost attachments of the scapula thoracic muscles such as trapezius and the levator scapulae can transfer loads from the shoulder girdle to cervical structures. Disturbance in this scapular muscle function can induce mechanical loading on cervical segments and create implication for the initiation of neck pain<sup>[16]</sup>. Petersen S. found that scapulothoracic muscle strength values was significantly lowered in individuals with neck pain<sup>[17]</sup>. Another possible reason can be due to poor posture in which the head is supported by spinal vertebrae. When the head is flexed forward, the vertebra does not support weight of the head of the head as much, so the muscles, tendons, and ligaments work harder to hold up the head. To compensate the muscles and soft tissues tighten up due to excessive workload required to hold up the head in position. The chronic overload and tightening on muscles and soft tissues eventually<sup>[18]</sup> lead to inappropriate muscle action and decreases the stabilizing musculature while reducing the mobility of neck<sup>[19]</sup>. Jyoti D found that there was a significant difference in scapular position due to abnormal posture<sup>[20]</sup>. Studies have found scapular postural correction could help in

normalizing muscle activity in neck pain individuals.

The present study found the positive relation between mechanical neck pain and scapular position at rest.

Further studies should be conducted to find the relationship between scapular position and neck pain.

## 5. Conclusion

However, the present study concluded that there is a significant relation between mechanical neck pain and resting scapular position. The implication can be the promotion of scapular stabilization exercise and strengthening exercise which can help in muscle activity regulation to improve the posture and to decrease pain over the neck. A regular correction to an upright neutral posture can be done by postural re-education exercise. Providing ergonomic intervention can be beneficial for the work-related posture

## 6. References

- Bland JH, Boushey DR. Anatomy and physiology of the cervical spine. In *Seminars in arthritis and rheumatism* WB Saunders. 1990; 20(1):1-20.
- Panjabi MM, White AA. *Biomechanics in Musculoskeletal System*. 1<sup>st</sup> Edition, Churchill Livington, New York, 2001.
- Mohd Azuan K, Zailina H, Shamsul BM, Nurul Asyiqin MA, Mohd Azhar MN, Syazwan Aizat I. Neck, upper back and lower back pain and associated risk factors among primary school children. *J Appl Sci*. 2010; 10(5):431-435.
- Hoy DG, Protani M, De R, Buchbinder R. The epidemiology of neck pain. *Best Practice & Research Clinical Rheumatology*. 2010; 24(6):783-92.
- Aggarwal P, Aggarwal B, Jain D. Clinical approach to neck pain. *Indian Journal of Rheumatology*. 2010; 5(4):193-8.
- Kanlayanaphotporn R, Chiradejnant A, Vachalathiti R. Immediate effects of the central posteroanterior mobilization technique on pain and range of motion in patients with mechanical neck pain. *Disability and rehabilitation*. 2010; 32(8):622-8.
- Tank KD, Choksi P, Makwana P. To Study the Effect of Muscle Energy Technique Versus Mulligan Snags on Pain, Range of Motion and Functional Disability for Individuals with Mechanical Neck Pain: A Comparative Study. *Int J Physiother Res*. 2018; 6(1):2582-87.
- Edmondston SJ, Wallumrød ME, MacLéid F, Kvamme LS, Joebges S, Brabham GC. Reliability of isometric muscle endurance tests in subjects with postural neck pain. *Journal of manipulative and physiological therapeutics*. 2008; 31(5):348-54.
- Ashok A, Suganya M, Arun B. Comparison of Myofascial Release, Muscle Energy Technique and Cervical Manual Therapy in Postural Neck Pain. *Asian Journal of Orthopaedic Research*. 2019; 26:1-6.
- Castelein B, Cools A, Bostyn E, Delemarre J, Lemahieu T, Cagnie B. Analysis of scapular muscle EMG activity in patients with idiopathic neck pain: a systematic review. *Journal of Electromyography and Kineiology*. 2015; 25(2):371-86.
- Yildiz TI, Turgut E, Duzgun I. Neck and scapula focused exercise training on patients with non specific neck pain: a randomized controlled trial. *Journal of sport rehabilitation*. 2018; 27(5):403-12.
- Ferraz MB, Quaresma MR, Aquino LR, Atra E, Tugwell P, Goldsmith CH. Reliability of pain scales in the assessment of literate and illiterate patients with rheumatoid arthritis. *The Journal of rheumatology*. 1990; 17(8):1022-4.
- Hawker GA, Mian S, Kendzerska T, French M. Measures of adult pain: Visual analog scale for pain(vas pain), numeric rating scale for pain(nrs pain), mcgill pain questionnaire(mpg), short form mcgill pain questionnaire(sf-mpg), chronic pain grade scale (cpgs), short form-36 bodily pain scale (sf-36 bps), and measure of intermittent and constant osteoarthritis pain(icoap). *Arthritis care & research*. 2011; 63(S11):S240-52.
- MacDermid, JC, Walton DM, Avery S, Blanchard A, Etruw E, Mcalpine C *et al*. Measurement of the neck disability index: a systematic review. *Journal of orthopaedic & sports physical therapy*. 2009; 39(5):400-17
- Kim SR, Kang MH, Bahng SY, An JK, Lee JY, Park SY *et al*. Correlation among scapular asymmetry, neck pain, and neck disability index (NDI) in young women with slight neck pain. *Journal of physical therapy science*. 2016; 28(5):1508-10.
- Castelein B, Cools A, Parlevliet T, Cagnie B. Are chronic neck pain, scapular dyskinesis and altered scapulothoracic muscle activity interrelated?: A case-control study with surface and fine-wire EMG. *Journal of Electromyography and Kinesiology*. 2016; 31:136-43.
- Petersen SM, Domino NA, Cook CE. Scapulothoracic muscle strength in individuals with neck pain. *Journal of back and musculoskeletal rehabilitation*. 2016; 29(3):549-55.
- Selvam PS, Arun B. A Study of Neck Pain and Role of Scapular Position in Drivers. *Indian Journal of Physiotherapy and Occupational Therapy*. 2016; 10(4):174.
- Vincent Jeyaraj D, Yamuna K. Correlation of the Scapular position and Neck Pain in Auto Drivers. *J Physiother Res*. 2018; 2(1):2.
- Dahiya J, Ravindra S. Effect of scapular position in computer professionals with neck pain. *International Journal of Science and Research*. 2013; 4(5):2075-80.