

## RELATION OF NECK PAIN, FORWARD HEAD POSITION AND PROTRACTED SHOULDERS IN STUDENTS WITH CHRONIC NECK PAIN.

### Physiotherapy

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### ABSTRACT

**Aim of the study:** To study the correlation between neck pain, forward head posture and protracted shoulders in students aged 18-25yrs with chronic neck pain. **Material and Method:** 36 subjects, male and female were included in this cross sectional, correlation study as per the inclusion and exclusion criteria. A written informed consent was signed by the subjects in their own language. Neck pain was measured using Numerical Rating Scale (NRS), Forward Head Posture (FHP) was measured using CVA angle by photogrammetry and Protracted Shoulders were measured using a Double Square Instrument. The results were compared and correlated using appropriate statistical tools. **Results:** There was no significant correlation between CVA and protracted shoulders with severity of neck pain ( $p=0.54$  and  $p=1.64$  respectively) in students aged 18-25 years. The comparison of CVA values in students with and without pain was significant ( $p<0.00$ ). The comparison of protracted shoulders in students with and without pain was significant. ( $p=0.00$ ). The correlation between CVA and protracted shoulders in students with chronic neck pain was found to be significant ( $p=0.01$ ) but the correlation between the same in students without chronic neck pain was found to be not significant ( $p=0.24$ ). **Conclusion:** The correlation between neck pain and CVA and neck pain and protracted shoulders was not significant, but there was a significant difference between the CVA and protracted shoulder values of students with and without neck pain suggesting an association, but not a linear relationship.

### KEYWORDS

Chronic Neck Pain, Forward Head Posture, Protracted Shoulders, CVA

### INTRODUCTION

Neck pain is a common disorder characterized by pain, discomfort or soreness experienced in a region between the inferior margin of the occipital bone and T1<sup>1</sup>.

Forward head posture is the anterior positioning of the cervical spine. This condition has increased and is exacerbated with the advancement in technology, incorrect studying postures and the increasing use of computers and smartphones for extended periods of time<sup>2</sup>.

This posture reduces the dispersion of biomechanical loading and therefore causes degeneration of the neck muscles and abnormal structural changes along with pain. Specifically, the deep cervical flexors and scapular retractors are weakened, and there is increased tension and thickness of the sternocleidomastoid muscle. The abnormal responses to neck pain are due to protective reactions of hyperactivity and inhibition of muscle to prevent damage to the body or reduce pain. This causes malalignment of the neck, a tilting in posture and an imbalance of the muscles and leads to neck pain<sup>2</sup>.

Patients with neck pain often complain of pain around the scapular region as well. They have symptoms around the neck, in the neck-shoulder muscles, as well as have abnormal postures such as rounded shoulders and forward head<sup>2</sup>.

While treating patients with neck pain, the physiotherapist usually localizes the treatment to the neck muscles (longus capitis, longus colli), corrects the forward head posture and tends to undertreat or overlook the scapular muscles such as middle trapezius, levator scapulae.

As neck pain could become a chronic and disabling symptom; discovering and improving the risk factors seems a reasonable prevention strategy<sup>3</sup>.

The relationship between forward head posture and protracted shoulders with neck pain severity would give the correct and further direction of treatment for patients with neck pain.

This study may help us to come to a conclusion about the abnormalities of posture in students. In the new era where the use of electronic gadgets is increasing tremendously along with the incorrect postures attained by them while studying, not only is it important to correct forward head posture but also the ensuing postural changes like protracted shoulders.

Correct and early treatment can be given to the younger and productive population and thus help in preventing further postural sequelae.

Therefore the objectives of this study were to correlate neck pain with head position (forward head) and neck pain with protracted shoulders in students and also to compare the head position and protracted shoulders in students with and without neck pain. Another objective was to correlate FHP with protracted shoulders in students with neck pain.

The secondary objective was to study the association of protracted shoulders with BMI in students with and without neck pain.

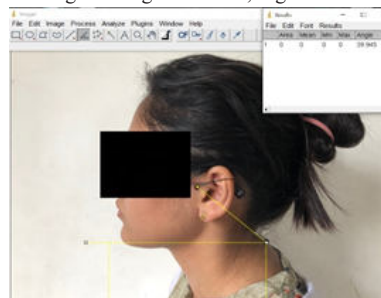
### METHODOLOGY:

18 students, aged 18-25 years of age with chronic (>3 months) neck pain, and 18 students without neck pain, willing to participate were included in the study. Students with any structural deformity in the shoulder or cervical spine, who had undergone any surgeries for the correction of the same deformity, Vertigo, Dizziness and Neuromuscular disorders were excluded.

Approval from Ethics Committee of K J Somaiya College of Physiotherapy was obtained. A written formal consent was taken from subjects after explaining the details of the study.

The pain on NRS, forward head shoulders using photogrammetry (by calculating the CVA) and protracted shoulders (using a double square instrument) was calculated and noted down.

CVA- this was measured by making the subject sit on a stool with the feet supported. The camera was placed on a tripod at a distance of 60cm from the tragus after configuration and a side profile picture was taken of the subject. Using the ImageJ software, angle was calculated.



**Protracted shoulders-** The subject was made to stand against the wall with the buttocks touching the wall and gazing straight ahead at a point. With the help of the double square instrument the distance between the wall and the acromion process was measured.



## RESULTS

The data was entered using Microsoft Excel and analysed using GraphPad Instat Software version 3.10.

Unpaired t test was used for comparison between groups for the data which passed the test of normality while Mann Whitney U test was used data which did not pass the test of normality. Spearman Rank Correlation test was used to study the relationship between variables as the data did not pass the test of normality. The level of significance was set as 0.05 for all analysis.

**Table 1: Mean and Standard Deviation of variables of the subjects with and without neck pain.**

| VARIABLES                | MEAN   | STANDARD DEVIATION | MINIMUM | MAXIMUM |
|--------------------------|--------|--------------------|---------|---------|
| <b>With neck pain</b>    |        |                    |         |         |
| PAIN                     | 5.944  | 1.056              | 4       | 9       |
| CVA (degrees)            | 40.213 | 3.881              | 30.7    | 45.4    |
| PROTRACTED SHOULDERS     | 15.383 | 1.363              | 11.7    | 17.8    |
| <b>Without neck pain</b> |        |                    |         |         |
| CVA (degrees)            | 48.363 | 2.776              | 43.671  | 54.816  |
| PROTRACTED SHOULDERS     | 13.916 | 1.650              | 11.2    | 16.5    |

**Table 2: Correlation between neck pain & CVA angle and neck pain & protracted shoulders in students with neck pain using Spearman rank correlation test.**

| NRS   |       | CVA (degrees)                    |       | r value | p value | significance    |
|-------|-------|----------------------------------|-------|---------|---------|-----------------|
| mean  | SD    | mean                             | SD    |         |         |                 |
| 5.944 | 1.056 | 40.213                           | 3.881 | -0.1529 | 0.5446  | Not significant |
|       |       | <b>Protracted shoulders (cm)</b> |       |         |         |                 |
|       |       | mean                             | SD    |         |         |                 |
|       |       | 15.383                           | 1.363 | 0.1179  | 1.6414  | Not significant |

**Table 3: Comparison between CVA angles of both groups and protracted shoulders of both groups (students with and without neck pain) using Mann -Whitney U test and Unpaired t test respectively.**

| CVA (students with neck pain)                         |       | CVA (students without neck pain)                         |       | p value | significance          |
|-------------------------------------------------------|-------|----------------------------------------------------------|-------|---------|-----------------------|
| mean                                                  | SD    | mean                                                     | SD    |         |                       |
| 40.213                                                | 3.881 | 48.363                                                   | 2.776 | <0.0001 | Extremely significant |
| <b>Protracted shoulders (students with neck pain)</b> |       | <b>Protracted shoulders (students without neck pain)</b> |       |         |                       |
| mean                                                  | SD    | mean                                                     | SD    |         |                       |
| 15.383                                                | 1.363 | 13.916                                                   | 1.650 | 0.0066  | Very Significant      |

**Table 4: Comparison between BMI of both groups (students with and without neck pain) using unpaired t test.**

| BMI (students with neck pain) |       | BMI (students without neck pain) |       | p value | significance          |
|-------------------------------|-------|----------------------------------|-------|---------|-----------------------|
| mean                          | SD    | mean                             | SD    |         |                       |
| 24.475                        | 4.187 | 22.02                            | 4.133 | 0.0858  | Not quite significant |

**Table 5: Correlation between CVA and protracted shoulders in students with and without neck pain using Spearman Rank Correlation**

| <b>WITH PAIN</b>    |       |                           |       |         |              |
|---------------------|-------|---------------------------|-------|---------|--------------|
| CVA                 |       | Protracted shoulders (cm) |       | r value | p value      |
| mean                | SD    | mean                      | SD    |         | significance |
| 40.213              | 3.881 | 15.383                    | 1.363 | -0.5732 | 0.0129       |
| <b>WITHOUT PAIN</b> |       |                           |       |         |              |
| CVA                 |       | Protracted shoulders (cm) |       | r value | p value      |
| mean                | SD    | mean                      | SD    |         | significance |
| 48.363              | 2.776 | 13.916                    | 1.650 | -0.2901 | 0.2428       |

## DISCUSSION:

The results of the present study showed that the correlation between neck pain and CVA (cranio- vertebral angle) as well as correlation between neck pain and protracted shoulders in students was **not significant**, whereas the comparison of CVA and protracted shoulders of students with and without neck pain was **extremely significant**.

Posture is dynamic. It depends on various confounding variables. The photogrammetry method, a modern way of assessing forward head posture was combined with the traditional method of measuring the protracted shoulders using the double square method.

Abnormal postures are seen in patients with chronic neck pain. A forward head posture along with protracted shoulders alters the scapular kinematics as a result of which the Serratus Anterior (SA) functioning is changed. In protracted shoulders there is decreased scapular upward rotation which increases the muscle activity of SA to compensate. In addition, the trapezius muscle generates a coupling force with SA, resulting in altered movements such as excessive upper rotation and anterior tilting<sup>7</sup>.

While the results showed that neck pain and craniovertebral angle were not correlated, it was seen that there was significant difference in the CVA values of students with and without neck pain.

It was also found out that while there was a significant correlation of CVA with protracted shoulders in students with chronic neck pain, there was no significant correlation of CVA and protracted shoulders in students without chronic neck pain. This was also reported in a study conducted by Singla, Deepika & Vejar, Zubia in 2017.

The normal CVA is found out to be 49.9 degrees. As the forward head posture keeps on exaggerating, the angle measures lesser (< 49.9 degrees). In both the groups (students with and without neck pain) the majority of the population i.e., 88% showed the angle to be lesser than 49.9 degrees with 77.77% population without neck pain showing the angle to be less than 49.9% and 100% of the population of students having chronic neck pain showing CVA less than 49.9 degrees. Although while comparing the two groups, the CVA angle of the students with pain was **much lesser** than the CVA angle of the students without pain, hence showing an association, but not a linear correlation.

Similarly it was found out that the correlation between neck pain and protracted shoulders was not significant.

Similar results (no significant correlation between neck pain and CVA in students with chronic neck pain) were recorded in studies (verbal communication) conducted by Sonal Bandekar and Dr. Mugdha Oberoi as well as in a study conducted by Vidhi Shah and Annamma Varghese<sup>5</sup>.

To confirm, an observation by the investigator regarding shoulder posture and obesity, frequency distribution of increasing acromion to wall distances were categorized into underweight, normal and overweight classes of BMI (WHO Asian Classification). Interestingly, it was observed that as the BMI increased, acromion to wall distance also increased, regardless of subjects having protracted shoulders or forward head posture or neck pain. Hence acromion to wall distance must not be considered as an absolute measure for studying protracted shoulder posture without evaluating BMI.

CVA and shoulder position is affected by a number of factors like mobility and flexibility of the shoulder, neck and the thoracic muscles,

neuromuscular control, strength of the muscles of the upper quadrant, etc. and not just neck pain. This study considered only one aspect i.e. neck pain, hence this could be a possible reason for the non-significant correlation.

It is important that students are made aware of the altered head and shoulder postures which are a result of faulty postures attained while studying, etc. and also stress on the importance of strengthening the neck and upper back musculature.

In the future, experimental studies may be conducted to study the effect of different exercise protocols for improving head and shoulder posture in this population. Flexibility, mobility and strength of the shoulder, scapular and neck muscles can be considered along with neck pain while comparing the values for CVA as well as protracted shoulders.

### CONCLUSION:

The correlation between neck pain and CVA and neck pain and protracted shoulders was not significant, but there was a significant difference between the CVA and protracted shoulder values of students with and without neck pain suggesting an association, but not a linear relationship.

The comparison of CVA values in students with and without pain was significant. ( $p < 0.00$ )

The comparison of protracted shoulders in students with and without pain was significant. ( $p = 0.00$ )

The correlation between CVA and protracted shoulders in students with chronic neck pain was found to be significant ( $p = 0.01$ ) but the correlation between the same in students without chronic neck pain was found to be not significant ( $p = 0.24$ ).

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