

Immediate Effect of Chin Tuck Exercises on Craniovertebral Angle and Shoulder Angle Among Collegiates with Forward Head Posture

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Forward head posture (FHP) is the forward movement of the head that is caused by improper postural awareness and often results in muscular imbalance that causes pain. The forward head posture is found to be influenced by Craniovertebral Angle (CV) and shoulder angle (SA) that in turn causes rounded shoulder. These biomechanical changes prove to be a hindrance in maintaining neutral head posture and affects the structural integrity. A sample size of 43 were taken according to the selection criteria and the FHP was assessed through plumb line. Double tape was used as markers at tragus of the ear, C7 vertebrae and acromion process. Photos were taken and analyzed using AUTOCAD 2017 software and the results were obtained. A positive association found between the pre and post test results for CV angle with $P=0.0001(P<0.05)$ and no significant association between the pre and posttest for SA with $P=0.2 (P>0.05)$. The craniovertebral angle can be altered with the chin tuck exercises but has no effect on the shoulder angle, hence having no influence over the rounded shoulders but has some effect over the forward head posture.

Keywords: Cervical Joint; Craniovertebral Angle; Chin Tuck; Forwarded head; Neck Exercise; Shoulder Angle.

Forward head posture is also called as “Scholar’s Neck”, “Wearsie Neck”, “I Hunch”, and “Reading Neck” or “Texting Neck” that has been the prevalent postural issue among the modern times predominantly the lifestyle which contributes to the bad posture. The plum-line suggests that the head, hips, knee and ankle should all fall along the same vertical line like a golf ball on a tree. But, as a result of repetitive forward head movement, in a position that the ears are ahead of the shoulder, the FHP looks as though the head is sticking out. Due to this, there is a lengthening and shortening of the muscles such as levator, rhomboid, trapezius,

pectoral. Added to this, there is also degradation of the cervical vertebrae and irritation of the cervical nerves. In adolescent age groups forwarded head posture is the common postural disorder which is always presented with protracted shoulders. The reason for this is still debatable. Prevalence of these postural disorders is more common among girls than in boys and the relationship between these two postural disorder is still debatable³.

The structural change in the positioning of the head away from the centerline of the body is termed to be forward head posture. The structure is such that there is a change in the position of the

cervical vertebrae in which the upper vertebrae is extended and the lower vertebrae is bent as result of which the weight of the head over the neck is more. This bending movement causes additional pressure over the muscles and joints around the cervical vertebra, added to the reduced mobility of the neck due to active myofascial trigger points of the suboccipital muscle which causes various kinds of headaches. The extension of the upper cervical joint and atlanto-occipital joint causes the upper cervical vertebrae to project forward with the facet pointing upwards, in order to compensate for the postural deformity that brings about a change in the curvature of the neck. This change in curvature causes an imbalance in the muscular pattern that results in the upper-cross syndrome that eventually leads to rounded shoulder. The postural analysis using the plum-line suggests that a protrusion of the acromion process of the shoulder joint with respect to the centerline of the body that results in the stooped posture.

Chin tuck in exercise is the common prescribed exercise for correcting FHP and recruiting deep cervical flexors. But the influence on forward shoulder angle is not well known. Therefore our study aimed at finding the immediate influence of chin tuck exercises on craniovertebral angle and shoulder angle among collegiate with forward head posture.

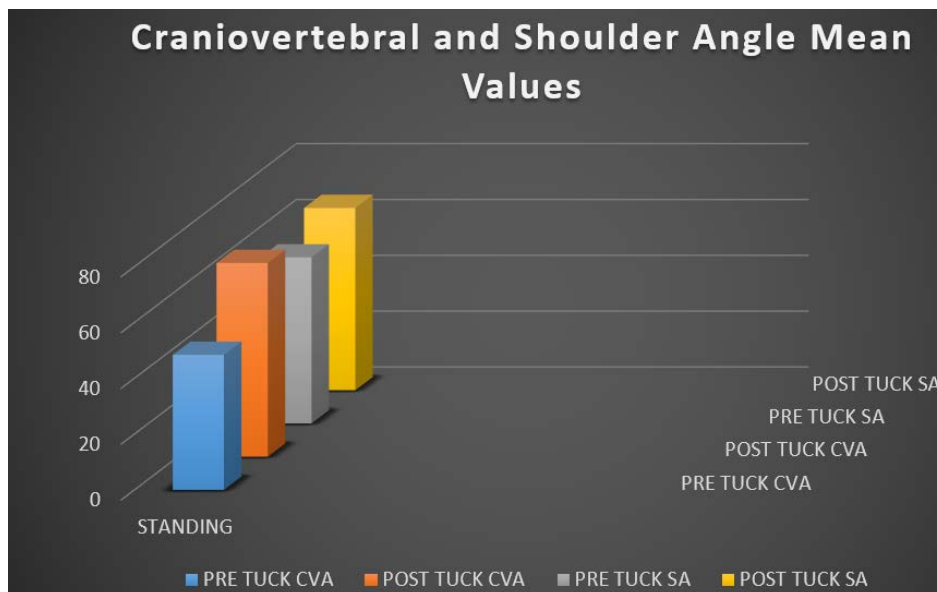
METHODOLOGY

A non-experimental observational study was carried over a sample size of 43 collegiate male students enrolled in physical therapy and occupational therapy who had forwarded head posture were completely explained about the purpose and procedures of the study (according to the Declaration of Helsinki). The subjects voluntarily agreed to take part in the study. The inclusion criteria were; age between 18-25yrs, FHP above 2.5cm, no history of cervical injury or pain or respiratory problems for past 1year. FHP was assessed through plumb-line.

Table 1. Baseline Statistics of the Population Studied (n=43)

Age, Years, Mean(SD)	21.21(2.02)
CVA, Mean	
Pretest	48.4
Posttest	69.4
P value	0.0001****
SA, Mean	
Pretest	59.5
Posttest	65.3
P value	0.2

****highly significant



Graph 1. Pre and Post Test Values for Craniovertebral and Shoulder Angle

Double tape was used as markers for photogrammetry¹. The subjects were taught to do chin tuck exercise in standing. Markers were placed on tragus, C7 spinous process and in acromion process after which photos were taken from lateral view from their dominant side, both with and without chin tuck. The photos were analyzed by using AUTOCAD 2017 software for Sagittal Head angle (SHA), Cranio Vertebral angle (CVA) and Forward Shoulder angle (SA). The data obtained was analyzed by both the researchers collectively and concluded collaboratively.

RESULTS

In this study, 43 samples were taken and assessed. Table 1 shows the baseline statistical values of the studied population for age, CVA and SA. The graph 1 represents the pre and posttest mean values for CVA and SA are 48.4, 69.4 and 59.5, 65.3 respectively. The t-test results for CV angle is found to be $P=0.0001$ and for SA is $P=0.2$. Hence, there is a positive relation between the pre and posttest values of CV angle.

DISCUSSION

The focus of this study was to find the immediate influence of chin tuck exercises on craniocervical angle and shoulder angle among collegiate with forward head posture.

The markers that were taken for the analysis were tragus of the ear, C7 vertebrae and acromion process that gets transected by the plumb line and are observed or palpated to be the anatomical landmarks that indicate the postural problems. The anterior portion of the tragus with respect to the plumb line is the cause for forward head posture with exaggerated cervical lordosis and the head being posteriorly rotated.

During chin tuck exercise, when the head is brought to an axial extension, the cervical lordosis gets flattened and the head is rotated anteriorly with respect to craniocervical angle. Added to this, the plumb line intersecting the tragus of the ear and the spinous process of C7 vertebrae, when the head is in neutral position provides a balanced muscle force and structural alignment. If the balance is lost that, would result in pain.

Apart from the pain, the FHP accompanies the rounded shoulders that can be attributed to anterior position of scapula, clavicle and humerus. The change in scapula position alters the position of the humerus that causes a forward movement of the bicipital tendon (anteromedially). The change in position of the humerus in the glenohumeral fossa is dependent on the shoulder girdle muscle as well. Now, considering the middle trapezius that originates from the spinous process of the C7 vertebrae and is responsible for the movement of the scapula. On observing the effect of chin tuck exercises on the shoulder angle, Zahra Abdollahzade *et al.*; suggests that there was no significant change in the length or strength of the middle trapezius after a 4-week exercise program that involved chin tuck in exercise, but it did correct the FHP by altering the CV angle and not the rounded shoulders.

Hence, the forward head posture and the rounded shoulders can be corrected to a complete extent by performing exercises that affect both CV angle and SA for better outcomes.

CONCLUSION

Chin tuck in exercise is helpful in correcting forward head posture (FHP) by increasing the craniocervical angle but has no immediate change in forward shoulder angle and thus no effect on the rounded shoulders among subjects with forward head posture (FHP). Hence, exercise programs that equally concentrate on CV angle and SA could yield better outcomes.

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Conflict of interest

There is no conflict of interest among the authors.

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