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Research Article

Correlation of non-traumatic neck pain with cervical angle and shoulder retractor power in adult clerical population

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ABSTRACT

Background: A forward head posture (or chin poking) is perhaps the most common abnormality associated with NP and is commonly defined as the protrusion of the head in the sagittal plane so that the head is placed anterior to the trunk. Forward head posture can occur because of an anterior translation of the head, lower cervical flexion, or both, and it is claimed to be associated with an increase in upper-cervical extension. It is suggested that forward head posture leads to an increase in the compressive forces on the cervical apophyseal joints and posterior part of the vertebra and to changes in connective tissue length and strength (because of stretching of the anterior structures of the neck and shortening of the posterior muscles) resulting in pain. The objective of the study was to correlate neck pain with cervical angle and shoulder retractor power in non-traumatic neck pain patients.
Methods: 50 clerical workers having non traumatic neck pain were included. Neck pain was measured on VAS, cervical angle was measured using photometric method and shoulder retractor power was measured.
Results: VAS showed moderate positive correlation with cervical angles (0.63 and 0.72) and moderate negative correlation with shoulder retractor power (-0.59 and -0.71). A moderate positive correlation of craniocervical angle to VAS seen (0.66) whereas there was negative correlation with shoulder retractors I and II (-0.59 and -0.61) A positive correlation was seen between VAS and craniocervical angle but is moderately negative with shoulder retractors I (Rhomboids) and II (Middle trapezius) (0.78, 0.04, -0.69 and -0.64).
Conclusion: A moderate increase in cranio vertebral & craniocervical angle showed plausible weakness in lower Trapezius and rhomboids among clerks` having Non-traumatic neck pain.

Keywords: Non-traumatic neck pain, Forward head posture, Craniocervical & cervicovertebral angle, Shoulder retractor power

INTRODUCTION

Posture can be defined as the position of all the body segments observed at a specific moment. Inadequate posture consists of poor interrelations between parts of the body. These imperfect interrelations cause muscle tension and shortening, which makes appropriate joint movements more difficult to achieve.[1]

A forward head posture (or chin poking) is perhaps the most common abnormality associated with NP and is commonly defined as the protrusion of the head in the sagittal plane so that the head is placed anterior to the trunk. Forward head posture can occur because of an anterior translation of the head, lower cervical flexion, or both, and it is claimed to be associated with an increase in upper-cervical extension. It is suggested that forward head posture leads to an increase in the compressive

forces on the cervical apophyseal joints and posterior part of the vertebra and to changes in connective tissue length and strength (because of stretching of the anterior structures of the neck and shortening of the posterior muscles) resulting in pain.[2]

In slouched forward posture, the shoulder retractors are kept at lengthened position. Clinical theory suggests that altered alignment of the shoulder girdle has the potential to create or sustain symptomatic mechanical dysfunction in the cervical and thoracic spine angles causing tightness and over activity of both the elevator scapulae and the rhomboid muscles.[3] Evidence are emerging, demonstrating that cervical angle is associated with the efficient function of the deep cervical flexors,[4] the trapezius, rhomboids and the serratus anterior muscles. There is a strong relationship between the cervical angles, alignment with the shoulder retractors leading to study the association of cervical angles, shoulder retractors power in non-traumatic cervical pain.

METHODS

50 clerical workers in the age group of 24 to 50 years and having non traumatic neck pain were selected randomly. Those having any musculoskeletal or neurological injury to the cervical spine or the shoulder were excluded. The sample size was calculated based on prior pilot study where significance level (95%) α=0.5 and power β=0.8. Ethical committee clearance was taken. A thorough examination of the subjects was done and written permission taken from the subjects. The pain intensity was measured on VAS. Cervical angles were measured using a photograph and shoulder retractor power was measured.

Craniocervical and cervicovertebral angle

The subject was seated comfortably on a stool. Markers were placed on the tragus canthus spinous process of C7 vertebra. A camera of 5 megapixels was mounted on a tripod 2.8 meters from the patient on the lateral side. A photograph was taken of the patient. Kinoveo software (version.8.15) was used to measure the craniocervical and cervicovertebral angles. The craniocervical angle was the angle between the line joining tragus and canthus and the vertical. The cervicovertebral angle is the angle between the line joining canthus and C7 spinous process and the vertical as shown in Figure 1.

Shoulder retractor strength

A make test was used to avoid overpowering the subjects in an effort to measure their force-producing capabilities. Make tests are used almost exclusively with handheld dynamometry. Subjects were asked to build their force gradually to a maximum voluntary effort over a 2-second period. They maintained a maximum voluntary effort for a 5-second period. The examiner kept the dynamometer in place by matching the force exerted by the subject, and the peak force was recorded. If the subject "broke" against resistance, the data were not recorded, and the muscle test was repeated. Strength measurements were collected for each subject's dominant upper extremity (Retractor power I).

The subjects were prone with the arm flexion. The dynamometer was placed on the posterolateral corner of the acromion, to check the lower Trapezius. The subjects were prone with the hand on the small of the back. The dynamometer was placed on the humerus halfway between the acromion and lateral epicondyle, to check rhomboids. The subjects were instructed to "squeeze their shoulder blades together" to retract his scapula (Retractor power II).[5]

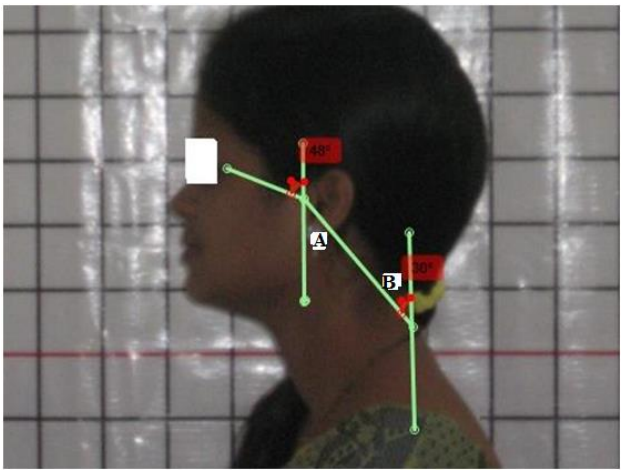

Figure 1: Shows craniocervical angle and cervicovertebral angle.

Where A is the craniocervical angle and B is the cervicovertebral angle.

RESULTS

The descriptive statistics of age and BMI are mentioned in the Table 1. The mean sitting hours was 14.53 with standard deviation of 4.67 whereas that of craniocervical angle was 51.61º with standard deviation of 7.16 and that of cervicovertebral angle was 52.28º and standard deviation 6.54. The mean power of shoulder retractors was 7.23 kg with standard deviation 1.52 and of shoulder retractors II was 6.94 kg with standard deviation 2.30 (Table 1).

There was a mild positive correlation of age with VAS of 0.46 whereas the correlation with craniocervical angle and cervicovertebral angle is moderately positive with values 0.57 and 0.62 respectively. There was moderate negative correlation between shoulder retractors power (-0.62 and -0.43). A moderate positive correlation of BMI with VAS craniocervical angle and cervicovertebral angle 0.61, 0.66, 0.71 respectively however a moderate negative correlation with shoulder retractors I and II was seen (-0.58 and -0.70) (Table 2).

Moderate positive relation of hours of sitting with VAS, craniocervical angle and cervicovertebral angle was seen along with moderate negative correlation to shoulder retractors I and II (0.74, 0.71, 0.64, -0.66, -0.69). A moderate positive correlation of craniocervical angle to VAS I seen (0.66) but it is mildly positive with cervicovertebral angle (0.12) whereas there was negative correlation with shoulder retractors I and II (-0.59 and -0.61) (Table 2).

A positive correlation was seen between VAS and craniocervical angle but is moderately negative with shoulder retractors I and II (0.78, 0.04, -0.69 and -0.64) VAS showed moderate positive correlation with cervical angles (0.63 and 0.72) and moderate negative correlation with shoulder retractor power (-0.59 and -0.71) (Table 2).

Table 1: Descriptive statistics for outcome variables.

Variable	Mean ± Standard deviation
Age	38.89 ± 8.98 years
BMI	26.32 ± 2.34
VAS	4.38 ± 2.65
Hours of sitting	14.53 ± 4.67 hours/day
Craniocervical angle	51.61 ± 7.16 degrees
Cervicovertebral angle	52.28 ± 6.54 degrees
Shoulder retractors-I	7.23 ± 1.52 kg
Shoulder Retractors-II	6.94 ± 2.30 kg

Table 2: Correlation of age with craniocervical angle, cervico vertebral angle and shoulder retractor power.

Variables	VAS	Craniocervical angle	Cervicovertebral angle	Shoulder retractors-I	Shoulder retractor-II
Age	0.46	0.57	0.62	-0.62	-0.43
BMI	0.61	0.66	0.71	-0.58	-0.70
Hours of sitting	0.74	0.71	0.64	-0.66	-0.69
Craniocervical angle	0.66	1	0.12	-0.59	-0.61
Cervicovertebral angle	0.78	0.04	1	-0.69	-0.64
VAS	1	0.63	0.72	-0.59	-0.71

DISCUSSION

In this study we found that age has a positive correlation with neck pain which is in accordance to the previous studies i.e. the neck pain intensity increases as the age increases. In a previous study it was showed that neck pain is more clearly associated with forward head posture in young population.[2] Previous studies have shown that subjects with neck pain demonstrated a reduced ability to maintain an upright posture during a computer task. There was a subtle forward drift of the head in association with a subtle increase in the thoracic flexion subjects with neck pain.[7]

Another factor responsible for impaired posture would be impaired proprioception due to the neck pain. In another study, 68% of the subjects showed forward head posture, which predispose them to regular neck pain.[4] Their results confirmed that subjects with neck pain showed a higher craniovertebral angle than those without neck pain. The interdependence between the neck pain and the craniovertebral angles was confirmed with the neck pain being more prevalent in adolescents with forward head posture than adolescents without forward head posture.[2] The result of our study also showed that as the pain intensity on VAS increased there was increase in the cervical angles. In reference to the previous study the craniovertebral angles showed higher angles due to prolonged sitting hours which were not into consideration. Moreover subjects who were acquainted to long sitting hours showed weaker shoulder retractors and higher angles showing adaptive forward head postural mechanism. The number of hours of sitting showed a highly positive correlation with VAS i.e. the pain intensity increased proportionally as the number of sitting hours increased. As the pain increased the cervical angles also increased as the pain impaired proprioception and reduction in the power of muscles. Till to date there is no study were done to find the association of Lower shoulder retractors power and cervical angles. Though the study started with pilot testing to find out the association of cervical angles and the entire shoulder stabilizer, considerable relevance were found with shoulder retractors.

The study aimed to minimize errors and bias by recruiting a sample matched for age and sex, setting careful selection criteria, having randomized order to avoid any serial effects in the data collection, and blinding the digitization procedure. In addition to it cervical range of motion were not studied which also inhibit the proprioception and alters muscle co activation. However, the self-report of exclusion and inclusion criteria may not be the most appropriate, and we did not screen participants for balance disorders that may have affected head posture. This needs to be considered in future studies.

CONCLUSION

Patients with non-traumatic neck pain aged 50 years or below showed moderate increase in craniocervical angle. In addition they showed moderate weakness of lower Trapezius and rhomboids among clerks` having Non-traumatic neck pain. Further research is needed to clarify whether the statistically significant difference found is clinically meaningful. Future studies comparing head posture for patients and controls should take age into account in their design.

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