Original Research Article

Co-relation between cervicothoracic angle and neck pain in adults

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A R T I C L E   I N F O

A B S T R A C T

Introduction: Neck pain is the fourth most common cause of disability after lower back pain, depression, and joint pain. Cervical sagittal balance is as crucial as pelvic sagittal alignment and is related to the concept of T1 alignment.

Materials and Methods: An observational cross sectional study was conducted on 235 Patients diagnosed as neck pain and treated at our institute between August 2017 to July 2019 with age between 20-80 years with neck pain complaints and on medication were included in this study. Pain and functional improvements were assessed using visual analogue scale (VAS) and neck disability index (NDI). Standing lateral view and standing swimmers lateral view of cervical spine radiographs were taken and studied for evaluating cervicothoracic parameters T1 slope and SVA (Saggital Vertical Axis) C2-7, following neck pain and compared with normal ranges. Variations of these criteria have been reported along with the scores of the questionnaire. Statistical analysis was carried out using the edition 21.0 of the Statistical Package for Social Sciences (SPSS).

Results: After analysis, it was found that the average T1 slope was 27.82 + 14.33, the average male T1 slope was 26.74 + 14.21 and the average female T1 slope was 28.56 + 14.42. According to Sang et al average T1 slope is 25.7.5 + 6.4 which was taken as a reference for comparison with the asymptomatic population, our study had an increased value but was not significant.

Conclusions: The pain in the neck increases with age. It is more prevalent in females. Study shows an increase in neck pain with increasing age due to degenerative changes in the T1 slope, SVA C2-C7. There is no significant correlation with cervical and neck pain or disability but a good relationship between the two. There was no substantial difference in cervical curve between symptomatic and asymptomatic patients.

1. Introduction

Neck pain is the fourth most common cause of disability after lower back pain, depression, and joint pain.[1] Simple conditions that are prone to accumulation such as mechanical stress, lack of muscle strength, office computer jobs, non-ergonomic working environments, and long working hours result in neck pain being more frequently seen in middle age.[2]

Cervical vertebral X-ray is the most common diagnostic tool used in this circumstance.[3,4] Cervical sagittal balance is as crucial as pelvic sagittal alignment and is related to the concept of T1 alignment.[5]

Due to a lack of clear consensus on the relationship between cervico-thoracic parameters and neck pain in the literature, we aimed to determine the various cervical thoracic junction parameters of our patients with radiographs due to better affordability. The present study was plan with aimed to examine whether the sagittal profile of the cervicothoracic spine shows any association with the presence and severity of neck pain in the adult population.

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2. Materials and Methods

An observational cross sectional study was conducted in Santosh Medical College and Hospital, Ghaziabad, India from August 2017 to July 2019 on 235 patients attending the Out-patient Department of Orthopaedics. Patients involved in study with neck pain complaints from age 20 to 80 years and those are already on medication. Patients having congenital cervical spinal deformity, any motor and sensory deficits, significant previous or recent trauma to the spine, previous cervical spinal surgery, spinal tumors and metastasis, significant history of malignancy or family history of malignancy, infections of spine, presence of spinal deformity on forward bending test, metabolic bone diseases, contraindications to radiographs (e.g. existing or suspected pregnancy), presence of red flag symptoms like constant pain, night pain, fever, loss of weight, and loss of appetite, malingerers and patient refusing consent were not include in the study. Ethical clearance was taken from the Institutional Ethical Committee of Santosh. Consent was taken from each participant.

Patient's information, history, pre-tested pain scale, and pre-tested disability index were obtained. The patients were explained in detail about the condition and the study protocol and informed consent were taken for utilizing the radiograph and examination findings for the study. Radiographic Examination following clinical assessment by the attending specialist, all patients underwent standing lateral view and standing swimmers lateral view of cervical spine radiographs were taken and studied for evaluating various cervicothoracic parameters following neck pain and compared with normal ranges of the parameter studied. Pain and functional improvements were assessed using visual analogue scale (VAS) and neck disability index (NDI).[6]

Measurement of Radiographic Parameters The radiographic film cassette was placed 72 inches from the tube, and radiographs were taken without magnification. Digital X-ray photographs were collected from the PACS method, which were used to collect orientation measurements.

Standing lateral view and standing swimmers lateral view of cervical spine radiographs were taken and studied for evaluating cervicothoracic parameters T1 slope and Saggital Vertical Axis (SVA) C2-7, following neck pain and compared with normal ranges of the parameter studied. Variations of these criteria have been reported along with the scores of the questionnaire. Statistical analysis was carried out using the edition 21.0 of the Statistical Package for Social Sciences (SPSS).

3. Observations and Results

In this research, 13.6 percent of patients in the age group between 20 and 40 years of age, 58.4 percent of patients in the age group between 41 and 60 years of age, and 28.1 percent in the age group between 61 and 80 years of age.
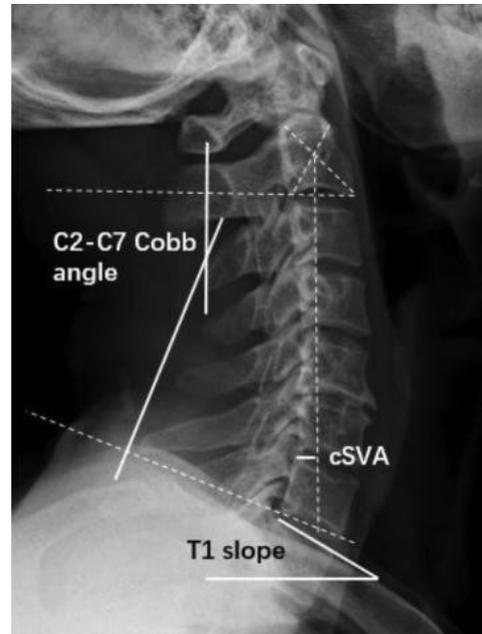

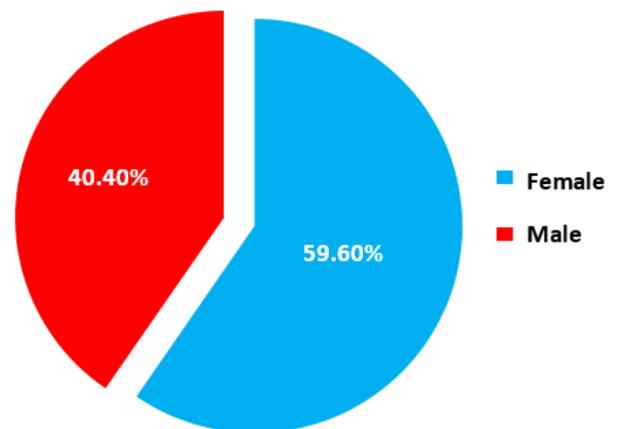**Fig. 1:**

Fig. 2: Distribution of patients according to sex

Table 1: Distribution of patients according to age

Age (Yrs)	N=235	%	P-value	95% CI
20-40	32	13.6		
41-60	137	58.4	<0.0001	30.168-55.264
61-80	66	28.1		

Of the study group (N=235), most of the patients belong to 41 to 60 year age group. In this research, 13.6 percent of patients in the age group between 20 and 40 years of age, 58.4 percent of patients in the age group between 41 and 60 years of age, and 28.1 percent in the age group between 61 and 80 years of age (Table 1). The observation was highly statistically significant (p<0.0001).

Most patients had dominant arm pain patterns. The average Neck Disability Index (NDI) was 56.54 + 12.84, the average male NDI was 57.2 + 12.43 and the average female NDI was 56.1 + 13.14. The average VAS was 5.9 +2.17, the average male VAS was 5.7 + 2.31 and the average female VAS was 5.92 + 2.06. Total T1 slope was 27.82 + 14.33, the mean male T1 slope was 26.74 + 14.21 and the mean female T1 slope was 28.56 + 14.42.

Average SVA C2-C7 was 18.55 + 12.75, Average male 17.34 + 11.99 and Average female 19.36 + 13.25. The T1 slope in patients with neck pain is 27.82 and the T1 slope in asymptomatic patients is 25.7 (p=0.2098). The SVA C2-C7 in patients with neck pain is 18.55 and the SVA C2-C7 in asymptomatic patients is 17 (p=0.60255) as shown in Table 2.

Table 2: Comparision of radiological parameters in symptomatic and asymptomatic patients

Variable	Neck pain	Asymptomatic	P-value
T1 slope	27.82 degrees	25.7 degrees	0.2098
SVA C2-C7	18.55 mm	17 mm	0.60255

4. Discussion

Neck pain is a critical issue for public health. Approximately half of all people have a clinically significant episode of neck pain in their lifespan. Neck pain-related illness has both a patient and a community-based health and economic impact. The prevalence of neck pain is 10–15% all over the world.

In this study, the mean age of all patients was 51.5 ± 12.8 years. The mean age of male patients was 51.3 ± 12.67 years and the mean age of female patients was 51.88 ± 12.97 years. The difference was found to be non-important (P=0.7345). However, on a comparison between male and female groups, there was no difference found in the age group. In a study by Endo et al.,[7] the mean age was found to 35.4±11.6 years while the mean age for males was 35.2±10.2 and females were 35.8±13.6 (p- value=0.86). In another study by Guo et al.[8] mean age was 42.30 years. A study done by Gore et al.[3] mean age was found to be 48.1 years. Yang et al.[9] found that most patients belong to the mean age of 46.3 ± 11.1 years (range 19–73) in males and 47.0 ± 11.8 years (range 20–69) in females. Nojiri et al.[10] observed in their study that, the mean age was 38.4 ± 17.4 years (male patients 37 ± 18 and female patients 39.7 ±

16.7 years of age).

The analysis found that the average T1 slope was 27.82 + 14.33, the average male T1 slope was 26.74 + 14.21 and the average female T1 slope was 28.56 + 14.42. According to Sang et al.[11] average T1 slope is 25.7.5 + 6.4 which was taken as a reference for comparison with the asymptomatic population, our study had an increased value but was not significant.

In the present study average SVA C2-C7 was 18.55 + 12.75, average male 17.34 + 11.99 and average female 19.36 + 13.25. Guo et al[8] also found out that asymptomatic population average SVA C2-C7 (mm) was 16.9 + 10.6. This study had no significant difference but slightly higher. Based on limited data that could be obtained under the eligibility criteria of this study,

There was no significant difference found between symptomatic and asymptomatic individuals in the angle of lordosis of the cervical spine. However, this observation is identical to several other associated studies.

5. Conclusion

In this research, it was found that the pain in the neck increases with age. It is more prevalent in females. Study shows an increase in age due to degenerative changes in the T1 slope, SVA C2-C7. There is no significant correlation between cervical and neck pain or disability but a good relationship between the two. There is no substantial difference in cervical curve between symptomatic and asymptomatic patients.

There is therefore an immediate need for regular physical inspection, calcium and vitamin D supplements and regular exercise.

6. Source of Funding

Nil.

7. Conflicts of Interest

None declared.

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