

Is Tech Neck A Growing Hazard among the Young?

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Abstract

Background: Tech neck is the term used to describe the neck pain and damage caused by looking down too often and for too long on the mobile phone, tablets or other digital devices. Digital devices can position the head in different uncomfortable postures. This study aims to determine the influence of duration of usage of digital devices on cervical range of motion and the craniovertebral angle.

Material & Method: This prospective study included 88 participants between the ages of 18 and 25 who have been using digital devices from Yenepoya (Deemed to be University) for six months or more were chosen using a convenience sampling method after obtaining institutional ethical clearance and consent from the participants. Participants were divided into four categories according to the duration of usage of digital devices i.e. less than 1 hour a day, 1-2 hours a day, 2-4 hours a day and more than 4 hours a day. Each group will be composed of 22 participants. By lateral photography method they were tested for cervical range of motion using goniometer and craniovertebral angle.

Results: There is a significant decrease in cervical flexion among groups but there is no significant difference between groups in cervical extension and craniovertebral angle.

Conclusion: The present study suggests that repeated use of digital devices may have an effect on raising neck flexion ability. Tech neck may thus be an increasing danger among the young.

Keywords: Smartphone addiction, Craniovertebral angle, Cervical Flexion, Cervical Extension.

Introduction

Text neck most frequently causes discomfort and soreness in the neck. Furthermore, looking down on the smartphone too much can lead to back pain ranging from constant, extreme back pain to acute and severe muscle spasm, back pain and tightness, likely leading to intense muscle spasm on the shoulder.¹ Seventy-nine percent of the population between the ages of 18-44 have their mobile phones with them nearly all the time, with just two hours gone without cell phones. Indian practitioners, 30 per cent of whom suffer from neck pain and neck

pain absenteeism is 41%. In this report, the prevalence of neck pain in computer users was 28%.²

Particularly neck pain is seen as one of the major health problems in modern societies. It also increases in intensity, frequency and severity due to greater stress and strain on the upper back and neck area.³ Over the past few years, the number of smartphone users has steadily risen worldwide and, with rising usage of smartphones, concerns about musculoskeletal issues associated with the extended use of smartphones have also risen, resulting in incorrect posture such as defective head posture, slouched posture or rounded shoulders.⁴ Typically people bend their neck backward while using a smartphone to look at the lowered target and hold the head in a forward position for long periods of time, which may cause musculoskeletal disorders such as "upper crossed syndrome." In addition, keeping

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a head-forward posture reduces cervical lordosis of the lower cervical vertebrae and produces a posterior curve for keeping equilibrium in the upper thoracic vertebrae.⁵

Our study aimed to determine the influence of duration of usage of digital devices (smartphones, laptop, tablet and desktop) on the cervical range of motion and craniovertebral angle.

Material & Method

This cross-sectional study was conducted on students and staff of constituent colleges of Yenepoya University who were 18-25 years of age, using digital devices like smartphone, laptop, desktop and tablet since six month or more, and used these digital devices for at least 5 days/week, both male and female were included in the study. Informed consent was obtained from all participants. Subjects who had history of trauma to cervical spine, surgery of cervical spine, any deformities and non-cooperative patients were excluded from study.

Materials used were, ruler, pencil, protractor, datasheet, universal goniometer, measuring inch tape, micropore surgical tape, tripod stand, single lens reflex camera (Canon EOS 1100D, Taiwan). The study was initiated after obtaining the institutional ethics clearance from institutional ethics committee. Participants were screened for the inclusion and exclusion criteria. Selected individuals were classified into four groups based on the duration of usage of these digital devices i.e. less than 1 hour/day, 1-2 hours/day, 2-4 hours/day and more than 4 hours/day. Each group included 22 participants both males and females.

Procedure for measuring the cervical range of motion:

a) Cervical range of motion was measured using a goniometer.

Position- The participant was seated in a chair with thorax and lumbar spine well supported by the back of a chair, position the head in 0 degrees of rotation and lateral flexion. Fulcrum of the goniometer was placed over the external auditory meatus, proximal arm so that it is either perpendicular or parallel to the ground, distal arm with the base of the nares. The participant was asked to do active cervical flexion and the same position and stabilization is carried out for cervical extension

and also the participant was asked to do active cervical extension. Then, cervical flexion and extension angle was measured. The range of motion was assessed three times by maintaining 1 minute interval for each and the average of three values were recorded. (Fig 1)

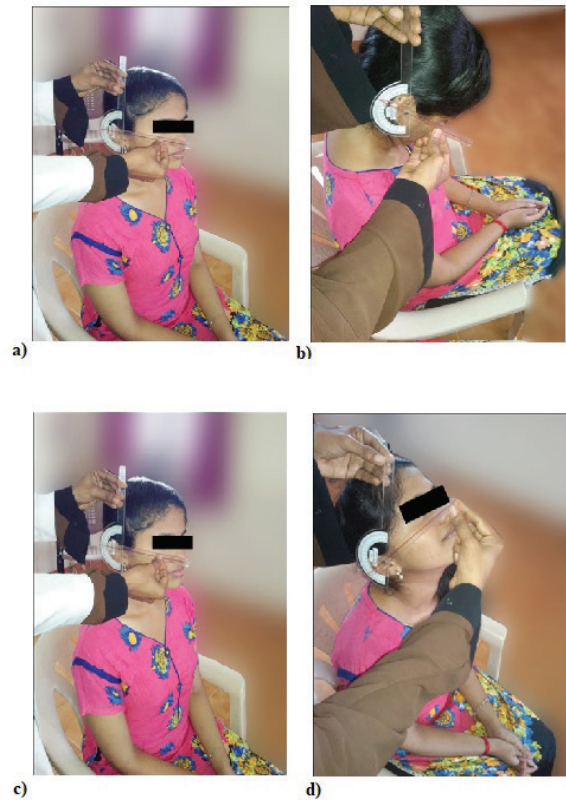


Figure 1: Shows procedure for measuring range of motion of cervical flexion (a - starting point, b - End position); Shows procedure for measuring range of motion of cervical extension (c - starting point, d - End position)

b) Procedure for measuring craniovertebral angle:

Position-The participant was seated in a chair with thorax and lumbar spine well supported by the back of a chair, position the head in 0 degrees of rotation and lateral rotation. The C7 spinous process and the tragus of the ear were marked. Participant's identity was concealed by blacking out the eyes in the facial photographs. In case, if data is published or presented their identity will not be revealed. Then the photographs of participants were taken in lateral view by using a digital camera (Canon EOS 1100D, Taiwan) which was kept on tripod, in such a way that the distance between the camera and the subject was 60 centimetres. The images which were obtained was analyzed by drawing a horizontal line which passed through C7 spinous process and a line extending from tragus of the ear to C7. The angle formed between them was measured. Thus, craniovertebral angle was assessed

three times by maintaining 1 minute interval for each and the average of three values were recorded. (Fig 2)

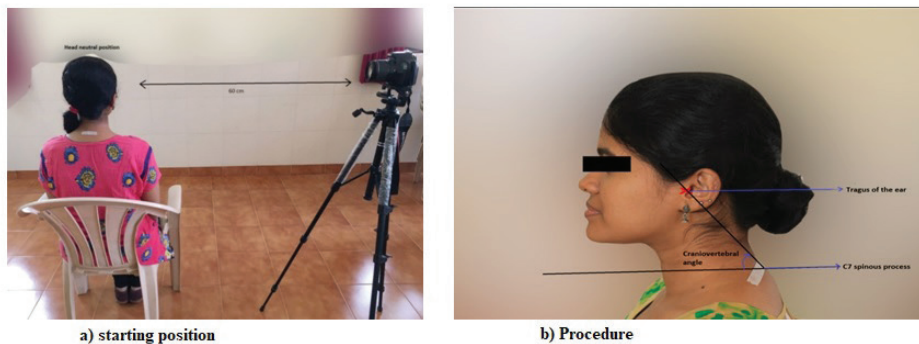


Figure 2: Shows procedure for measuring craniocervical angle

Statistical analysis - the data were entered in Microsoft excel sheet and analysed using the SPSS version 21 operating on windows 10. The data were represented as mean, standard deviation, frequency and percentage in tables and figures as appropriate for the type of data. The multiple groups with non-parametric analysis was performed by Analysis of Variance-Kruskal Wallis test, with p-value <0.05 considered statistically significant.

Results

A total of 88 participants were included in present study after obtaining the informed consent. Among them, males were 42 and females were 46, with mean age off 21±3.51 yrs.

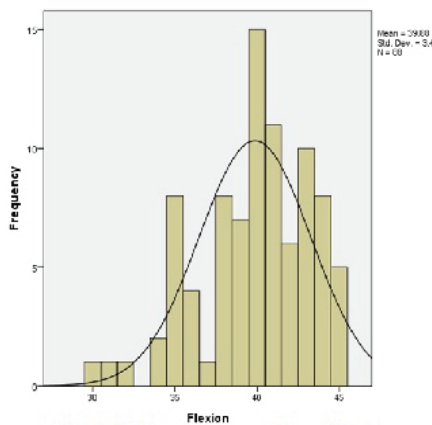
Table 1: Descriptive statistics								
		N	Mean	SD	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Flexion	< 1 Hour	22	41.50	3.447	39.97	43.03	30	45
	1-2 hours	22	40.36	2.555	39.23	41.50	34	45
	2-4 hours	22	38.86	3.468	37.33	40.40	32	45
	> 4 hours	22	38.77	3.477	37.23	40.31	31	44
	Total	88	39.88	3.400	39.15	40.60	30	45
Extension	< 1 Hour	22	44.41	.908	44.01	44.81	41	45
	1-2 hours	22	43.09	2.486	41.99	44.19	35	45
	2-4 hours	22	43.23	1.926	42.37	44.08	38	45
	> 4 hours	22	42.91	2.617	41.75	44.07	36	45
	Total	88	43.41	2.142	42.96	43.86	35	45
Craniocervical angle	< 1 Hour	22	44.00	8.586	40.19	47.81	31	62
	1-2 hours	22	47.45	5.697	44.93	49.98	37	59
	2-4 hours	22	47.77	6.156	45.04	50.50	35	56
	> 4 hours	22	46.68	7.161	43.51	49.86	36	64
	Total	88	46.48	7.027	44.99	47.97	31	64

P<0.05 is considered statistically significant

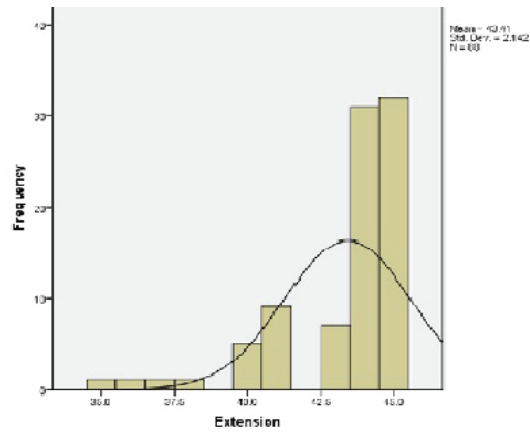
The result of Table 1 shows; Mean value of flexion for participants in group1 is $41.50^{\circ} \pm 3.447^{\circ}$; Mean value of flexion for participants in group2 is $40.36^{\circ} \pm 2.555^{\circ}$; Mean value of flexion for participants in group3 is $38.86^{\circ} \pm 3.468^{\circ}$; Mean value of flexion for participants in group4 is $38.77^{\circ} \pm 3.477^{\circ}$; Thus, there is significant reduction in cervical flexion; Mean value of extension for participants in group1 is $44.41^{\circ} \pm 0.908^{\circ}$; Mean value of extension for participants in group2 is $43.09^{\circ} \pm 2.486^{\circ}$; Mean value of extension for participants in group3 is $43.23^{\circ} \pm 1.926^{\circ}$; Mean value of extension for participants in group4 is $42.91^{\circ} \pm 2.617^{\circ}$; Thus, there is no significant difference in cervical extension; Mean value of craniovertebral

angle for participants in group1 is $44.00^{\circ} \pm 8.586^{\circ}$; Mean value of craniovertebral angle for participants in group2 is $47.45^{\circ} \pm 5.697^{\circ}$; Mean value of craniovertebral angle for participants in group3 is $47.77^{\circ} \pm 6.156^{\circ}$; Mean value of craniovertebral angle for participants in group4 is $46.68^{\circ} \pm 7.161^{\circ}$; Thus, there is no significant difference in craniovertebral angle.

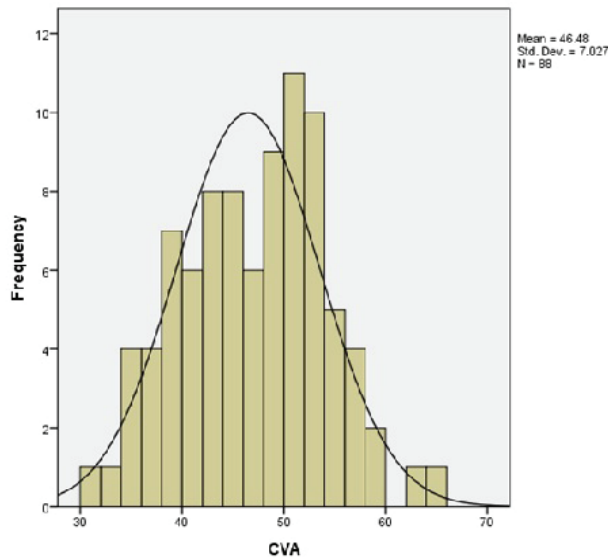
There is a statistical significant difference in flexion variable between groups (p -value=0.008). There is no statistical significant difference in Extension variable between groups (p -value=0.051). There is no statistical significant difference in CVA variable between groups (p -value=0.294).



Graph 1: Shows mean value of flexion range of motion between groups.



Graph 2: Shows mean value of extension range of motion between groups



Graph 3: Shows mean value of craniovertebral angle between groups

Discussion

The research was conducted among university staff and age group students ranging from 18-25 years of age using digital devices for six months or more. Participants were divided into four classes based on the period of use of digital devices, i.e. less than 1 hour / day, 1-2 hour / day, 2-4 hour / day and more than 4 hours / day. Researchers found that those who used smartphones for more than 2 hours had problems that were higher than those who used less than 2 hours a day.⁶

The study results showed a statistically significant decrease in the range of cervical flexion in group 4 relative to other groups ($p < 0.05$) and no substantial difference in cervical extension among groups. The study results are confirmed by “The presence of altered craniocervical posture and mobility in South Korean smartphone addicted adolescents with temporomandibular disorder” by Kee et al, who concluded that smartphone addicted adolescents showed substantial decrease in cervical flexion, extension, lateral flexion and rotation.⁶ In support of our finding, another study on cervical proprioception in young people, which spends long periods on mobile devices in Australia, by Portelli et al., concluded that there is a substantial difference in cervical flexion but there was no difference between groups for other cervical movements (extension, lateral flexion and rotation).⁷ In contrast some studies showed males with greater use of the computer was associated with increased flexion of the head and flexion of the spine and in females, greater use of the computer was associated with increased lordosis.⁸ Other studies concluded that over usage of smartphones in non-neutral neck, there was a substantial reduction in extension, right and left flexion, and right and left neck rotation except neck flexion.⁹

The present study did not show any statistical significant difference in craniocervical angle between the groups, which was supported by a study conducted on 68 subjects by Selvaganapathy et al.,¹⁰ Cervical angle between heavy user group and control group (according to their responses on smartphone addiction questionnaire), there was significant difference in head position angle but not in the craniocervical angle.³

Limitations of study: Research limitations were small sample size, participants mostly used smartphones so analysis more revolved on smartphones, length

comparison could not be achieved using different devices. No educational interventions were assessed for the outcome changes in the participants.

Conclusion

This study indicates that spending long hours using digital devices may have an effect on reducing neck flexion ability. Tech neck may thus be an increasing danger among the young. Musculoskeletal neck pain in children and adolescents is a common multifactorial disorder, meaning that multiple risk factors contribute to its growth. By understanding of lifestyle changes, we can avoid neck pain, and few easy arrangements at work according to ergonomics will minimize neck pain.

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Conflict of Interest: No conflict of interest

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