

Assessment of Forward Head Posture in Information Technology Employees with Neck Pain: A Cross-Sectional Study

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Abstract

Background: Neck pain is the most common complaint that we deal with in orthopedics, most of which are information technology (IT) professionals. These individuals have vocational mismanagement which leads to high incidence of forward head posture (FHP).

Methods: A cross-sectional study was carried out from January 2019 to June 2019 during which a total of 300 patients were taken into study. Clinical assessment of neck pain, head posture, range of motion (ROM), and radiological assessment of craniovertebral angle (CVA) and anterior head translation (AHT) was done.

Results: Out of 300 patients, the majority of the patients were men. On average, men used computers for 9.6 hours compared to 9.2 hours for women. The average CVA was higher in women (58.8). The average AHT was more in men (22.9).

Conclusion: As compared with the previous literature, our study showed that 84.3% of male and 92.91% of female participants had FHP. CVA was lower, while AHT was higher in both groups than the usual range. The mean AHT in our sample was 18.8 mm, which was found to be aberrant in the prior research studies. In our study, we have found a negative correlation between the CVA and AHT, resulting in FHP, which can furthermore lead to early changes of cervical spondylosis in IT employees, probably due to long hours of desktop usage resulting in fixed postural habit.

Keywords: Head; Posture; Vocational; Neck Pain; Information Technology

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Background

Mankind saw a great leap in achievements and standard of living after the invention and usage of computers and smartphones. But it came with a price; widespread, prolonged use of personal computers and smartphones has led to increased forward head posture (FHP). FHP, also known as turtle neck syndrome, is an aberrant posture that includes gazing at a monitor below eye level, causing the head to slide forward and exacerbating the anterior curve (kyphosis) in the lower cervical and posterior curve in the upper thoracic levels.

The center of gravity changes anteriorly as the head moves forward; to compensate, the upper body shifts posteriorly, and the shoulders fall forward (1). In addition, a sedentary lifestyle has resulted in weak back muscles.

Due to this sedentary lifestyle, a fixed postural habit is adopted following forward head and trunk flexion, which results in cumulative trauma disorders, overuse injuries, and repetitive strain injuries (2). When the position of the head is in forward position, there is an improper leverage of 30 pounds on the cervical spine which can disrupt the spinal alignment.

It has been observed that there is a reduction of 30% in the vital capacity in cases of FHP (3). Studies have shown that these disorders are more common in people who spend more amount of time using computers (4, 5). Disabilities related to neck pain have a profound impact on health and the economy, both at individual and community level (6). Morphological assessment of the position of head has become imperative in designing and evaluating treatment regimens for patients who are suffering from neck

discomfort and other clinical conditions as mentioned above.

One of the most used objective approaches for assessing head position is craniovertebral angle (CVA) measurement (7, 8).

An angle created by a horizontal line drawn between the spinous process of the 7th cervical vertebra and a line connecting the spinous process of the 7th cervical vertebra with the tragus of the ear is known as the CVA (7-9).

The anterior head translation (AHT), which is the horizontal distance between the posterosuperior aspect of the 2nd cervical vertebra and a vertical line drawn superiorly from the posteroinferior aspect of the 7th cervical vertebra, is another method for quantifying forward head position.

This position is a good way to tell if your head and neck are in good shape (7). The CVA of tension-type headache and migraine sufferers was compared to that of normal people by Fernandez-de-las-Penas et al. The patient group had a higher FHP and a smaller CVA, according to the findings (10, 11).

There is very little literature available discussing the AHT CVA as a cause or effect of chronic neck pain. Therefore, this study aimed to find out the prevalence of AHT and reduced CVA in Indian patients with chronic neck pain using traditional lateral cervical radiography and to probe the association between CVA, AHT, and neck pain.

Methods

From January 2019 to June 2019, a cross-sectional study was carried out at a tertiary care hospital in an eastern Indian state. Three hundred full-time employees with office desk jobs that involve using computers were selected.



The study included information technology (IT) professionals over the age of 30 who had been diagnosed with mechanical neck pain for at least 6 months, with or without referred symptoms. Any cervical fracture or trauma, cervical spine surgery, idiopathic scoliosis, bone tumor, spasmodic torticollis, neurological motion disorder, hearing impairment, temporomandibular surgery, visual impairment not corrected by glasses, or systemic disorder, such as rheumatoid arthritis (RA) or systemic lupus erythematosus (SLE), were all considered to be in exclusion criteria. The study was explained in detail, and informed consent was acquired.

Basic data such as age, sex, hours of working with a computer, type of computer, i.e., whether desktop or laptop, type of chair used during work hours, i.e., with or without headrest, history of neck pain, and history of migraine were recorded for all participants. The subjects were evaluated in three prongs, i.e., neck pain severity, head postures, and neck range of motion (ROM).

The neck pain intensity and disability were assessed using the Numeric Pain Rating Scale (NPRS) (10, 11) and the Northwick Park Questionnaire (NPQ) (12), respectively, as well as the Neck Disability Index (NDI), a commonly used questionnaire that assesses how neck pain impacts everyday living.

Head postures were evaluated by using lateral cervical digital radiography. The participant was told to stand comfortably with his or her weight evenly distributed on both feet and to maintain his or her gaze straight ahead. He was then told to flex and extend his or her head three times before resting it in a comfortable posture.

A lateral cervical spine digital radiograph was obtained. From such radiographs, two parameters were obtained: a) CVA and b) AHT. The CVA was calculated by drawing two straight lines, one centered at the tip of the C7 spinous process and the other connecting the C7 spinous process to the tragus of the ear. The CVA was calculated by measuring the angle between these two lines.

The horizontal distance between the posterior-

superior body of the C2 vertebra and a vertical line drawn superiorly from the posterior-inferior body of the C7 vertebra was used to calculate AHT.

A universal goniometer was used to evaluate the ROM of the neck, including flexion extension, right and left lateral flexion, and rotation. All the data were compiled on spreadsheets and analyzed. Data were analyzed and formulated using Microsoft Excel 2008 edition, and statistical analysis was done using an independent t-test by SPSS software (version 20.0, IBM Corporation, Armonk, NY, USA). A P-value of < 0.05 was considered significant.

Results

Of the 300 subjects, 57.67% were men and 42.33% were women. The age ranged from 30 years to 55 years, with a mean age group of 42 years. All of them were IT professionals who used computers for the major part of their work. Men used computers for an average of 9.6 hours per day, while women used computers for an average of 9.2 hours per day. Among men, 105 ones used desktop computers and 68 used laptops, and among women, 82 were desktop users, and 45 were laptop users. The mean duration of neck pain was 44 weeks among men and 41 weeks among women. In our study group, 98 people (61 men and 37 women) had symptoms of radiculopathy, and 65 members had a history of migraine.

Neck pain scores were calculated for all the participants based on the NPRS (10, 11), the NPQ, and the NDI. As shown in table 1, the average NPRS of men was 4.9, and for women 4.1.

Variable (mean)	Men	Women	P-value
NPRS	4.9	4.1	0.003
NPQ	38.7	34.1	0.002
NDI	13.5	13.2	0.005
CVA	52.3	58.8	0.004
AHT	22.9	16.9	0.004
NPRS	4.9	4.1	0.003

NPRS: Numeric Pain Rating Scale; NPQ: Northwick Park Questionnaire; NDI: Neck Disability Index; CVA: Craniovertebral angle; AHT: Anterior head translation

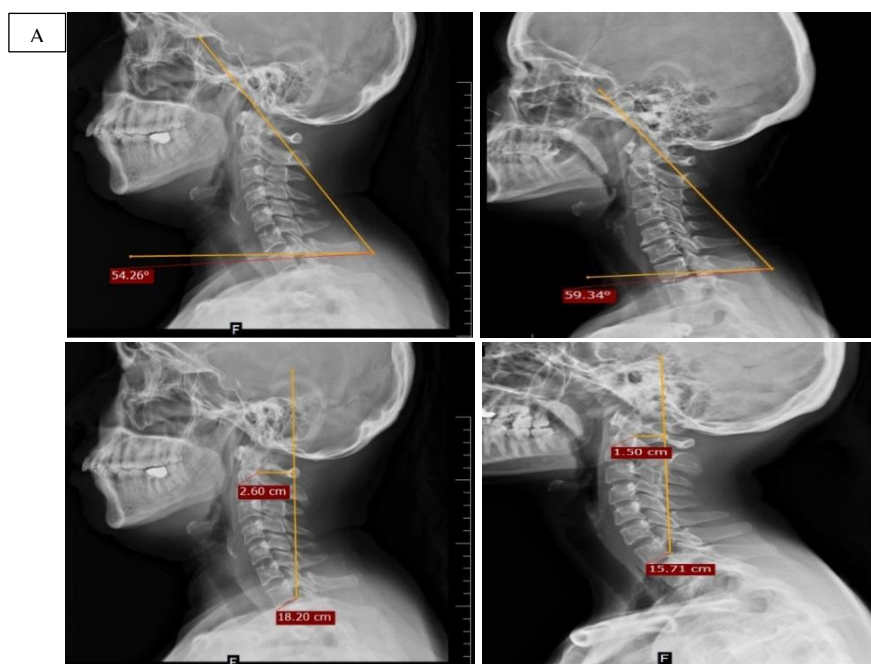


Figure 1. Lateral radiographs of the cervical spine and morphometric assessment. A) Craniovertebral angle (CVA) measurement; B) Anterior head translation (AHT)

NPQ score for men averaged 38.7, and for women, it was 34.1. The NDI score for men was 13.5 and 13.2 for women. Neck pain was found to be more in laptop users and participants who had long working hours. From the digital radiographs of the lateral cervical spine, the CVA and AHT were measured (Figure 1).

The average CVA of men was 52.3 degrees, and for women, it was 58.8. The average mean AHT was 22.9 for men and 14.8 for women. The men's CVA was smaller, and their AHT was longer than the women (Table 1). Figure 2 shows the correlation between NPRS, NPQ, AHT, CVA, and NDI in a web diagram representation.

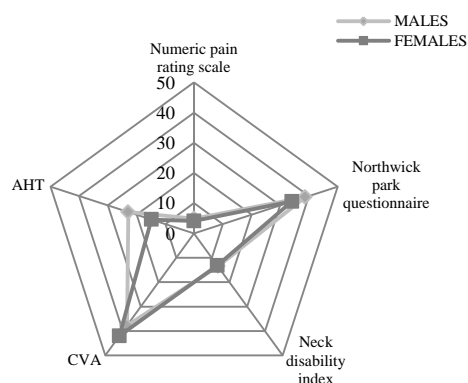


Figure 2. Correlation between Numeric Pain Rating Scale (NPRS), Northwick Park Questionnaire (NPQ), anterior head translation (AHT), craniocervical angle (CVA), and Neck Disability Index (NDI) in a web diagram representation

Based on the above data among the 300 individuals, 264 participants (146 men and 118 women) had FHP.

The neck's ROM was measured with a universal goniometer. Flexion, extension, side flexion, and rotation were all assessed. Data were gathered and transferred to an Excel spreadsheet, where it was examined using relevant tests.

Discussion

Musculoskeletal problems, such as musculoskeletal disorders (MSDs), are the most prevalent causes of long-term sick leave and disability compensation in numerous developing nations. The annual prevalence of neck pain, which was reported in community-based studies conducted worldwide, ranged from 15% to 44% (13).

Higher prevalence was noted in office workers who had neck pain as compared to the general community (14).

Global research carried out among administrative workers reported a one-year prevalence of around 15% to 34.4% (15, 16).

It is a fact that there exists a causal relationship between prolonged usage of computers and neck pain (14). According to research conducted by Cagnie et al., there is a positive link between the length of computer work and neck discomfort (17).

Ariens et al. conducted a prospective research on more than 1334 employees with a three-year follow-up and found a robust link between lengthy sitting hours (sitting for more than 95 percent of their working time) and neck discomfort (18, 19).

The current study discovered that most office workers had poor posture when using a computer, with the symptomatic group having the worst posture. It might be related to inadequate ergonomics of the chair, desk, and

computer positions, as well as a lack of attention paid to body posture when working (2). These personnel were overworked in units with a larger workload, which necessitated a high level of concentration and focus, resulting in increased psychological stress and a lack of awareness of poor posture. However, we did not gather any data on stress. In future research, it will be preferable to assess psychological stress using a job-stress questionnaire to discover the link between job-induced psychological stress and poor posture.

According to previous literature (17, 20), FHP is more prevalent in men compared to women. As compared with the previous literature, our study showed 93.4% of male and 97.05% of female participants had FHP. CVA (52.3 degrees in men and 58.8 degrees in women) was lower, while AHT (22.9 mm in men and 16.9 mm in women) was higher in both groups than the usual range. In populations from other nations, the average CVA was 48.94 (1, 21-23). Harrison et al. stated in their study that in case of asymptomatic persons, AHT was approximately 15 mm. The patients having AHT more than 15 mm were considered to have FHP (24).

Our study showed an incidence of FHP among IT professionals with neck pain to be 97% in men and 93% in women.

According to the criteria proposed by Portney and Watkins (25), the results of our investigation demonstrated a moderate to good negative connection. To put it another way, the smaller the CVA, the longer the AHT and hence, the "more" FHP (26, 27). The mean AHT in our sample was 18.8 mm, which is within the range of 15 to 21 mm, which has been found to be aberrant in prior investigations (28).

According to Harrison et al., anterior head weight bearing increases the flexion of lower cervical spine and extension of the upper cervical spine, which results in an increase in the amplitude of AHT (28).

The NPRS in men averaged 4.9, and in women, it averaged 4.1. The NPQ for men was 38.7, and for women, it was 34.1. The NDI for men was 13.5 and for women 13.2. The findings of this investigation were congruent with those of Yip et al., who found that CVA was adversely linked with NPQ and NPRS (7). We found that the CVA exhibited a negative connection with AHT in the same way that NPQ and NPRS did.

In patients presenting with neck discomfort, the present study found a significant association ($P = 0.006$) between CVA, AHT, and NPRS. The clinical efficacy of the CVA and AHT in evaluating patients with neck discomfort is now established.

The ROM of the head was measured using the universal goniometer, and no statistically significant restrictions of movement were noted. The readings are shown in table 1. There were various flaws in this study. We did not use conventional and accurate psychological questionnaires to measure the individuals' stress and mental health, which is a major flaw in our study. Based on these constraints, more research is needed.

Conclusion

Ergonomics plays a very important role in work-related disabilities. In our scenario, IT employees are prone to developing FHP, probably due to long hours of desktop and laptop usage, resulting in fixed postural habits. In our study, we have found a negative correlation between the CVA and AHT, resulting in FHP, which can furthermore lead to early changes of cervical spondylosis.

Conflict of Interest

The authors declare no conflict of interest in this study.

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