Original Article

Correlation Between Forward Head Posture and Neck Pain in IT Professionals by Using Postural Screen Mobile Application

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ABSTRACT

Neck pain is a type of pain that starts inside the neck and can radiate down to one or both arms. Neck discomfort can be caused by a variety of disorders or illnesses affecting any of the neck structures, nerve fibers, bones, joints, connective or contractile tissue. Forward head position is described as the skull being bent forward over the atlas by more than one inch. **Objective:** To assess the correlation of neck pain with forward head posture in IT Professionals by using the postural screen mobile app (sit screen). **Methods:** It was a cross-sectional survey. The sample size was 150. The study was conducted at TkXel Software Company and UMT IT department and UOL IT department in Lahore. Males of age 20-60 were included in the study. The tool used was the Posture Screen Mobile app iPhone 7plus and neck disability pain index questionnaire. Results: The cross-tabulation of NPAD SCORE and CV angle resulted in negative co-relation with r=−0.680 p<0.05 i.e., the smaller CV angle showed the worst FHP along with greater NPAD SCRORE showed the worst becomes neck pain. Cross-tabulation of working hours and CV angle result in negative co-relation with r= −0.450, p<0.05 i.e., worst FHP with working hours greater than 6 hours. Cross-tabulation of working hours and NPAD SCORE result in positive co-relation with r= 0.477, p<0.05 i.e., the greater the NPAD SCRORE the worst becomes neck pain with working hours greater than 6 hours. All calculations showed that FHP and neck pain are positively correlated with each other as working hours increased, with the result being statistically significant. **Conclusions:** Our findings have revealed that IT employees had a defective posture and improper posture was more severe while working more than 6 hours per/day. The ratio of moderate pain with FHP was found in the majority of IT professionals.

INTRODUCTION

Neck pain is a type of pain that starts inside the neck and can radiate down to one or both arms. Neck discomfort can be caused by a variety of disorders or illnesses affecting any of the neck structures, nerve fibers, bones, joints, connective or contractile tissue [1]. The cervical section of the spinal column is made up of seven (C1-C7) vertebrae that are separated by an intervertebral disc. These discs enable the backbone to move easily while also acting as shock absorbers throughout regular activities. Each vertebra has an aperture that develops into a hollow longitudinal cavity that runs the length of the spine. The spinal canal is the passageway through which the spinal cord and nerve fasciculi pass. Forward head posture, also known as "Scholar's Neck," "Text Neck," or "Reading Neck," is a position in which the head appears to be in front of the body. It is a prevalent condition that I see in the office on a fairly regular basis [2]. Forward head position (FHP) is described as the skull being bent forward over the atlas by more than one inch. The most prevalent postural abnormality is FHP, which affects between 66% and 90% of the population. You can start fixing this posture with a few basic exercises, postural understandings, and workplace adjustments. Forward head posture impacts not only the neck and shoulders but also your entire body's center of gravity, which affects the trunk and every joint of the body [3]. Neck ache is considered the most resolved musculoskeletal pain ailment since it occurs infrequently and recovers differently from event to event. It is usually

caused by problems such as musculoskeletal, neurological disorders, neoplasms, and cervical spine fractures, or it can be unexplained. Neck pain has been linked to the female sex, advanced age, being a smoker, high occupation requirements, or friendliness. It is entirely associated with holding the neck in a forward lean stance for an extended period of time and doing repetitive tasks. Neck flexion can be used with FHP, which moves the head forward in relation to the shoulder. This is a popular cervical postural defect in the longitudinal plane that affects people of all ages with a different presentation. More severe FHP has been linked to significant limitations in cervical range of motion, particularly neck pivot and flexion [4]. FHP has shown an association with neck pain. Faulty posture during computer work is the reason for even worse pain that is associated with FHP [5]. Sedentary or office employees have been found to have a high occurrence of neck pain in schools, hospitals, and the military [6]. FHP reduces the EMG activity of the middle trapezius, splenii, and sternocleidomastoid muscles (SCM) and these depressed activities were linked to a decreased ability to generate force due to changes in muscle length caused by FHP [7]. Office workers spend a lot of time in front of computers, sit in their seats for long periods of time and the strain can create musculoskeletal problems. The increased use of cell phones has also been identified as a significant cause as a result, pain produces postural deformation around the cervical vertebra, and many persons encounter biomechanical alterations in their cervical vertebra. The most visible shift is a FHP with round shoulders which has been attributed to the majority of neck pain sufferers [8]. Because of the long-term forward head stance, muscles lengthen and debilitate. Deep cervical flexors, erector spine, shoulder edge retractors sub-occipital muscles, chest muscles, and the levator scapulae muscle are the muscles involved. Increased weight on the cervical spine, hyper-flexion and hyperextension, muscle over-burden, and a hunched upper back are all possible consequences of this head position. Forward shoulders and an adjusted upper back, combined with a forward head, might result in increased pain in the upper back and shoulders [9]. Postural screen mobile (PSM) is a low-cost postural assessing device for enhancing between and intra-rater arrangement, where screening can be directed with participants wearing minimal clothing. It provides consistent measurements for anatomical milestones and this technology could also be useful for identifying forward head posture. This program can be used in both clinical and research environments. The intra-rater reliability increases from 0.71 to 0.99. The program may distinguish the adjustment of the four parameters selected, according

to the build legitimacy investigation [10]. Working at a computer causes back and neck pain since the person is bound to the workstation rather than moving around. Many people find it difficult to see a computer screen that is far away, low, high, small, or excessively dim. When the neck is turned to 45 degrees, the normal human head exerts over 50 pounds of force on the neck. The pressing element affects breathing and temperament as well as stressing joints and muscles in the neck and shoulders[11].

METHODS

In the cross-sectional study, 150 IT employees between the ages of 20 to 60 years who had worked 3 to 8 hours a day were enrolled. All the employees were male as female employees had privacy issues. The variables used were age, height, weight, working hours, NPAD scale, NPAD category (no, mild, moderate, severe, or worst pain), CV angle, and CV category (FHP, NO FHP). NPAD scale Performa was given to fill, to determine the neck pain intensity. To know whether they have FHP or not the Posture Screen mobile application version 11.2–iPhone 7plus–IOS 14.4 was used to determine their CVA angle. Pictures of them were taken while they were working in a sitting position. Their CV angle was noted. Statistical analysis was done in SPSS version 20.0. In statistical analysis, the mean mode and median of age, height, and weight were calculated along with their graphs. The frequency and percentage of NPAD CAT and CV CAT were calculated. The frequency and percentage of neck pain or no pain among the data selected was also calculated. A cross-tabulation of NPAD cat and CV cat was calculated and, in the end, a Pearson correlation coefficient(r) was calculated between NPAD score and CV angle. The value of r = –0.680** where p<0.05. Both variables were negatively correlated. Pearson correlation coefficient(r) was calculated between working hours and CV angle. The value of r = –0.450** where p<0.05. Both variables were negatively correlated. Pearson correlation coefficient(r) was calculated between working hours and NPAD SCORE. The value of r = –0.477** where p<0.05. Both variables were positively correlated. After taking informed written consent. Data was collected through a Questionnaire and analyzed on SPSS with the help of graphs and tables. Age was represented as a quantitative variable with a mean and standard deviation. Gender was reported as a frequency and percentage for the qualitative variables.

RESULTS

On the basis of my research on determining the correlation between FHP (Forward head posture) And Neck pain, took the following variables under consideration weight, height,

age, CV Angle including category (FHP, NO FHP), NPAD score including its category (no/mild/moderate/severe or worst pain) and working hours. The cross-tabulation was conducted using Pearson correlation method (Table 1). Total of three tabulations were conducted: NPAD score and Working hours, NPAD score and CV Angle and CV Angle and Working hours (Figure 1).

Cross-tabulation		FHP (angle less than 28)	FHP (angle less than 28) FHP (angle less than 28)	
NPAD CAT	NO PAIN (0-19)	0	27	27
	MILD PAIN (20-39)	26	22	48
	MODERATE PAIN (40-59)	46	0	46
	SEVERE PAIN (60-79)	16	0	16
	WORST PAIN (80-100)	13	0	13
Total		101	49	150

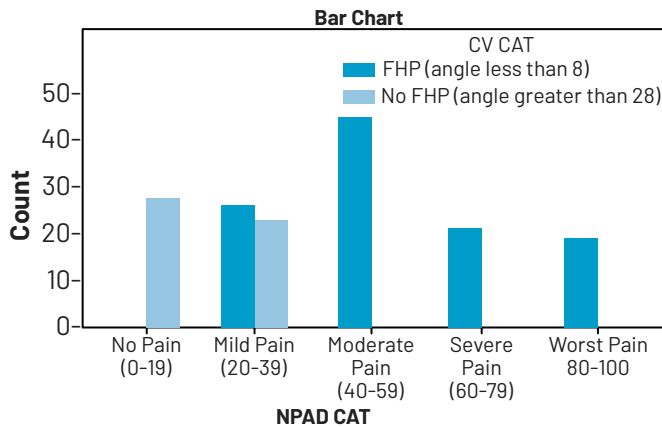**Table 1:** Cross-tabulation table between NPAD CAT and CV CAT

Figure 1: Bar chart to show relation between NPAD CAT and CV CAT

Correlation between NPAD score and CV angle shows a negative correlation with r= -0. 680 and p<0.05. Correlation is significant at the 0.01 level (2-tailed) (Table 2). Table 3 between NPAD score and Working hours shows a positive correlation with r= 0. 477and p<0.05. Correlation is significant at the 0.01 level (2-tailed). Table 4 between Working hours and CV angle shows a negative correlation with r=-0. 450 and p<0.05. Correlation is significant at the 0.01 level (2-tailed). It is concluded from the above statistics that FHP and neck pain are positively correlated with each other while working continuously for more than 6 hours/day on the computer

NPAD SCORE	PearsonCorrelation	1	-.680**
	Sig.(2-tailed)		.000
	N	150	150
CV ANGLE	Pearson Correlation	-.680**	1
	Sig.(2-tailed)	.000	
	N	150	150
** Correlation is significant at the 0.01 level (2-tailed)			

Table 2: Correlation between NPAD SCORE and CV ANGLE

Working Hours	Pearson Correlation	1	.477*
	Sig (2-tailed)		.000
	N	150	150
NPAD SCORE	Pearson Correlation	.477*	1
	Sig (2-tailed)	.000	
	N	150	150
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 3: Correlation between NPAD SCORE and Working Hours

Working Hours	Pearson Correlation	1	-.450*
	Sig (2-tailed)		.000
	N	150	150
CV ANGLE	Pearson Correlation	-.450*	1
	Sig (2-tailed)	.000	
	N	150	150
** Correlation is significant at the 0.01 level (2-tailed)			

Table 4: Correlation between Working Hours and CV Angle

DISCUSSION

The findings of the cross-sectional study showed that FHP (forward head posture) and neck pain are co-related with each other in IT professionals that their neck pain becomes worst and posture becomes improper while working continuously on a PC. The reason behind the neck pain and improper posture could be poor ergonomics of chair, desk, and computer positions and lack of awareness of sitting posture in front of a PC. Although we hadn't found any relationship between age, height, and weight with neck pain and FHP, there is a relationship noted between height and FHP which can be further studied in the future.

In previous studies, almost 80 % person of studies showed that there is a positive relationship between working hours and neck pain on the basis of results Cagine et al., it has revealed that there is a positive correlation between working hours and neck pain [12]. In other studies [13,14], if the duration of working hours is longer than 5 hours/day it can be a risk factor for neck pain [15]. Although clinical evidence of a correlation between computer-using time and neck pain has been widely documented, previous research on the relationships of particular modifiable behavioral or occupational characteristics among intense computer-using office employees with neck pain is rare [16], and 20% showed no such relation, by Parisa Nejati et al., [5] in which they found showed no relation between working hours on computer and neck (p=0.322).

In the present study, there is a positive correlation between neck pain and working hours that working greater than 6 hours a day on a computer becomes a risk factor for neck pain and also there is a negative correlation between cv angle and working hours that is the greater time employees

work on a computer the lower their angle be which indicates worst FHP which is consistent with studies referring stress, lengthy regular working hours, insufficient social support have been identified as occupational risk factors [17,18]. There was a study done by Chris Ho Ting Yip et al., in which the CV angle was lower for the people who had neck pain [19]. It was concluded from the NPAD scale that out of 150 employees   only 27 employees didn't have neck pain. All the others had neck pain. In the statistics, 48 employees had moderate pain with FHP. According to Paksaichol et al., the incorrect height (vertical level) of computer monitors could be an indirect risk factor for the neck [20]. The cross-tabulation table IV between NPAD score and CV angle shows a negative correlation with r= -0. 680 and p<0.05. At the 0.01 level, the correlation is significant (2-tailed). The cross-tabulation table IV between NPAD score and working hours shows a positive correlation with r= 0. 477 and p<0.05. Correlation is significant at the 0.01 level (2-tailed). The cross-tabulation between Working hours and CV angle shows a negative correlation with r = -0.450 and p<0.05. At the 0.01 level, the correlation is significant (2-tailed). Pearson correlation coefficient score of NPAD score and CV angle determined that neck pain is positively co-related to FHP and neck pain intensity is proportional to FHP while working more than 6 hours/day on the computer.

CONCLUSION

It is concluded that "the correlation is significant at 0.01 level (2-tailed) between FHP (forward head posture) and Neck Pain" when working more than 6 hours a day on the computer, through the variables NPAD Score and CV Angle and working hours. It was noticed that as the NPAD SCORE increases the CV angle decreases and the low the CV angle the worst FHP. The more working time the more the NPAD SCORE and the more working hours the low the CV angle. People who were heightened had the worst neck pain and worst Forward Head Posture. It was also noted that the ratio of moderate pain with FHP was greater compared to another NPAD category from which we can say that department people have mostly moderate pain with FHP while working more than 6 hours a day on the computer.

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