EVALUATION OF THE PATTERN OF NECK PAIN WITH FORWARD HEAD POSTURE (FHP) AMONG SEWING MACHINE OPERATORS- A CROSS-SECTIONAL STUDY

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ABSTRACT

One of the very common negative effects experienced by operators and workers of sewing machines is neck pain. The use of sewing machines in a forward-leaning position over an extended period of time contributes to neck strain and promotes bad postures like the Forward Head Posture (FHP). The objective of this study was to determine the prevalence of FHP and neck pain among sewing machine operators in tailors and garment factories of District Swabi, Pakistan. This cross-sectional study was carried out on a total of 223 users of sewing machines while seated (97 women and 126 men). The study was conducted in Swabi District from October 2022 to February 2023. The outcomes were evaluated using a numerical pain rating scale and the Neck Disability Index (NDI). According to the Numerical pain Rating Scale (NPRS) for neck pain, 24 participants (10.8%) reported mild discomfort, 79 participants (35.4%) reported moderate pain, and 120 participants (53.8%) reported severe pain. Only 13.9% (n=31) of the participants (n=192) had a normal head position. The majority of the participants were hunched forward. The NPRS had a mean of 3.43 (± SD 0.49), the NDI mean was 3.43 (± 0.68), and the cranial vertebral angle (CVA) mean was 1.13 (±SD 0.34). According to the findings of the current study, FHP and neck pain are quite common among individuals who use sewing machines, and a large percentage of these people also have FHP and neck discomfort.

Key Words:. : Neck pain, Forward Head Posture, Sewing Machine related neck problems

INTRODUCTION

Neck pain is one of the common public health issues and most prevalent musculoskeletal condition (1, 2). It ranges in severity from mild discomfort to excruciating pain that is incapacitating (3). While mechanical and degenerative reasons are more likely to cause chronic neck pain, poor posture, neck strain, sports and work-related accidents, and mental health issues including anxiety and depression are the causes of less severe neck pain (4). In the sagittal plane, forward head position (FHP), is the most prevalent postural abnormality (5). Any alignment in which the external auditory meatus passes through the shoulder joint ahead of the plumb line is considered it. Although there are a number of ways to calculate FHP, numerous studies have found that the reliable indicator for doing so is the cranial vertebral angle (CVA) (6). Numerous assessment techniques, including observation, instrumental (electronic head position instrument, cervical motion instrument), imaging, conventional radiography, and photography, have been used to evaluate the position over the years (7). It has been demonstrated that photogrammetry is a sensitive, dependable tool for evaluating FHP that has good radiography correlation. The angle of a horizontal line passing through Cervical vertebrae 7 (C7) and the imaginary line extending between C7 and the tragus are used to calculate CVA (6). This non-invasive method entails acquiring pictures, which are subsequently digitized using computer software for additional examination (8). The raised cervical lordosis curve's apex is located far from the

centre of gravity in FHP. The head also advances forward. Nerve root compression is caused by FHP, which progressively shortens the posterior joint capsule, narrows the intervertebral gaps, and causes inappropriate compression at the zygapophyseal joint and posterior vertebral discs. Furthermore, these postural modifications result in functional alterations in the temporomandibular joint. FHP can result in decreased cervical range of motion, muscle ischemia, soreness, tiredness, inflammation, and protrusion of the nucleus pulposus, which can rotate the mandible and compress and irritate the retrodisc pad (9). Sewing machine operation involves a forward-leaning sitting position that is static and unnatural in terms of the angle of the knee and ankle, which continuously strains the neck muscles (10). Previous research has shown the common occurrence of neck pain among global garment workers (11). Sewing machine workers frequently experience work-related musculoskeletal disorders as a result of their extended working hours, insufficient breaks, and poor ergonomics, which increase their risk of neck, back, and shoulder injuries (12). Literature, however, indicates that there are few studies on the pattern of FHP and its connection with high-risk employment. Majority of the studies reported so far have focused on the relationship between neck pain and work postures rather than a normal body. This study sought to ascertain the association between neck discomfort and the cranio-vertebral angle in sewing machines at two clothing companies in Pakistan's Swabi District, as well as the rate of occurrence of FHP among these workers.

METHODS

A total of 223 sewing machine operators who worked in the sitting posture participated in this cross-sectional study, including 97 females and 126 males. Users of sewing machines who spent at least five hours a day in a seated position and those with more than a year of experience using sewing machines met the inclusion criteria. Individuals who were diagnosed with conditions that could impair cervical spine mobility, such as rheumatoid arthritis, traumatic neck injuries, idiopathic scoliosis, cervical spondylosis, bone cancer, and congenital neck problems or radiation, were excluded from the study. The study was conducted from October 2022 to February 2023, the study was carried out in District Swabi. Numeric pain rating scale (NPRS) and Neck disability index (NDI) were used for outcome measurement.

Neck pain assessment

The interviewer's questionnaire, which asked about personal information, employment history, knowledge of postural correction exercises, and the presence or absence of neck discomfort, was used to gauge the degree of neck pain. Using the NPRS, the level of neck discomfort was evaluated. It was thought improbable that the CVA measurement would have an impact on the severity of pain complaints. The participants were informed that neck pain was specifically defined as pain in the neck and/or upper trapezius area that they experience during work hours or at the conclusion of a shift due to their prolonged periods of standing in one position (13).

Measurement of cranio-vertebral angle (CVA), cervical flexion and extension

Two body spots were designated before CVA measurements were taken with photos. They were the tragus and the synovium of the seventh cervical vertebra. To make two points visible in the pictures, markers made of Styrofoam balls and 0.5 cm x 0.5 cm double-sided tape were used to mark them. In order to reference the horizontal and vertical axes of the photographs, the participant was instructed to stand in front of a calibration table that had been adjusted to match their location. The calibration plate displayed the participant's registration number for identifying purposes. To ensure that every

subject stood in the same spot, a footprint was placed on the ground. The placements of the tripod and camera were fixed to ensure uniformity throughout the data collection procedure. Measuring tapes were used to mark the subject's location in front of the board and the distance between the subject and the tripod in order to prevent any changes from altering the measurement. 100 cm from the lateral edge of the footprint, the camera was positioned on a tripod. The camera's height was changed so that the participant's tragus was in focus (7). The centre mark and the horizontal indicator bubble were overlapped by adjusting the camera mount (14). The subject was instructed to wait for an object on the wall while standing on a footprint in order to record the CVA. Subsequently, he was instructed to stand up with his weight evenly spread between his legs and arms. In order to make sure that the head and neck were in a relaxed, neutral position, the participant was asked to tilt their head forward and backward three times. To lessen distortion from stress, three pictures were obtained at two-minute interval (15).

Analysis of cranio-vertebral angle (CVA)

Every picture was evaluated on Kinovea software (0.9.4). The angle created between the line connecting the tragus-articular tendon of the seventh cervical vertebra and the horizontal line that passes through the spiral of the vertebra was used to calculate the CVA (Figure 1).

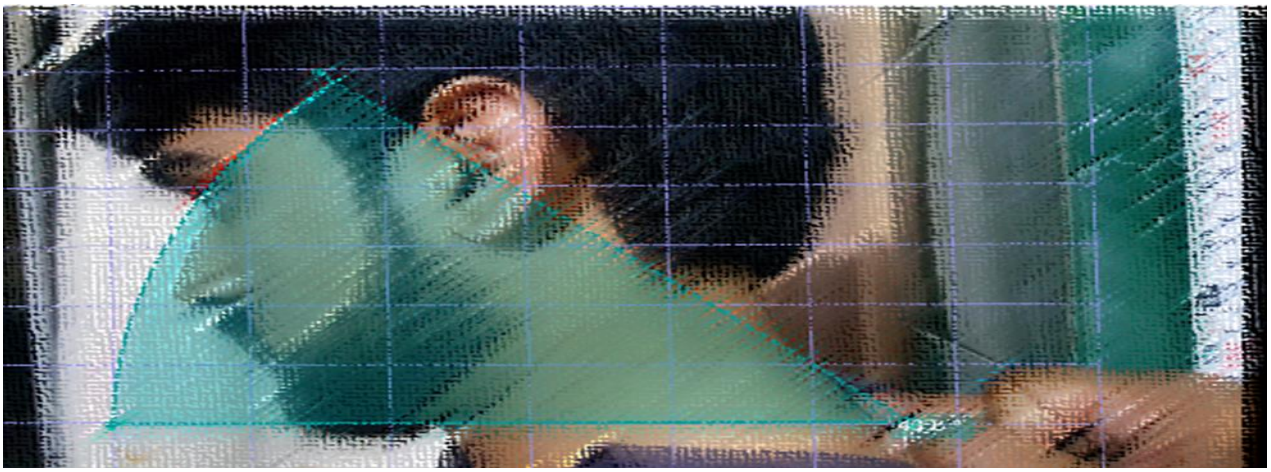

Figure 1: Method of analysis of cranio-vertebral angle

Statistical analysis

Data was analyzed by using Statistical Package for Social Sciences (SPSS 23.0). Data was presented in frequency distribution and percentages.

RESULTS

Out of total 223 participants; 126 (56.5%) were males and 97 (43.5%) were females. Out of these 121 (54.3%) were between the age group 25 to 35 years, 64 (28.7%) were 36 to 46 years and 38 (17%) were over 46 years. With respect to the duration of work 23.3% (n=52) were working around 4 hours/day and 76.7% (n=171) were working more than 4 hours/day. Which clearly showed that most of participants were working more than 4 hours/day. Regarding neck pain with respect to NPRS scale; 24 (10.8%) were in mild pain, 79 (35.4%) were in moderate pain and 120 (53.8%)were in severe pain. On NDI scale 5.8% were mildly disabled, 15.7% were moderately disabled and 78.5% were severely disabled. 171 participants were working more than 4 hours per day and 52 were working around 4

hours per day. 129 (57.8%) participants were dress tailors and 94 (42.2%) were factory workers. 86.1% (n=192) participants had FHP and only 13.9% (n=31) were reported to be normal. Which clearly showed that most of the participants were in FHP (Table 1). The mean NPRS was 3.43 (SD± 0.49), NDI was 3.43 (SD±0.68) and the mean CVA was 1.13 (SD±0.34). The association of the working hours and CVA showed significant results with (p-value < 0.001).

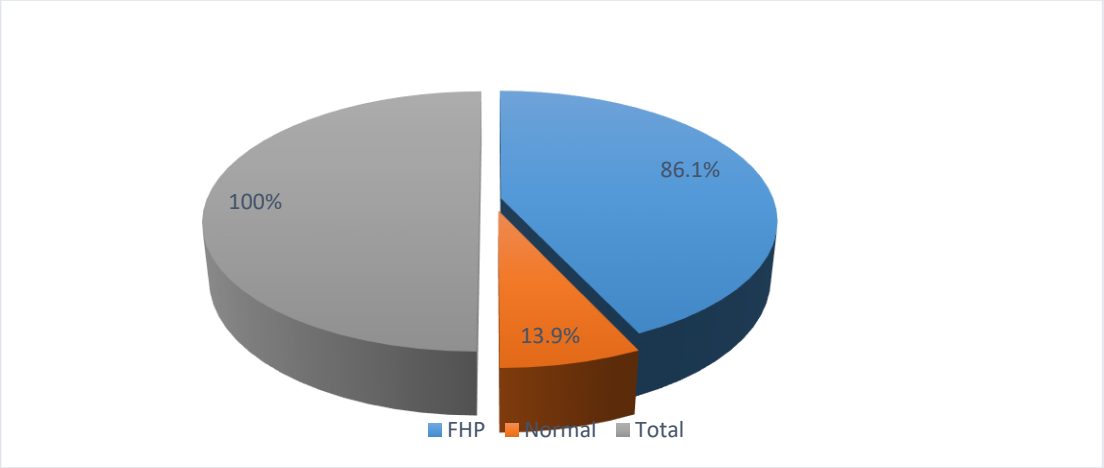

Figure 2: Showing the Frequency of Cervical vertebral angle.

Table 1: Showing the statistical Description of the study.

		Frequency	Percent
Gender (n=223)	Male	126	56.5%
	Female	97	43.5%
NPRS (n=223)	Mild pain	24	10.8%
	Moderate pain	79	35.4%
	Sever pain	120	53.8%
NDI (n=223)	Mild Disable	13	5.8%
	Moderate Disable	35	15.7%
	Sever Disable	175	78.5%
CVA (n=223)	FHP	192	86.1%
	Normal	31	13.9%
Duration of work (n=223)	Less than 4 hours	52	23.3%
	More than 4 hours	171	76.7%

DISCUSSION

The purpose of this study was to determine the pattern of FHP and the connection between neck discomfort and CVA in sewing machine workers. The photogrammetry approach, which has never used before in Pakistan's physiotherapy area, was employed in this study to quantify CVA.

Sewing machine operators exhibited FHP with 103 (64.67%) of them meeting the recommended standard of a CVA of 50˚or above. Numerous articles support the high prevalence of FHP among various occupations with similar postures, such as office workers, dentists, and call centre operators (15, 16). Sixty-eight of the 167 sewing machine users in the sample reported having neck pain at the end of their shift or during working hours. The prevalence of neck pain among seamstresses and clothing industry workers is in line with earlier studies' findings (16). Sixty-three (6.67%) of the sewing machine users displayed a forward head position, even though a CVA of 50˚or higher was thought to be the proper head position. Numerous studies have reported the high incidence of FHP in a range of positions with comparable postures, including call centre operators, dentists, display terminal employees, and office workers (17).

Of those who used sewing machines and reported having neck pain at work, 86.1% of participants had FHP. The high frequency of FHP among individuals experiencing neck pain is in line with earlier research by Ruivo, Pezarat-Corriea, and Carita (2019)(18) and Chiu et al. (2002) (19), which revealed 60.5% of FHP among academic staff experiencing neck pain. Among sewing machine users with neck pain, there was a negative connection observed between the severity of neck pain and CVA.

These results are in line with earlier research conducted between various professional groups by Subbarayalu and Ameer (2017) and Abbhas et al. (2016) (20). Similar results were seen in other studies including patients with neck pain by Contractor, Shah, and Shah (2018), Yip, Chiu, and Poon (2008), and Lau, Chiu, and Lam (2010) (21). These investigations also revealed a low-negative connection between the intensity of neck pain and CVA. Our theory that FHP correction may improve outcomes for individuals with neck pain is supported by the negative connection found between CVA and neck pain intensity, which shows that lower CVA values correspond to more severe neck pain. Our results showed that the link between CVA and the level of neck pain was, at most, modest, indicating that it might be one of the causes related to neck pain and that other aspects needs to be focused in further research. We were unable to establish a causal association between head posture and neck discomfort because this was a cross-sectional study, and self-reporting of the inclusion and exclusion criteria might have some recall bias, therefore it is taken as limitations of the study. Psychological stress, balance issues, or visual abnormalities that could influence head posture were not ruled out. Additionally, we did not examine the properties of the entire spine. Future research should take this into account since modifications to the lumbar and thoracic spine may have an impact on head posture.

CONCLUSION

The findings of the present study demonstrated that a significant number of sewing machine users who also had neck pain and a high prevalence of both conditions. The study found a small but statistically significant negative connection between neck discomfort intensity and CVA. Further studies are required to confirm findings of our study. Interventional studies to improve posture during working hours are needed to be done and make recommendations.

CONFLICT OF INTEREST:
Authors declare no conflict of interest
FUNDING SOURCE:
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ETHICAL APPROVAL:
The study was approved by local Research Ethics Committee.

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