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ORIGINAL ARTICLE

Relationship Between Forward Head Posture and Hand Function in Middle-Aged Tailors: A Cross-Sectional Study

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ABSTRACT

Background of the study: Tailors are creative workers who stitch clothing and have exceptional machine and hand abilities. These employees who operate in a hunched posture for extended periods of time impair tension, stretching and ligaments around neck. Reduced hand function in tailors may be caused by forward head posture during sewing.

Objective: To find the association between forward head posture and hand function in tailors.

Methods: The cross-sectional study was conducted on 29 subjects aged between 40–65 years, who met with inclusion criteria. Based on the experience, the subjects were grouped into three classes of Skilled tailors, Expert tailors, and Master tailors. The forward head posture and hand function were assessed by craniovertebral angle [CVA] and nine-hole peg test [NHPT] respectively. The obtained data was statistically evaluated to find out whether forward head posture was correlated with hand function in tailors.

Results: The mean scores obtained for CVA and Hand Function were 45.18 ± 7.87, 29.89 ± 5.21, respectively. Pearson correlation coefficient was computed to assess the correlation between the obtained variables among skilled, expert and master tailors. The obtained correlational values were [r = -0.244] in skilled tailors and [r = -0.272] in expert tailors, whereas a weak positive correlation [r = 0.279] in master tailors. This shows there was no significant correlation between hand function and

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forward head posture in tailors.

Conclusion: The study concluded that there was no correlation between forward head posture and hand function in tailors.

KEYWORDS

• Forward head posture • Hand function • Cranio-vertebral angle • Hand grip

INTRODUCTION

Workers frequently exhibit certain work attitudes while standing, bending, squatting, strolling, and other postures. Depending on the circumstances of the current work system, the working attitude was implemented. Tailors' jobs often require them to sit front in a static position for extended periods of time.[1] Tailors are creative workers with superior manual and machine skills.[2] These workers who spend a lot of time sitting forward at work produce strain and stretching in the neck's muscles and ligaments. One of the most popular adapted postures that most tailors adopt is forward head position [FHP].[1] Numerous work-related musculoskeletal disorders [WRMD] are more likely to affect them. They often experience cervical muscular stiffness, soreness, and edema, which makes it difficult for them to carry on with their job.[2] Any alignment where the external auditory meatus is positioned anterior to the plumb line across the shoulder joint is referred to as forward head posture.[3] The head is brought forward from the middle of the shoulder in this attitude, which is also known as shifting the center of gravity. To compensate for this shift in COG, the upper body drifts backward and the shoulder slumps forward so that the head is more anterior than the vertebrae.[1]

The most common deviation from the neck's normal curve is forward head posture. In tailors, this issue is thought to be the most prevalent postural malformation. Every daily action requires maintaining a specific posture. The tailor's hand serves as their functional unit and is utilized to hold tools and instruments firmly.[4] The hands' anatomical integrity, sensation, coordination, strength, and dexterity can affect a person's ability to use them to carry out daily tasks. Fine, voluntary motions needed to manage small items during a given activity were referred to as dexterity or manipulative competence.[5]

In order to counteract the pressure of the head, tailors position their heads forward and produce a long moment arm for the cervical extensor muscles. This reduces the muscular need of the cervical extensors while increasing the activation of the upper trapezius, which causes the cervical extensors to become weak. The nerves and other soft tissue structures in the upper quadrant can be adversely affected by work-related activities that involve abnormal repetitive movement or prolonged static postures of the head, neck, and upper extremities that are maintained for extended periods of time. This can lead to dysfunctions in the arms and hands, such as sewing, writing, and turning small everyday objects.[6] Despite this trend, there is still little research on how tailors' forward head posture affects their hand function, especially when it comes to the connection between them. Therefore, the purpose of this study is to determine how FHP and hand function relate to one another among tailors.

METHODS

This was an Observational cross-sectional study to establish a relationship between forward head posture and hand function in middle-aged tailors. This study was conducted by the Department of Physiotherapy, Little flower Institute of Medical Science and Research, Angamaly, among middle-aged tailors during the period July 2024 to January 2025. This study used participants from various tailoring units with an experience more than 5 years with purposive sampling.

Procedure: Tailors were provided with a detailed explanation about the study. After initial assessment the tailors who met inclusion criteria of Age between 40–65 years, working hours more than 4 hours daily, working experience more than 5years in tailoring and exclusion criteria which include recent fractures of neck, clavicle and in upper extremity, history

of surgery around neck, part-time workers, congenital and acquired deformities around neck were included. Informed consent was obtained from the participants. A total of 35 potential participants were recruited from the tailoring shops in and around Angamaly, and 29 participants were finally enrolled for the study. Based on the experience, the subjects were grouped into three classes of Skilled tailors, Expert tailors, and Master tailors. The forward head posture and hand function were assessed by craniovertebral angle [CVA] and nine-hole peg test [NHPT] respectively.

The craniovertebral angle [CVA] was measured using the Angulus android application for assessing forward head posture. The participants assumed a sitting position, and a lateral view picture was taken. The photos were analyzed by using the Android application Angulus to create a virtual angle, formed by two lines, one joining the tragus and the C7 spinous process, and the second imaginary line that goes horizontally through the C7 spinous process. The CVA less than 48^0 indicates the forward head posture. A smaller CVA angle generally indicates a more severe FHP.

The Nine-hole peg test was conducted for assessing hand function. The pegboard was centered in front of the person. The container filled with pegs is placed next to the board, on the same side as the hand being assessed. The dominant hand was tested first. The following instructions were given to the subject as the examiner briefly demonstrated the test: Pick up the pegs one at a time using the right or left hand at a time and put them into the holes in order until all the holes are filled. Then remove the pegs one at a time and return them to the container. Stabilize the peg board with left or right hand. The stopwatch was started by the examiner as soon as the subject touched the first peg and stopped when the last peg hit the container. The tests were repeated in the same way on the nondominant hand. Three trials were done in both hands, and the average time to complete the task was recorded. Finally, the measured values and test scores of CVA and NHPT were subjected to statistical analysis.

STATISTICAL ANALYSIS

Descriptive statistics were used for all variables, it was used to calculate the mean and standard deviations of characteristics of the subjects: age in years, experience in years, CVA angle, and hand function in time. Pearson correlation was used to find the relation between variables. A p-value less than 0.05 was considered statistically significant, and all statistical calculations were done using the computer program IBM SPSS.

RESULTS

Table 1 shows the mean and standard deviation values of various parameters were calculated as age [48.52 ± 6.96], experience [21.79 ± 11.46], CVA [45.18 ± 7.87], Hand Function [29.89 ± 5.21].

Table 1: Descriptive statistics for the participant's age, experience, working hour and other measured parameters

Variables	Minimum	Maximum	Mean	Standard Deviation
Age	34	60	48.52	6.96
Experience (Years)	6	55	21.79	11.46
Working Hours	4	8	6.17	1.25
CVA	28.5	51.8	45.18	7.87
Hand Function	14	39	29.89	5.21

Table 2: Correlations between measured CVA and dominant hand function of skilled tailors

		CVA	Dominant Hand Function
CVA	Pearson Correlation	1	-.244
	Sig. (2-tailed)	-	.599
	N	7	7
Dominant hand Mean	Pearson Correlation	-.244	1
	Sig. (2-tailed)	.599	-
	N	7	7

Table 2 Pearson correlation was conducted to explore the relationship between CVA and Dominant Hand Function. Results showed a weak negative correlation (r = -0.244, p = 0.599), which was not statistically significant. This indicates that there is no significant linear association between CVA and Dominant hand Mean in the Skilled Tailors.

Table 3: Correlations between measured CVA and Dominant Hand Function of Expert Tailors

		CVA	Dominant hand mean
CVA	Pearson Correlation	1	-.272
	Sig. (2-tailed)		.418
	N	11	11
Dominant hand mean	Pearson Correlation	-.272	1
	Sig. (2-tailed)	.418	
	N	11	11

Table 3 A Pearson correlation analysis was conducted to examine the relationship between CVA and Dominant hand mean in the sample (N = 11). The analysis revealed a weak negative correlation (r = -0.272, p = 0.418), which was not statistically significant. This indicates that there is no significant linear association between CVA and Dominant hand mean in the current sample.

Table 4: Correlations between measured CVA and Dominant Hand Function of Master Tailors

		CVA	Dominant hand mean
CVA	Pearson Correlation	1	.279
	Sig. (2-tailed)		.467
	N	9	9
Dominant hand mean	Pearson Correlation	.279	1
	Sig. (2-tailed)	.467	
	N	9	9

Table 4 A Pearson correlation analysis was conducted to examine the relationship between CVA and Dominant hand mean in the '26 and above' group. The results revealed a weak positive correlation (r = 0.279, p = 0.467), which was not statistically significant. This indicates that there is no significant linear association between CVA and Dominant hand mean in this sample (N = 9).

In the study population the age ranges from 34–60 years with a mean and SD of 48.52 ± 6.96, and the experience ranges from 6–55 years with a mean and SD of 21.79 ± 11.46, which was categorized into three classes of 5-15 years [skilled tailors], 16–25 years [expert tailors], 26 years and above [master tailors]. CVA angle ranges from 28.5–51.8 with a mean and SD of 45.18 ± 7.87 which shows 82.76% of the subjects had forward head posture.

DISCUSSION

There was no research report about the effect of FHP on hand function and the relationship between FHP and hand function in middle aged tailors. The present study was conducted to find out the correlation between forward head posture and hand function in tailors. Hand function and craniovertebral angle of 29 subjects in this study were assessed by Nine Hole Peg Test and Angulus app respectively. Based on the experience, the subjects were categorized into three classes of 5-15 years [skilled tailors], 16–25 years [expert tailors], 26 years and above [master tailors]. The results showed a mild negative correlation between craniovertebral angle and dominant hand function [r = -0.244] in skilled tailors and [r = -0.272] in expert tailors, whereas a weak positive correlation [r = 0.279] in master tailors. The negative correlation among the skilled and expert tailors indicates that subjects with forward head posture has decreased hand function. On the other hand the positive correlation among master tailors indicates that subjects with forward head posture has good hand function even though it is not statistically significant.

The occupation of tailoring may contribute to the development of musculoskeletal disorders because of working in awkward and static postures with poorly designed seat or table adjustments.[2] Tailors face so many health-related problems characterized by static sitting posture, a forward inclined posture of the head and trunk of relatively uncomfortable ankle and knee angles. 35% of tailors have pain due to simultaneous hand and arm movements and the continuous operation of foot pedals.[7] CVA is defined as the angle formed at the intersection of a horizontal line through the spinous process of C7 and the line to the tragus of the ear. This provides an estimation of the neck on upper trunk positioning. A decrease of the CVA indicates a more forward head posture.[8] A study conducted by Zahra Salahzadeh *et al*[9] supports the use of photogrammetric methods to assess FHP. This study defined forward head posture as any alignment in which the external auditory meatus is positioned anterior to the plumb line through the shoulder joint. Nine hole peg test is a frequently used dexterity task in many clinical populations. Advantages include the simple, cheap, easy to administer and time efficient. NHPT despite potentially provide valuable information relating to upper limb dexterity, especially among persons with a neurological dysfunction.[10] Previous study

states that forward head posture changes the biomechanical stress of cervical spine and leads to musculoskeletal disorders such as cervical pain, headache, temporomandibular and muscular dysfunction.[6]

Similar to the results of Shaksi jain *et al* the current study findings among skilled and expert tailors reported that with forward head posture there can be alterations in hand functions which can result in decreased hand function, clinically even though it was a mid negative correlation.[6] The sustained static posture of the head can negatively affect the nerves and other soft tissue structures in the upper quadrant may be a possible reason for resultant arm and hand dysfunctions. Studies shows that the FHP can reduce the hand function due to compromised.

Among the master tailors the results shows no significant correlation between FHP and hand function. This contrast results obtained from the master tailors may be due to the fact that they were the study sample group who were engaged more in hand activities such as cutting, folding etc compared to the other groups. And this repeated hand activities found to nurture the hand muscle strength which could be explained by the study of Adel Alshahrani *et al*[11] who did not found any significant correlation between FHP and CVA. The repeated static muscle contractions maintain the strength in the hand muscles which may improve hand function. In addition, Jean Wessel[12], reporterd that increased hand activities may lead to strength changes in hand muscles, which may be also a possible reason to connect our results among master tailors.

The current findings are supported by Dalia Mohammed Mosaad *et al*[13] , who observed that forward head posture (FHP) did not affect hand function and found no significant correlation with craniovertebral angle (CVA). Similarly, the present study revealed that hand function in master tailors was not influenced by FHP, which may be attributed to the repetitive nature of hand activities that help preserve hand functionality. Although weak positive and negative correlations were observed among the tailor groups, these were not statistically significant. Clinically, however, the overall findings suggest that FHP does not impact hand function in tailors. The weak statistical correlations may be due to factors such as sample size bias, participants' physical fitness, and variations in workstation ergonomics. Future research should explore these variables further, including workstation setup, years of experience, and the specific nature of tailoring tasks.

CONCLUSION

The present study concluded that there is no significant correlation between forward head posture and hand function in Skilled, Expert and Master Tailors.

List of Abbreviations

CVA: Cranio-Vertebral angle

FHP: Forward Head Posture

NHPT: Nine Hole Peg Test

WRMD: Work-related musculoskeletal disorders

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Conflict of Interest

The authors agree that there were no competing interests.

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