

ASSOCIATION BETWEEN FORWARD HEAD POSTURE AND CERVICAL DISABILITY IN FEMALE PHYSIOTHERAPY STUDENTS

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Abstract:

Background: Forward head posture (FHP) occurs when the head is positioned structurally away from the body's midline, with the upper cervical vertebrae stretched and the lower cervical vertebrae bent, increasing the weight of the head being supported by the neck.

Objective: The current study sought to investigate the relationship between neck impairment and the degree of forward head position.

Methods: The craniovertebral angle was used to quantify the degree of forward head posture in standing and sitting position, and neck discomfort and functional impairment were measured using neck disability indices. A total 201 subjects aged 19 to 24 years were chosen for this study.

Results: In contrast to 60.1 ± 7.1 in the sitting position, the CVA of the individuals were 62.5 ± 4.5 while standing. The standing position CVA and NDI correlation coefficient

analysis revealed $r=-0.46$, showing a substantial negative association, whereas in sitting position $r=-0.29$ was discovered, indicating a similarly significant negative correlation.

Conclusion: The findings of this study showed that there is an association between FHP and neck impairment. To avoid postural deformity, postural pain syndrome, and functional incapacity, proper postural habits and posture training activities are advised.

Key Words: Forward Head Posture, FHP, Cervical disability, physiotherapy, Neck Disability Index, NDI

Introduction

Adolescence is characterized by poor posture, especially in those with prolonged and repeated exposure to monitors. This has been linked to visual display terminal syndrome. (1) The persistent usage of smart phones exposes users to cumulative trauma disorder brought on by holding the same position. (2) Because the head carries 1/7 of the body's weight, keeping a motionless position with the head tilted forward requires 3.6 times as much power as maintaining the same position when standing straight. (3) A forward head posture (FHP) occurs when the head is positioned structurally away from the body's midline, with the upper cervical vertebrae stretched and the lower cervical vertebrae bent, increasing the weight of the head being supported by the neck. In addition to active myofascial trigger points of the suboccipital muscle, which may cause tension-type headaches, neck pain, and cervical headaches, the bending moment of the head places pressure on the muscles and joints surrounding the cervical vertebra (4). This also limits the neck's range of motion. (5) The upper cervical vertebrae comparatively protrude forward as the face directs upwards as a compensatory response for the postural abnormality of FHP. Severe extension develops between the upper cervical joint and atlanto-occipital joint as a result. Upper-crossed syndrome (6) is caused by a change in the curvature of the neck bone (change in the curvature of the neck bone), which then results in improper shoulder position. (7)

Janda coined the term upper-crossed syndrome to characterize the co-occurrence of FHP and rounded shoulder. (8) Fernández-delas-Peas and other researchers have shown that FHP causes tension headaches. Therefore, FHP is linked to issues with the neck bone and produces neck pain as a result of an imbalance between the curvature of the spine and muscles that are tied to the neck bone. While several interventional trials are being conducted to enhance FHP. The purpose of the current study was to use objective

data to precisely analyse the relationship between neck discomfort, disability, and degree of FHP.

Methodology

Data was sought from 201 female physiotherapy college students; aged 19 to 24, who were enrolled in DPT program at the Women Institute of Rehabilitation Sciences, Abbottabad. The data was gathered between April 2022 and November 2022 following guided protocols and ethical considerations. All individuals were given a thorough explanation of the study goals and methods before willingly deciding to participate in it through an informed consent. A formal ethical approval was sought from Institutional Review Board of Women Institute of Rehabilitation Sciences Abbottabad (Ref. No 1846). The individuals' general parameters, such as age (22.7 ± 2.3 years), height (169.4 ± 5.9 cm), and weight (65.2 ± 12.9 kg), were measured. The research did not include participants who had neurological issues, had undergone spinal surgery, routinely took painkillers, or had any other intrinsic spinal deformities.

The cranio-vertebral angle was measured on participants in standing and sitting positions. The standard was a plumb line, and a thread with a pendulum was fastened to the ceiling to measure the craniovertebral angle (CVA) of Foerwad Head Posture. Each participant had a landmark fastened on their seventh neck bone and tragus, and a digital camera was placed 1.5 meters distant from their sides while remaining horizontally level with the landmark. In order to preserve natural head posture while posing for the camera, subjects were advised to adopt a self-balancing stance in which they were to relax their arms to their sides and bend and extend their heads no more than three times. The individuals were asked to concentrate their gaze on the mirror in order to prevent posture shift. The axis of the goniometer was placed on the spinous process C7 while the stable arm was placed horizontally at C7 level and movable arm at the tragus of the ear. The resulting angle was measured. (10, 11) CVA is the angle formed when the landmark on the seventh neck bone and the line connecting it to the tragus are intersected by a horizontal line drawn perpendicular to the plumb line. (12,13) An increase in the bend of the lower cervical vertebrae is indicated by a lower CVA. (14) After this, Neck Disability Index questionnaire was distributed to the participants and were asked to fill the form by them. The neck disability indices (NDI) were used to quantify neck pain and functional impairment. They consisted of 10 categories, each of which was scored from 0 to 5, for a

total of 0-50: degree of pain, daily living, lifting, reading, headache, attention level, job, driving, sleep, and leisure activity. The disability ranges were 0–4 for no disability, 5–14 for a mild disability, 15–24 for a moderate disability, 25–34 for a severe impairment, and 35 for a whole disability. (15)

Using SPSS version 25, the mean values and standard deviation of the measured data were computed. The associations between NDI, CVA when sitting, and CVA while standing were examined using Pearson's correlation analysis. The thresholds for all statistical significance were 0.05.

Results:

In contrast to 60.1±7.1 in the sitting position, the CVA of the individuals was 62.5±4.5 while they were standing. Standing position CVA and NDI correlation coefficient analysis revealed r=-0.46, showing a substantial negative association, whereas sitting position r=-0.29 was discovered, indicating a similarly significant negative correlation.

Table 1. CVA values measured in standing/ sitting and NDI

Standing CVA	Sitting CVA	NDI
62.5±4.5	60.1±7.1	5.1±4.1

Table 2. Correlation between NDI and CVA

	Standing CVA	Sitting CVA	NDI	P value
Standing CVA	1			0.001
Sitting CVA	0.91	1		
NDI	-0.46	-0.29	1	

Discussion:

In order to gauge the level of FHP, 201 female students were enlisted as participants for the current study, and their CVA was assessed both while standing and when sitting. These associations were also looked into since it was thought that CVA can

have an impact on how much neck discomfort a person experiences. In this study CVA was 60.1 ± 7.1 in the sitting position and the CVA of the individuals was 62.5 ± 4.5 while they were standing. The limit of FHP was established by Nemmers and others at 53° of CVA. (4) Yip and colleagues (5) did not offer a specific angle range to detect FHP, despite their suggestion that a lower CVA was associated with a higher frequency of neck discomfort. Gore and colleagues (16) defined FHP as having a neck bone joint operating at range less than 70° and a cervical lordosis angle less than 21° .

Standing position CVA and NDI correlation coefficient analysis revealed $r = -0.46$, showing a substantial negative association, whereas sitting position $r = -0.29$ was discovered, indicating a similarly significant negative correlation. The value of NDI was 5.1 ± 4.1 , which was in mild disability range. As a reduction in CVA due to FHP can be shown to produce neck discomfort, a negative association between CVA and neck pain was found between standing and sitting positions. In other words, it indicates the FHP angle at which neck discomfort and impairment start to manifest.

Without any inducer, FHP at which the head bending moment rises exerts pressure on extensors such as the semispinalis capitis and levator scapulae muscles. Furthermore, the muscles in the back of the neck get tired from holding the stretched position to change the eye level. (5) Additionally, a reduction in CVA caused by FHP results in physiological restrictions because of the added strain on the facet joint, which raises the probability of discomfort. Silva and others found that FHP results in physiological restrictions, including excessive pressure on the facet joint, extension of the neck muscles, and shortening of the tail muscles, all of which produce discomfort because of an overly tightening of the capsular ligament. (7) Chronic tensional headaches may result from an increase in the active myofascial trigger points of the sub occipital muscle caused by FHP, and Martin-Herrero and others have shown a proportionate link between NDI and the Pittsburg sleep quality index. (16)

The findings of this study showed a connection between FHP and neck discomfort and impairment. To avoid postural deformity, postural pain syndrome, and functional incapacity, proper postural habits and posture training activities are advised.

Ethics Statement and Approval:

This study aims to investigate the potential association between forward head posture and cervical disability in female physiotherapy students. The following outlines the ethical considerations for this research project.

a. Informed Consent:

- All participants were provided with a detailed written informed consent form explaining the study's purpose, procedures, potential risks and benefits, and their right to withdraw at any point.
- The consent form clarified that participation is voluntary and anonymous.
- Only participants who provided written informed consent were included in the study.

b. Privacy and Confidentiality:

- All data was collected anonymously. No identifiable information was linked to participants.
- Data was stored securely and confidentially according to institutional guidelines.
- Participant confidentiality was maintained throughout the research process and in any publications resulting from this study.

c. Inclusion and Exclusion Criteria:

The study has clearly defined the inclusion and exclusion criteria for participation.

- Inclusion Criteria: The study included female physiotherapy college students; aged 19 to 24, who were enrolled in DPT program at the Women Institute of Rehabilitation Sciences, Abbottabad primarily to check for the forward head posture in young physiotherapy students who would be treating the case in future.
- Exclusion Criteria: The research did not include participants who had neurological issues, had undergone spinal surgery, routinely took painkillers, or had any other intrinsic spinal deformities.

d. Risk and Minimization:

- The study procedure was non-invasive and pose minimal risk to participants.

- Any potential discomfort or inconvenience associated with posture assessments or questionnaires were explained.
- Researchers were prepared to address any participant concerns and provide appropriate referrals if needed.

e. Vulnerable Populations:

- As the study focuses on physiotherapy students, it was unlikely to involve a vulnerable population. However, researchers were mindful of any potential power dynamics between themselves and participants.

f. Data Analysis and Dissemination:

- The plan for data analysis was outlined, ensuring anonymity and adherence to ethical research practices.
- Findings were disseminated through reports, presentations, or publications adhering to ethical publication guidelines.

g. Ethical Review:

- This study was submitted for review and got subsequent approval from the Institutional Review Board (IRB) of Women Institute of Rehabilitation Sciences, Abbottabad with Reference No. 1846 (attached in supplementary materials).

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