

Assessment of Forward Head Posture in UG Physiotherapy Students Using Prescription Eyeglasses

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ABSTRACT

BACKGROUND: Forward head posture (FHP) is a common postural deviation characterized by the anterior displacement of the head relative to the thorax. It is associated with various musculoskeletal disorders, including neck pain, headaches, and shoulder pain. While the role of prescription eyeglasses in FHP has been debated, this study aimed to investigate this association among undergraduate physiotherapy students.

METHODOLOGY: A sample of 235 undergraduate physiotherapy students, aged 17 to 25 from Lokmanya Tilak College of Physiotherapy Kharghar was enlisted for this study. To evaluate the impact of the intervention, two primary outcome measures were employed: a self-designed questionnaire to collect subjective data on posture and pain, and photogrammetric measurement of the cranio-vertebral angle using KINOVEA software to objectively assess postural alignment.

RESULT: The statistical analysis shows that there is no significant difference in the P value of Craniovertebral Angles of students with and without glasses.

CONCLUSION: In conclusion, our study investigated the relationship between forward head posture (FHP) and prescription eyeglass use, focusing specifically on undergraduate physiotherapy students. In our total sample of 235 students, 44.6% of students had a forward head posture. Among the group of students who wear prescription glasses, 42.1 % had a forward head posture, and among the group of students who do not wear prescription eyeglasses, 46.5% of students had a forward head posture. Analysing data from 235 participants, including 107 eyeglass users, there was no statistically significant difference in Forward head Posture between Undergraduate Physiotherapy students wearing prescription eyeglasses and those not wearing them.

Keywords: Forward Head Posture, Cervical, Kinovea, Prescription Eye-glasses, Physiotherapy Students, FHP, Posture, Neck

INTRODUCTION

Forward head posture (FHP) involves a misalignment of the head and neck, characterised by hyperextension of the upper cervical spine and flexion of the lower

cervical spine. This positioning results in anterior displacement of the head relative to the thorax. This misalignment places abnormal weight-bearing on the cervical spine and leads to muscle imbalances and

shortened muscles, which can decrease muscle endurance and lead to pain over time. [1,2,3,8] Individuals with FHP commonly experience a range of symptoms and musculoskeletal disorders, including neck pain [4,5], headaches [6], shoulder pain, and temporomandibular joint dysfunction. [7]

While various factors influence FHP, recent attention has turned toward the role of corrective eyewear among individuals with refractive errors.

Errors of refraction are common vision problems that occur when the shape of the eye prevents light from focusing directly on the retina. These errors can lead to blurred vision and difficulty seeing objects clearly at various distances. The major types of refractive errors include Myopia or Near-sightedness, Hyperopia or Far-sightedness, Astigmatism, and Presbyopia.

Treatment for these typically requires prescription eyeglasses with lenses that compensate for the specific refractive error and can provide clear vision.

There has already been a study conducted, comparing forward head posture only between people who use multifocal lenses with people who do not. [3] No study has directly compared individuals who use prescription eyeglasses with those who do not use them in terms of FHP incidence. Individuals with refractive errors often adopt compensatory head positions to better focus on objects at a distance. Since distant objects appear blurry, those with myopia/astigmatism may tilt their heads in an attempt to maintain a clear line of vision perfectly aligned to the object they are focusing their vision on. [1] This abnormal head posture can contribute to the development of forward head posture (FHP). The craniovertebral angle (CVA) is an angle between a straight line connecting the spinous process of the C7 vertebra to the tragus of the ear and a horizontal line passing through the C7 vertebra. The normal craniovertebral angle is 50°. Any angle less than 50° signifies forward head posture, as the head is positioned anteriorly relative to the cervical spine. Conversely, a normal or

increased CVA indicates a more neutral head position. It is the most common and validated measure of forward head posture. [9] Measurement of the craniovertebral angle using lateral/sagittal photographs is reliable and valid. [10] Kinovea software is validated to measure angles. [11]

MATERIALS & METHODS

This study uses a comparative study design to assess forward head posture in Undergraduate Physiotherapy Students.

A purposive sampling technique was utilized to recruit a sample of 235 undergraduate physiotherapy students from Lokmanya Tilak College of Physiotherapy. Participants were included based on specific criteria, including age (17-25 years), and excluded based on criteria such as pre-existing spinal deformities or recent trauma Any acute or chronic trauma to the spine, shoulder, head, face, or neck, Any recent fracture of the spine, shoulder, head, face, or neck and use of eyeglasses for less than 1 year.

To evaluate the impact of the intervention, two primary outcome measures were employed: a self-designed questionnaire to collect subjective data on posture and pain, and photogrammetric measurement of the cranio-vertebral angle using KINOVEA software to objectively assess postural alignment.

After obtaining informed consent, participants completed a self-designed questionnaire to collect demographic and lifestyle information. Eligible participants underwent photogrammetric measurement of the craniovertebral angle in both sagittal views. Images were captured using a phone mounted on a tripod, ensuring standardized conditions. KINOVEA software was utilized to measure the angle from the images. Participants were then divided into two groups based on their reported use of prescription eyeglasses. Statistical analysis was performed using Microsoft Excel and GraphPad Prism to analyze the data.

RESULT

The present study was conducted on 235 Undergraduate Physiotherapy students. The criteria put forth included students from the

age group of 17-25. The Following Data shows the necessary Details taken into account for the study.

AGE GROUP DISTRIBUTION

Age group	17	18	19	20	21	22	23	24	25
No. of students	3	21	47	40	52	39	26	6	1

Table.1 depicts the number of students in a particular age group

GENDER DISTRIBUTION

Gender	Male	Female
No. of students	47	188

Table.2 depicts Gender distribution of the students

DOMINANCE

Dominance	Right	Left	Ambidextrous
No. of People	227	7	1

Table.3 depicts the dominance of the students.

STUDY TIME PER DAY

Hours	Less than one	Two to Five	More than five
No. of students	15	178	42

Table.4 depicts the number of hours the students are studying in a day

SCREEN TIME

Hours	Less than one	Two to Five	More than five
No. of students	23	181	31

Table.5 depicts the number of hours the students are using a screen such as mobile phone/computer/tablet in a day

EYEGLOSS USAGE

Eyeglass usage	Yes	No
No. of Students	107	128

Table.6 Shows the percentage of students that wear or do not wear eyeglasses

CRANIOVERTEBRAL ANGLE OF ALL STUDENTS

CVA	No. of Students
32.67-35.33	1
35.33-38.00	7
38.00-40.67	6
40.67-43.33	11
43.33-46	28
46-48.67	34
48.67-51.33	49
51.33-54.00	29
54.00-56.67	32
56.67-59.33	18
59.33-62.00	8
62.00-64.67	8
64.67-67.33	2
67.33-70	1

Table.7 Shows Craniovertebral Angles of all Participants

CRANIOVERTEBRAL ANGLE OF STUDENTS WITHOUT GLASSES

CVA	No. of Students
30-33.64	1
33.64-37.27	3
37.27-40.91	6
40.91-44.55	15
44.55-48.18	18
48.18-51.82	34
51.82-55.45	24
55.45-59.09	18
59.09-62.73	6
62.73-66.36	3
66.36-70	1

Table.8 Shows Craniovertebral angle of students without glasses

CRANIOVERTEBRAL ANGLES OF STUDENTS WITH GLASSES

CVA	No. of Students
35-38.50	1
38.50-42	6
42-45.50	9
45.50-49	26
49-52.50	28
52.50-56	15
56-59.50	14
59.50-63	5
63-66.5	4

Table.9 Shows Craniovertebral Angles of Students with Glasses

MEAN CRANIOVERTEBRAL ANGLE

Groups	Students not using Prescription eyeglasses	Students using Prescription eyeglasses
Mean CVA	50.28	51.06

Table.10 Shows Mean Craniovertebral Angle of the Two groups

PRESENCE OF FORWARD HEAD POSTURE IN ALL STUDENTS

FHP	Present	Absent
No. of Students	104	129

Table.11 Shows Presence of Forward Head Posture in All Students

PRESENCE OF FORWARD HEAD POSTURE IN STUDENTS WHO DO NOT USE GLASSES

FHP	Present	Absent
No. of Students	59	68

Table.12 Depicts the Presence of Forward Head Posture in Students who do not use glasses

PRESENCE OF FORWARD HEAD POSTURE IN STUDENTS WHO USE GLASSES

FHP	Present	Absent
No. of Students	45	62

Table.13 Shows the Presence of Forward Head Posture in Students who use glasses

P-VALUE

The Data was analysed using independent t-test to find the p-value.

Unpaired t test	
P value	0.3566
P value summary	Not Significant
Significantly different (P < 0.05)?	No
One- or two-tailed P value?	Two-tailed
t, df	t=0.9236, df=233
How big is the difference?	
Mean CVA of Students with Glasses	51.06
Mean CVA of Students without Glasses	50.28
Difference between means (T - S) ± SEM	-0.7749 ± 0.8390
95% confidence interval	-2.428 to 0.8780
R squared (eta squared)	0.003648
F test to compare variances	
F, DFn, Dfd	1.126, 127, 106
P value	0.5283
P value summary	Not Significant
Significantly different (P < 0.05)?	No

Table.14 Shows the P value

RESULT

The statistical analysis shows that there is no significant difference in the P value of Craniovertebral Angles of students with and without glasses.

DISCUSSION

In this study, we investigated the association between forward head posture (FHP) and the use of prescription eyeglasses among undergraduate (UG) physiotherapy students. Our study employed reliable and validated methods for assessing forward head posture, the photogrammetry technique to measure the craniovertebral angle.

A total sample size of 235 individuals was included for analysis. The age group was between 17-25 years (Table 1). In terms of gender distribution, the majority of participants were female, comprising 188 individuals, which accounts for approximately 80% of the total sample. Male participants constituted a smaller proportion, 47 individuals, representing approximately 20% of the sample (Table. 2). Regarding handedness, the vast majority of participants reported being right-dominant, with 227 individuals indicating right-hand dominance, while only 7 individuals reported left-hand dominance. One person reported being

ambidextrous. (table.3) Among 235 participants, 107 reported wearing eyeglasses, representing approximately 45.5% of the total sample (Table 6).

Contrary to our initial hypothesis, our findings indicate that there is no significant difference in the degree of forward head posture between UG physiotherapy students using prescription eyeglasses and those not using them.

The absence of a significant difference in FHP between eyeglass users and non-users in our study may have several explanations. It is important to consider that our study population consisted of physiotherapy students, who are likely to have a heightened awareness of posture-related issues and potentially greater adherence to ergonomic principles in their daily activities. This awareness and adherence may have contributed to the lack of significant differences observed, as these students might implement strategies to mitigate the impact of eyeglass use on their posture. The education and training received by physiotherapy students emphasize the importance of maintaining proper posture and could lead to behaviours that counteract the potential postural deviations associated with eyeglass use.

Other factors such as ergonomic practices, physical activity levels, or individual variations in posture, possibly play a more prominent role in determining head posture among physiotherapy students. The forward head is common in university students. [17][18]

With the widespread use of electronic devices, people often spend significant amounts of time looking down at screens. This constant downward gaze places strain on the neck muscles and contributes to FHP.[19] Sitting in improper ergonomic positions while studying, typically hunched over desks or screens, strains the neck muscles and encourages FHP.[20] Carrying heavy backpacks filled with textbooks and school supplies places additional stress on the neck and shoulder muscles, contributing to forward head positioning.[21] Insufficient physical activity and sedentary behaviours – common among students during study sessions or leisure time – lead to muscle weakness and imbalance, further exacerbating FHP. Moreover, academic stress and pressure can manifest as tension in the neck and shoulder muscles, promoting poor posture habits.

It is also important to note that a significant population of eyeglass users in our sample was not using eyeglasses for a prolonged period, and that could have also influenced the results.

This underscores the complexity of factors influencing postural alignment among physiotherapy students.

While previous literature has suggested a potential relationship between wearing eyeglasses and altered head posture, our study suggests that other variables, such as ergonomic practices, physical activity levels, or individual variations in posture, may exert a stronger influence on forward head posture in this population. Clinicians should consider a multi-factorial approach when assessing and managing postural issues in this population, taking into account factors beyond visual correction alone.

LIMITATIONS

The cross-sectional design of the study limits the ability to establish causal relationships between eyeglass use and forward head posture. Longitudinal studies would be needed to determine the temporal relationship between these variables. This study compares myopic individuals with and without prescription eyeglasses, there may be other factors contributing to forward head posture that are not adequately addressed by the control group. For example, individuals without eyeglasses may still experience visual strain or adopt compensatory postures for other reasons. Photogrammetry relies on the analysis of static images captured in a single plane, which may not fully represent the dynamic nature of posture and movement. Additionally, factors such as camera angle, positioning, and focal length can introduce distortions or tilts in the images, leading to inaccuracies in posture measurements. While photogrammetry is a convenient and non-invasive method for assessing forward head posture, there is potential for measurement errors, and complementary techniques, such as three-dimensional motion analysis, can be considered to capture more comprehensive data on postural alignment. Measuring CVA on radio graphs is also more accurate. The study did not account for potential differences in eyeglass characteristics, such as lens type, frame design, or fit, which may influence their impact on forward head posture.

CONCLUSION

In conclusion, our study investigated the relationship between forward head posture (FHP) and prescription eyeglass use, focusing specifically on undergraduate physiotherapy students. In our total sample of 235 students, 44.6% of students had a forward head posture. Among the group of students who wear prescription glasses, 42.1% had a forward head posture, and among the group of students who do not wear prescription eyeglasses, 46.5% of students had a forward head posture. Analysing data

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Declaration by Authors

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