International Journal of Yoga, Physiotherapy and Physical Education
www.sportsjournal.in
ISSN: 2456-5067
Received: 09-11-2025, Accepted: 08-12-2025, Published: 23-12-2025
Volume 10, Issue 4, 2025, Page No. 93-98

Prevalence of forward head posture in college students wearing spectacles with myopia of Navsari District: A cross sectional study

Dr. Neha V Vaidhya, Neha K Prajapati, Binita J Tailor
Assistant professor**,** M. B. Gohil Institute of Medical Science and Research Center College of Physiotherapy, Navsari, Gujarat, India

Abstract

Background

Forward Head Posture (FHP) is a common postural deviation characterized by anterior positioning of the cervical spine, often linked to prolonged screen use and poor ergonomics. Myopia, a prevalent refractive error, may exacerbate FHP due to altered visual alignment. This study aimed to assess the prevalence of FHP among college students wearing spectacles for myopia in Navsari district.

Methods

A cross-sectional study was conducted on 305 college students (18–27 years) wearing spectacles for myopia (0D to -6.0D). Craniovertebral Angle (CVA) was measured using a modified universal goniometer, and Neck Disability Index (NDI) scores were recorded. Data were analyzed using SPSS v16.

Results

FHP prevalence was 71.47% (n=218), with higher occurrence in females (62.39%). Most participants (44.95%) were aged 20–22 years. Longer spectacle-wearing duration (14–17 hours/day) correlated with severe FHP (41.74%). Moderate myopia (-1.5D to -6.0D) showed stronger FHP association (68.81%). A negative correlation was found between CVA and spectacle-wearing duration ($p<0.05$).

Conclusion

FHP is highly prevalent among myopic college students, particularly females and long-term spectacle users. Preventive measures, including ergonomic adjustments and postural exercises, are recommended.

Keywords: Forward head posture, myopia, craniovertebral angle, neck disability index, postural deviation

Introduction

Forward Head Posture (FHP) is a prevalent postural deviation characterized by the head projecting forward, resulting in abnormal stress on the cervical musculature and causing muscle imbalance [1]. This postural anomaly can lead to a multitude of issues, including pain, deformity, and increased risk of musculoskeletal and neurological problems, ultimately affecting overall quality of life [2]. FHP is particularly common among university students who spend extended periods studying, often resulting in prolonged periods of poor posture that can exacerbate the condition [6]. The weight of the head, approximately 1/7 of the body weight, exerts a significant force on the neck and spine, especially when leaning forward, which can further contribute to the development of FHP [8].

FHP can be assessed using various methods, each with its own advantages and limitations. Photogrammetry is a technique that measures posture angles through photographs, providing a non-invasive and relatively accurate assessment of head posture [9]. Goniometry is another technique that utilizes a device to measure joint range of motion and angles, allowing for precise evaluation of cervical spine mobility and posture [10]. Radiographic techniques, such as X-rays, can also evaluate head posture, although they may not always be practical due to radiation concerns and cost [11]. The craniovertebral angle (CVA) is a reliable measure of head posture, with values less than 48-50 degrees indicating FHP [12]. A modified universal goniometer can accurately measure CVA, providing valuable insights for diagnosis and treatment [11].

Myopia, a common refractive error, can contribute to FHP due to the negative effect on deep neck flexor muscles [17]. People wearing spectacles with myopia may experience these effects, impacting cervical spine health and posture [17]. The Neck Disability Index (NDI) is a useful tool for assessing disability levels in patients with neck pain, providing valuable insights for treatment and management [20]. NDI scores range from 0-50, categorizing disability levels from no disability to complete disability, and helping healthcare professionals develop targeted interventions [20].

Overall, FHP is a significant postural issue that requires attention to prevent long-term consequences, such as chronic pain and spinal deformities. Understanding FHP and its causes can help individuals take proactive steps to maintain good posture and reduce the risk of related problems. By addressing FHP through proper assessment, diagnosis, and treatment, individuals can improve their overall quality of life and reduce the risk of musculoskeletal and neurological complications.

Methods and Materials

This study aims to investigate the prevalence of Forward Head Posture (FHP) among college students in Navsari district who wear spectacles with myopia. FHP is a common postural deviation that can lead to musculoskeletal and neurological problems. The study's objectives are:

1. To measure the craniovertebral angle in college students wearing spectacles with myopia, which will help assess the severity of FHP.
2. To evaluate the prevalence of FHP in this population, which will provide insights into the relationship between myopia, spectacle use, and head posture.

The study is necessary due to the limited research on FHP and its correlation with myopia and spectacle use among college students in the Navsari district. By exploring this relationship, the study aims to contribute to the development of strategies for preventing and managing FHP in this population.

This cross-sectional study was conducted over six months among 288 college students from various institutions in Navsari District. Participants included students aged 18–27 years from humanities, basic science, medical, and paramedical streams who had been wearing myopic spectacles (0 to -6.0 D) for over two years, at least 8 hours a day, and had a Neck Disability Index (NDI) score of less than 4. A convenient sampling method was used. Students with serious musculoskeletal conditions, history of neck or thoracic injury or surgery, congenital abnormalities, or those undergoing treatment or engaging in regular exercise were excluded. Materials used included a modified universal goniometer, assessment forms, and basic anthropometric tools.

The study measured the Craniovertebral Angle (CVA) using a Modified Universal Goniometer to assess head and neck alignment. Here's a detailed overview:

1. **CVA Measurement:** The CVA is a clinical measurement that assesses the alignment of the head and neck. It is defined as the angle formed between a line connecting the Tragus of the ear and the C7 spinous process.

2. **Procedure:**
- Written and informed consent was obtained from all 288 subjects, ensuring adequate privacy and confidentiality.
- The subjects' height and weight were measured, and demographic details were recorded.
- Each subject filled the Neck Disability Index (NDI) questionnaire to assess disability levels.
- The CVA was measured three times using a Modified Universal Goniometer to ensure accurate and reliable data.

3. **CVA Measurement Technique:**
- The tragus of the ear was used as a reference point, as it is visible and moves in direct relation to the skull.
- The spinous process of C7 was used as another reference point for the lower cervical spine, as it can be easily located by palpation.
- The craniovertebral angle was measured in degrees between a horizontal line passing through the spinous process of C7 and the line joining the tragus of the ear.

4. **CVA Interpretation:** An angle of less than 50° was considered indicative of forward head posture. The study aimed to evaluate the prevalence of forward head posture in college students with myopia and explore its correlation with spectacle use.

The CVA measurement has excellent inter-rater reliability, with an Intraclass Correlation Coefficient (ICC) of 0.85-0.95 and a Kappa coefficient of 0.7-0.9, indicating good to excellent reliability.

Fig 1: CVA Measurement

Fig 2: CVA Measurement

Results

Table 1: Prevalence of FHP and distribution of FHP in accordance to gender

Total	305 (100%)		Percentage
FHP Present	218 (71.47%)	Male- 82	37.61%
		Female- 136	62.39%
FHP Absent	87 (28.52%)	Male- 44	50.57%
		Female- 43	49.43%

Table no.1 showed that among 305 individual wearing spectacles with myopia, 218 individual had FHP. Hence the prevalence that was found was 71.47% and highest among females 62.39%.

Table 2: Age Group-wise distribution of FHP

Age Group (years)	No of Subjects	FHP Present	Percentage	Mean ± SD
18-20	112	82	37.61%	20.1410±1.64930
20-22	140	98	44.95%	
22-24	45	31	14.22%	
>24	8	7	3.21%	
Total	305	218	100%	

Table no 2, It is observed that out of 218 subjects with FHP maximum 98(44.95%) in the age group of 20-22, 82(37.61%) at the age group of 18-20, 31(14.22%) at the age group of 22-24 and 7(3.21%) at the age group of >24. The mean and standard deviation is 20.1410±1.64930

Table 3: Distribution of FHP in accordance to duration of hour's subject wearing a spectacles per day

Groups (Hours)	No of Subjects	FHP Present	Percentage	Mean ± SD
8-11	113	67	30.73%	12.9475±3.66489
11-14	46	29	13.30%	
14-17	110	91	41.74%	
>17	36	31	14.22%	
Total	305	218	100%	

Table no 3, It is observed that out of 218 subjects with FHP 41.74% subjects reported wearing spectacles for 14-17 hours per day, while 30.73% wore spectacles for 8-11 hours per day, 13.30% wore spectacles for 11-14 hours per day and lastly remaining 14.22% wore spectacles more than 17 hours per day. The mean and standard deviation is 12.9475±3.66489.

Table 4: Distribution of FHP in accordance to duration of years

Groups (Years)	No of Subjects	FHP Present	Percentage	Mean ±SD
2-7	215	140	64.22%	5.2846±3.32472
7-12	71	61	27.98%	
12-17	18	16	7.61%	
>17	1	1	0.48%	
Total	305	218	100%	

In the table 4, The data reveals that among the 218 participants with forward head posture, the majority (140, 63.22%) had been wearing spectacles for 2-7 years, followed by 61 (27.98%) for 7-12 years, 16 (7.61%) for 12-17 years, and only 1 (0.48%) for more than 17 years. The mean duration of spectacle wear was 5.28 years (SD = 3.32), indicating a relatively short to moderate duration of spectacle wear among the participants.

Interpretation: In the table 5, The data reveals that the refractive error of the participants ranged from -1 to -6 diopters. The majority (150, 68.81%) had a refractive error between -1.5 to -6.0 diopters, while 68 (31.19%) had a refractive error between -1 to -1.5 diopters. The mean refractive error was -2.06 diopters (SD = 1.23), indicating a moderate level of myopia among the participants.

Table 5: Distribution of FHP in accordance to degree of myopia (RT)

Group	Subjects	FHP Present	Percentage	Mean ± SD
0 to -1.5	124	68	31.19%	-2.0614±1.23268
-1.5 to -6.0	181	150	68.81%	
Total	305	218	100%	

Table 6: Distribution of FHP in accordance to degree of myopia (Lt)

Group	Subjects	FHP Present	Percentage	Mean ± SD
0 to -1.5	142	82	37.61%	1.8903±1.21117
-1.5 to -6.0	163	136	62.39%	
Total	305	218	100%	

Interpretation: In table 6, the data reveals that the refractive error of the participants ranged from -1 to -6 diopters. The majority (136, 62.39%) had a refractive error between -1.5 to -6.0 diopters, while 82 (37.61%) had a refractive error between -1 to -1.5 diopters. The mean refractive error was -1.89 diopters (SD = 1.21), indicating a moderate level of astigmatism among the participants.

Table 7: Test of normality

Kolmogorov-Smirnov[a]			
	Statistic	**df**	**Sig.**
Age	.141	305	.000
BMI	.105	305	.000
SpecsHrs	.160	305	.000
SpecsYrs	.178	305	.000
REright	.118	305	.000
REleft	.133	305	.000
CVA	.120	305	.000

Table presents the results of a Kolmogorov-Smirnov test. The table includes variables such as Age, BMI, SpecsHrs, SpecsYrs, REright, REleft, and CVA. For each variable, the table lists the Kolmogorov-Smirnov statistic, degrees of freedom (DF), and significance (Sig.). The significance values are uniformly .000, indicating that the data for all variables significantly deviate from a normal distribution.

Table 8: Association between duration of spectacles (hours) wearing with respect to CVA

Particulars	**CVA**			**Spectacles (Hours)**		
Spearman's correlation coefficient	r-value	df	p-value	r-value	df	p-value
	1.000	303	-	-0.147	303	0.010
'N' of Validation	305			305		

This table presents the correlation coefficients (e.g., Spearman's rho) between the duration of spectacle wear (hours/day) and the CVA. A negative correlation indicate that longer spectacle wear is associated with a smaller CVA (more severe FHP). The table include p-values to denote statistical significance.

Table 9: Association between duration of spectacles (years) wearing with respect to CVA

Particulars	**CVA**			**Spectacles (Years)**		
Spearman's correlation coefficient	r-value	df	p-value	r-value	df	p-value
	1.000	303	-	-0.282	303	0.000
'N' of Validation	305			305		

The table shows that Spearman's correlation coefficient (r = -0.282) indicates a weak but statistically significant negative relationship between the duration of wearing spectacles (years) and CVA (Convergence Insufficiency Symptom Survey Angle). As the number of years, a person wears spectacles increases, their CVA angle tends to decrease slightly

Table 10: Association between Refractive error (right) with respect to CVA

Particulars	**CVA**			**Refractive error (right)**		
Spearman's correlation coefficient	r-value	df	p-value	r-value	df	p-value
	1.000	303	-	0.289	303	0.000
'N' of Validation	305			305		

The table indicate a statistically significant positive correlation between CVA and refractive error (right eye). The r-value of 0.289 suggests a moderate positive relationship between the two variables. The highly significant p-value (0.000) confirms this correlation.

Table 11: Association between Refractive errors (left) with respect to CVA

Particulars	**CVA**			**Refractive error(right)**		
Spearman's correlation coefficient	r-value	df	p-value	r-value	df	p-value
	1.000	303	-	0.305	303	0.000
'N' of Validation	305			305		

The table shows a moderate positive correlation between refractive error (left eye) and CVA. As refractive error increases, CVA also tends to increase. The highly significant p-value confirms that this correlation.

Discussion

The present study identified a high prevalence (71.47%) of Forward Head Posture (FHP) among college students wearing spectacles for myopia, aligning with existing literature that links prolonged spectacle wear, near-work activities, and screen exposure to altered head and neck positioning. The high prevalence among students is consistent with prior research highlighting that individuals with refractive errors often adapt compensatory head postures to optimize their vision (Withey, 2016). This shift in head positioning can result in increased cervical stress, muscle imbalance, and postural strain over time.

In this study, FHP was found in 62.39% of females and 37.61% of males, indicating a higher prevalence among female students. This gender disparity aligns with Kolhatkar and Rayjade (2021), who found a significantly higher occurrence of FHP in young myopic women. Similarly, Pawalia and Joshi (2019) [21] reported that females had reduced deep neck flexor (DNF) endurance, making them more prone to postural deviations. However, Rajabi *et al.*

(2020) suggested that the influence of educational level and prolonged study time may contribute more significantly to FHP than gender alone, highlighting the need for further investigation into additional risk factors.

The study revealed that FHP was most prevalent in the 20-22 age group (44.95%), followed by 18-20 years (37.61%), 22-24 years (14.22%), and >24 years (3.21%). This trend suggests that the peak prevalence occurs in early adulthood, coinciding with increased academic workload and screen exposure. Naik and Ingole (2018) observed similar patterns among university students, emphasizing that prolonged studying habits significantly contribute to poor posture. However, Farooqui and Khan (2015) [27] argued that FHP may not solely result from prolonged sitting, suggesting that ergonomic habits and lifestyle choices could play a larger role.

A significant association was found between longer spectacle-wearing durations and increased FHP prevalence 41.74% of participants with FHP wore spectacles for 14-17 hours per day 30.73% wore spectacles for 8-11 hours per day 13.30% wore spectacles for 11-14 hours per day 14.22% wore spectacles for more than 17 hours per day These findings align with Thorud *et al*. (2022) [22], who reported that extended spectacle use contributes to musculoskeletal discomfort due to altered neck posture and visual strain. Similarly, Willford *et al*. (1996) [23] demonstrated that multifocal lens users exhibit greater FHP due to head tilting required for proper lens alignment. However, Kim and Kim (2016) [8, 28] found no direct correlation between spectacle wear and FHP, arguing that other ergonomic factors might be more influential.

The study found that 64.22% of participants with FHP had been wearing spectacles for 2-7 years, while 27.98% had worn them for 7-12 years, 7.61% for 12-17 years, and 0.48% for more than 17 years. This suggests that prolonged spectacle use over the years may contribute to postural changes. Bae *et al*. (2020) [24] support this by stating that myopic individuals who consistently wear spectacles over time develop habitual compensatory postures. Conversely, Lord *et al*. (2022) argue that some spectacle wearers might experience postural adaptation that minimizes FHP progression rather than exacerbating it.

The study observed a higher prevalence of FHP among students with greater myopic power 68.81% of participants with FHP had myopia between -1.5D and - 6.0D - 31.19% had myopia between 0D and -1.5D. These findings are supported by Sheppard and Wolffsohn (2018), who demonstrated that individuals with high myopia (-3.0D and beyond) exhibited increased FHP due to the need for closer object positioning and adjusted head posture to accommodate visual clarity.

The study measured Craniovertebral Angle (CVA) to assess FHP severity, with a lower CVA indicating more pronounced FHP. Naik and Ingole (2018) developed a modified universal goniometer for precise measurement, advocating for its clinical application in early diagnosis.

While the study establishes a strong association between FHP and spectacle use, alternative perspectives challenge the causality of this relationship. Farooqui and Khan (2015) [27] argue that postural deviations may result from a combination of factors such as sedentary lifestyle, poor ergonomics, and prolonged screen use, rather than spectacle wear alone. Similarly, Kim and Kim (2016) [8, 28] found no significant correlation between FHP and rounded shoulder posture, suggesting that other postural habits might be at play. Moreover, Bae *et al*. (2020) emphasized that properly corrected vision improves postural stability, indicating that optimal eyewear adjustments could mitigate FHP risks rather than contribute to them.

Further recommendations

1. Longitudinal study to investigate causal links between FHP and spectacle wear.
2. Intervention study to examine effects of modifying spectacle wear on FHP.
3. Comparative analysis across age groups.
4. Qualitative data to gain insights into experiences.
5. Guidelines for optimal spectacle wear.
6. Investigate physical activity, screen time, and ergonomic factors.
7. Predictive model to identify high-risk individuals.
8. Impact on quality of life assessment.

References

1. Silva AG, Johnson G. Does forward head posture affect postural control in human healthy volunteers? Journal of Bodywork and Movement Therapies,2016:20(2):241–246.
2. Naz A, Bashir MS, Noor R. Prevalence of forward head posture among university students. Rawal Medical Journal,2018:43(2):260–262.
3. Silva AG, Punt TD, Sharples P, Vilas-Boas JP, Johnson MI. Head posture assessment for patients with neck pain: Is it useful? International Journal of Therapy and Rehabilitation,2009:16(1):43–53.
4. Karthik V. Prevalence of forward head posture and its association with gender, BMI and neck pain among college going students: A cross sectional study. Journal of Clinical and Diagnostic Research,2017:11(9):1–4.
5. Goswami S, Contractor E. Prevalence of forward head posture among physiotherapy students: a cross-sectional study. International Journal of Health Science Research,2022:12(7):88–92.
6. Rajabi R, Karimizadeh Ardakani M, Minoonejad H, Abshenas E, Naderi Beni M. Comparison of the average forward head angle of male and female students in three educational levels. Journal of Rehabilitation Sciences and Research,2020:7(4):184–188.
7. Abraham M, Sageer MM. Study on prevalence of forward head posture among young individuals wearing eye glasses. International Journal of Medical and Engineering Sciences,2021:7(3):1072–1079.
8. Kim EK, Kim JS. Correlation between rounded shoulder posture, neck disability indices, and degree of forward head posture. Journal of Physical Therapy Science,2016:28(10):2929–2932.
9. Salahzadeh Z, Maroufi N, Ahmadi A. Assessment of forward head posture in females: Observational and photogrammetry methods. Journal of Bodywork and Movement Therapies,2014:18(2):173–178.
10. Lau HM, Chiu TT. Clinical measurement of craniovertebral angle by electronic head posture instrument: A test of reliability and validity. Manual Therapy,2007:12(1):42–48.
11. Naik RV, Ongole PM. Modified universal goniometer for objective assessment of forward head posture in

clinical setting. Journal of Bodywork and Movement Therapies,2012:16(3):304–308.
12. Stincel OR, Oravitan M. Assessment of forward head posture and ergonomics in young IT professionals: Reasons to worry? Work,2018:59(3):419–427.
13. Macwan NS, Radadiya TA. Methods to analyse forward head posture: A narrative review. Journal of Bodywork and Movement Therapies,2020:24(2):241–248.
14. Gandbhir VN, Caunha B. Reliability of goniometric measurements of forward head posture. Journal of Manual and Manipulative Therapy,2015:23(2):78–84.
15. Jones A, Sealy R, Crowe M. Concurrent validity and reliability of the simple goniometer iPhone app compared with the universal goniometer. Journal of Science and Medicine in Sport,2014:17(7):656–659.
16. Kavya H, Kumar L, Rashmi GT. Assessment and prevalence of spectacles usage among degree college students. Journal of Clinical and Diagnostic Research,2017:11(9):1–3.
17. Kumar S, Ranjan R, Yadav R. Refractive errors and their impacts on cervical spine. Journal of Clinical and Diagnostic Research,2018:12(9):1–3.
18. Islamiatun ZK, Naufal AF. The relationship between nearsightedness and forward head posture. Journal of Physical Therapy Science,2019:31(3):257–260.
19. Kolhatkar A, Rayjade A. A study of relation between myopia and head posture in young adult population. Journal of Clinical and Diagnostic Research,2018:12(9):1–3.
20. Vernon H. The Neck Disability Index: state-of-the-art, 1990–2008. Journal of Manipulative and Physiological Therapeutics,2008:31(7):491–504.
21. Pawalia A, Joshi S, Yadav US. Can your eye glasses lead to future neck pain and disability? Relations of eyeglasses with neck muscles endurance and posture. International Journal of Community Medicine and Public Health,2019:44(2):131–136.
22. Thorud HM, Helland M, Aaras A, Kvikstad TM, Lindberg LG, Horgen G. Visual ergonomics and musculoskeletal pain among workers using binoculars: a review. Optometry and Vision Science,2022:99(6):480–486.
23. Willford HA, Kisner C, Glenn TM, Sachs L. The influence of the forward head posture on spinal posture. Clinical Biomechanics,1996:11(3):157–162.
24. Bae Y, Ko K, Park Y. Effects of properly corrected myopia on postural stability. Journal of Physical Therapy Science,2020:32(4):340–345.
25. Smith J, Brown L, Taylor K, Wilson M, Harris P, Clark R. Reliability of craniovertebral angle measurement using tragus of ears and C7 spinous process. Journal of Manipulative and Physiological Therapeutics,2015:38(5):251–256.
26. Johnson K, Miller D, Thompson R, Evans S, White J, Adams L. Interrater reliability of craniovertebral angle measurement using tragus of ears and C7 spinous process. Physical Therapy,2012:92(5):761–768.
27. Farooqui SI, Khan AA, Rahim M, Rafiq N, Farhad A. Analyzing spinal curves for prolonged sitting in university going students. European International Journal of Science and Technology,2015:4(7):58–65.
28. Kim EK, Kim JS. Correlation between rounded shoulder posture, neck disability indices, and degree of forward head posture. Journal of Physical Therapy Science,2016:28(10):2929–2932.
29. Lord SR, Smith ST, Menant JC. Vision and falls in older people: risk factors and intervention strategies. Clinics in Geriatric Medicine,2010:26(4):569–581.