Journal of Positive School Psychology http://journalppw.com
2022, Vol. 6, No. 9, 5084-5090

Prevalence Of Forward Head Posture And Its Association With Gender, BMI And Neck Pain Among College Going Students – A Cross Sectional Study

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Abstract

Background: Forward head posture is the common faulty posture of the neck that has been widely reported among teenagers and young population as theykeeptheir head forward unknowingly while using smartphones and laptops which affects the head-neck-shoulder mechanics. Moreover, in physiotherapy the nature of the profession necessitates neck flexion which the students may unaware of.
Objective: To find the prevalence of forward head posture and its association with gender, BMI and neck pain among college going students.
Methods: This cross-sectional study adopted convenient sampling method. After screening for selection criteria,150 physiotherapy students studying under the Department of PMR, aged between 18 and 25 years were recruited. Their age, height, weight and BMI were recorded. The CV anglewas assessed using Kinovea software, a photogrammetric method.Participants were asked to mark the intensity of neck pain in Numerical Pain Rating Scale (NPRS) and who had no neck pain marks zero score.
Results: The mean age of the participants was 19.8± 1.42 years.Female students were dominant by 60%.It was found that 63.3% had reduced CV angleand 36.7% had normal CV angle.BMI ($p=0.003$) had significant association with CV angle. The genderand neck pain had no significant association with CV angle ($p>0.05$).
Conclusion: There was a marked prevalence of FHP among college students. It was significantly associated with weight component of BMI whereasgender and neck pain had no associations.

Keywords: Kinovea software, CV angle, Anterior translation of head, Neck pain, posture.

I. INTRODUCTION

Proper posture is a state of musculoskeletal balance which imposes a minimal amount of stress and strain on the body. A good posture can be defined as keeping one's ears aligned with the shoulders and having the angel wings or the shoulder blades retracted. Ideal posture decreases spinal stress and to be the most efficient position for the spine[1-2]. The wide spread use of computers, laptops and smart-phones among teenagers makes their head and neck misaligned[3-4]. Especially during Covid-19

pandemic, most of their time was spent on smart phones for attending online class, searching study materials, gaming and chatting with their friends via the social media[4-5]. The head was maintained in bowed position to look at the screen for longer periods which was ergonomically not advisable. This leads to faulty posture such as rounded shoulder, protruded head with poked chin and literally Forward Head Posture (FHP)[5-6].

Forward Head Posture was otherwise called as "Text Neck", "Scholar's Neck" and "Reader's neck". FHP has become more prevalentas an epidemic in modern technological world. It can be better described as 'carrying the head forward to the center of the shoulder. The anterior translation of head shifts the body's center of gravity (COG). To compensate for this shift of COG, upper body was drifted backward and the shoulders slumped forward which poses the head anterior to the trunk[7-8].

In FHP, the upper cervical spine was extended whereas the lower cervical spine and upper thoracic region showed increased flexion. This results in the shortening of the cervical extensors,upper trapezius, sternocleidomastoid and levatorscapulae muscles. Thus, FHP may contribute to neck pain and shoulder pain. Literatures suggested increased risk of the following pathological conditions in those with FHP, such as headache, neck pain, temporomandibular joint disorders, vertebral bodies disorder, soft-tissue length alteration or even scapula and shoulder dyskinesis[5, 9].

Evaluation of FHP has become increasingly important in clinical practice to design the treatment regimen for patients with head-neck-shoulder abnormalities and prevent future complications. The Cranio-Vertebral Angle (CVA) was one of the most common methods for evaluating the FHP. It was a good indicator for the degree of protrusion of head. The CV angle measured below 50˙was considered as having forward head posture. It was a reliable and valid method to measure FHP and the severity increases by decreased angle.[10-12]

Various methods were used to assess CV angle (x ray, Electronic Head Posture Instrument, photogrammetry) were used. In this study, the FHP was evaluated by Kinovea software, a photogrammetric method to assess the CV angle. It was a feasible, valid and reliable tool which measures the angles accurately.[13]The present study was aimed to find out the prevalence of Forward head posture and its association on neck pain, gender, body mass index among college going students. The study results might reveal the proportion of altered head posture among the young generation and help in preventing the consequences of FHP.

II. MATERIALS AND METHOD

This cross sectional study was conducted on 150 physiotherapy students studying in the Department of Physical Medicine & Rehabilitation at Rajah Muthiah Medical College and Hospital (RMMCH) Annamalai University, Chidambaram, Tamilnadu from March to May 2022. Ethical clearance was obtained from the Institutional Human Ethics Committee (IHEC/595/2019) of RMMCH.

The study population was recruited by convenient sampling method. 60 male students and 90 femalestudents aged between 18 and 25 years were willingly participated in the study and gave their informed consent. Students who had a known history of recent cervical and thoracic fracture, structural abnormalities, torticollis, were excluded. The demographic data like age, height, weight and BMI of the participants were recorded. They were assessed for their CV angle using photogrammetric method and asked to mark the intensity of pain in Numerical Pain Rating Scale (NPRS). Participants who had absence of neck pain marks zero score (0) in NPRS scale.

Photogrammetry

In this study photogrammetry method, a digital imaging technique was used to evaluate the head and neck posture.A Redmi note 7s (48mp) camera was placed at a distance of 150cm on a tripod stand and height was adjusted according to the level of the subject's shoulder, colored body markers was placed on tragus of ears and C_7cervical spine of the subjects. The participant was asked to face straight and positioned lateral

to the camera. A picture of the lateral view of each participant was taken in the standing position. Then the photography was transferred to computer and analyzed using kinovea software[13]. A virtual line was drawn between the midpoint of tragus to C_7 spinous process and a horizontal line through the spinous process of C_7vertebrae. Subjects having CV angle less than 50˚ would be considered as having forward head posture[8].

Statistical Analysis:

The collected data was statistically analyzed using SPSS version 21 (Statistical Package For Social Sciences). Frequency distribution and descriptive statistics of the study variables have been made. Chi-squaretest was used to analyze the association between CV angle and study variables.

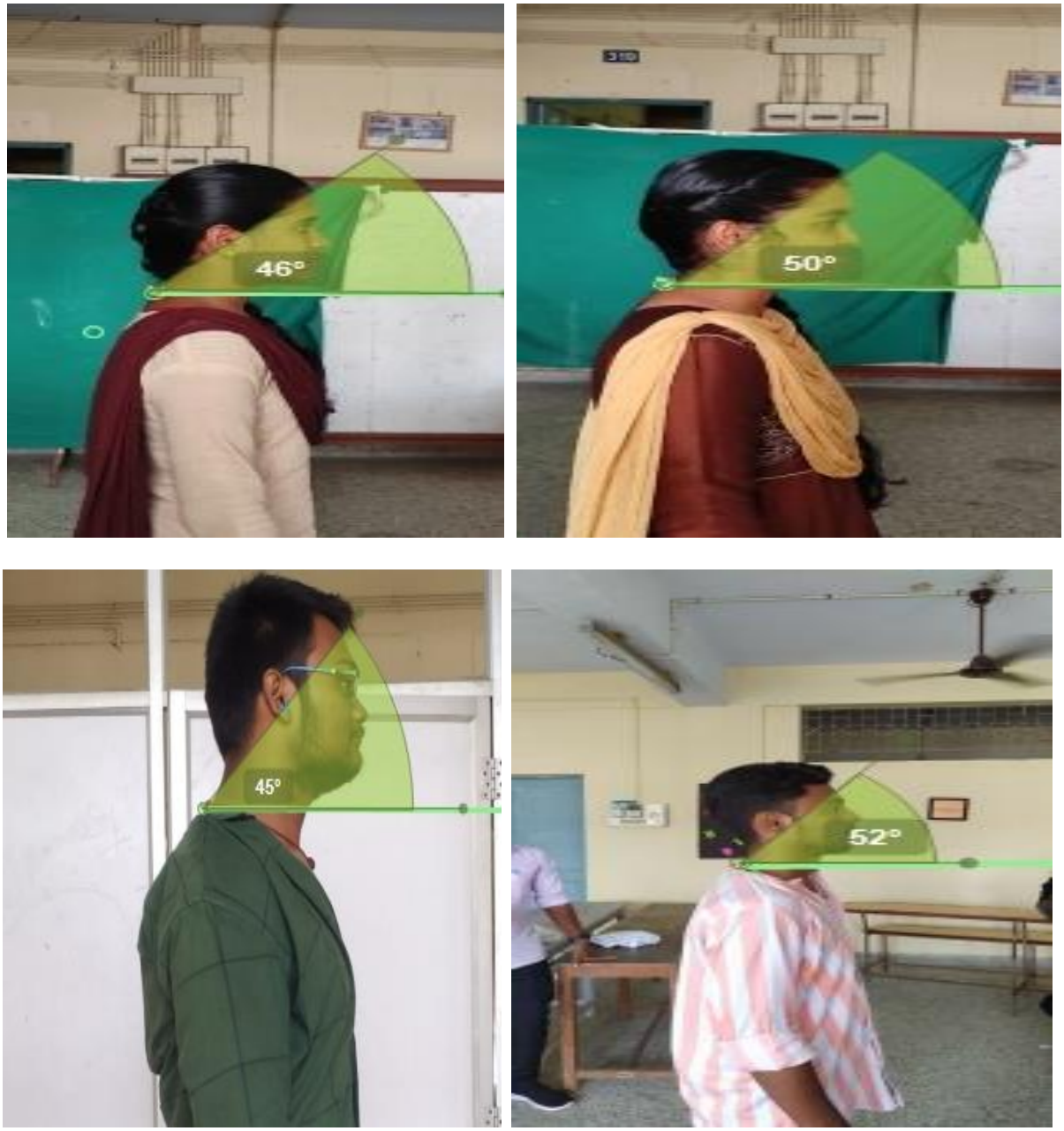

Figure 1: *Normal and reduced CV angle in Photogrammetric method.*

III.RESULTS

Table 1 describes the demographic details of the study participants and their neck pain intensity. The mean age of the participants was 19.8± 1.42 years and nearly 2/3 of the participants were below 20 years. Female

students were dominant by 60%. Nearly 57.3% of the students were in the height range of 151-165cms and the mean height was 163.2± 7.19cms. The mean weight of the participants was 60.33± 10.5kgs with more people falling in the range of 60-79kgs(54.7%) and <59 kgs (40.7%). Only 4.6% had body weight more than 80kgs.The mean BMI was 22.6± 3.8 with 64.7% of the participants having normal BMI.The mean NPRS score was 2.7± 1.84. The neck pain was mildly present in 51.3% and moderately present in 33.4% whereas 15.3%had absence of neck pain

Graph1. showed the prevalence of FHP among the study participants. It was found that 63.3% had reduced CV angle (n=95) and 36.7% had normal CV angle (n=55).

From the table 2 it was found that, the BMI and weight had significant association with CV angle. As the weight and BMI increases, CV angle get reduced. The other study variables like age,gender,height and neck pain had no significant association with CV angle ($p>0.05$).

IV. DISCUSSION

The cross-sectional study was performed with the main objective to find the prevalence of forward head posture among college students. As per the findings of present study, out of total 150 students, 95 were found to have forward head posture which constituted 63.3% of the total study population. Similar findings were observed by Afranazet al[14]and Sutantarsingh et al[15] who documented73% and 63.9% of FHP prevalence among college students respectively. The students were spending most of time on books, laptops and smartphones which might be the reason for their poor posture. Moreover, as the students of physiotherapy, their head and neck kept flexed while assessing and treating the patients.

The present study also tried to establish an association of FHP with gender, BMIand neck pain in college going students. Out of 95 students having FHP, 34 males (56.6%) and 61 females had reduced CV angle (67.7%). The psychosocial issue such as stress which was partially associated with secondary sexual characteristics was focused as a reason for more prevalence in females[16].

It was found that, out of 63.3% (n=95) of FHP population, 52.7% (n=79) had neck pain. The remaining 10.6% (n=16) were free of neck pain symptoms. Based on the statistical analysis, it was observed that the neck pain was mildly present in 51.3% and moderate in 33.4% whereas 15.3% had absence of neck pain which shows CV angle had no association with neck pain.It seems that in spite of the presence of neck pain; CV angle may be normal or reduced. A meta-analysis conducted by Nesreen Fauzy Mahmoud et al. supported the present study that there was no association found between FHP and neck pain among adolescents[17]. Also, it was evident that adults, with neck pain show increased FHP when compared to asymptomatic adults and that FHP is significantly correlated with neck pain measures in adults and older adults.

Most of the participants in the present study had normal BMI. BMI and weight were found to had significant association with CV angle. As the weight component of BMI increases CV angle got reduced. The height component of BMI had no association with CV angle. It was supported by Piotr Kocur, etal 2019[18] who established a moderate negative correlation for age and BMI with CV angle. The present study focused on younger population and found age had nil association with CV angle. It has been clear that, a marked prevalence of forward head posture among young population was found which has to be taken for consideration. Its association with age, gender and presence of neck pain needs further analysis.

Limitations and Recommendations

The present study focused on physiotherapy students which may not be applicable to other student population. The results can be generalized when performed on a large scale with wide range of age groups. Most of the study participants were unaware of their posture as they had no neck pain, which may develop in future if left ignored. As the students of physiotherapy, they should avoid future

ailments and should pay attention in maintaining good posture.

V. CONCLUSION

The findings of the study demonstrated a marked prevalence of Forward Head Posture among college students. It was found be significantly associated with body weight and BMI. There was no association of forward head posture with gender and neck pain.

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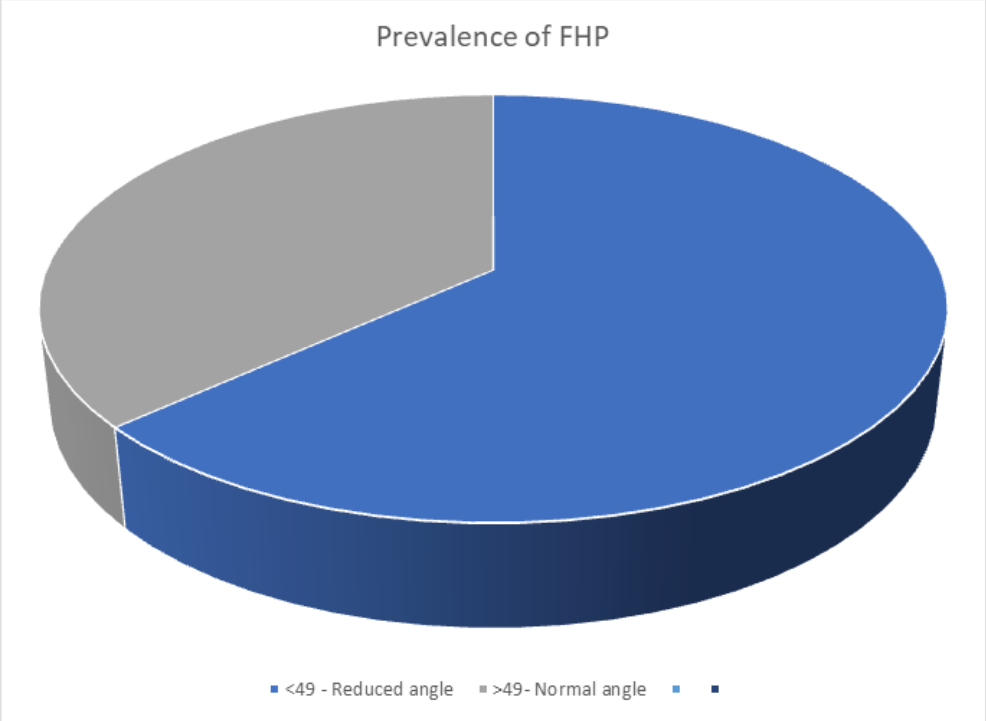
Table:1 *Descriptive statistics of the Study variables.*

S. No	Variables	Sub-categories	Number	%	Mean ±S.D	Minimum	maximum
1.	Age (in years)	*<20*	94	62.7	19.8±1.42	17	25
		>20	56	37.3			
2.	Gender	*Females*	90	60			
		Male	60	40			
3.	Height (In Cms)	*<150*	10	6.7	163.2±7.19	145	184
		151-165	86	57.3			
		>165	54	36			
4.	Weight	*<59*	61	40.7	60.3±10.5	40	94
		60-79	82	54.7			
		>80	7	4.6			
5.	BMI	*Underweight*	22	14.7	22.6±3.8	15.6	37.2
		Normal	97	64.7			
		Overweight	25	16.6			
		Obese	6	4			
5.	NPRS	*0*	23	15.3	2.72±1.84	0	8
		1-3	77	51.3			
		4-8	50	33.4			



Graph 1: *Prevalence of FHP.*

Table 2:*Association between FHP and selected variables*

S. No	Variables	Sub-categories	Forward Head Posture				Chi-square value	p-value
			Present		Absent			
			Number	%	Number	%		
1.	Age (in years)	*<20*	65	69.1	29	30.9	3.66	0.055
		>20	30	53.6	26	46.4		
2.	Gender	*Female*	61	67.8	34	56.7	1.91	0.167
		Male	29	32.2	26	43.3		
3.	Height (In Cms)	*<150*	7	70	3	30	1.32	0.514
		151-165	57	66.3	29	33.7		
		>165	31	57.4	23	42.6		
4.	Weight (in Kgs)	*<59*	30	49.2	31	50.8	11.24	0.004
		60-79	58	70.7	24	29.3		
		>80	7	100	0	0		
5.	BMI	*Underweight*	10	45.5	12	54.5	13.92	0.003
		Normal	57	58.8	40	41.2		
		Overweight	22	88	3	12		
		Obese	6	100	0	0		
6.	NPRS	*0*	16	69.6	7	30.4	0.96	0.610
		1-3	46	59.7	31	40.3		
		4-8	33	66	17	34		

(p <0.05 was significant; p>0.05 was non-significant)