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Prevalence and Associated Risk Factors of Forward Head Posture in Early Adolescence

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Abstract

People who spend a lot of time sitting and reading or using a computer frequently develop forward head posture. The weight of the head is kept in front of gravity in a forward head position, shortening the sub occipital muscles and lengthening the pre- vertebral muscles, which increases the flexion moment of the spine. Increased neck discomfort, headaches, temporomandibular (jaw) joint dysfunction, and limited neck mobility are all linked to forward head position. The objective of this study is to evaluate the prevalence of forward head posture in students and young adults and to assess the risk factors of forward head posture. The craniovertebral angle is the most widely used measurement for assessing forward head posture. Subjects are included and excluded according to the criteria developed. Measurement of the craniovertebral angle is usually performed with the help of photometric way and with the help of goniometer. A self-made questionnaire is formed to identify the risk factors. Forward head posture and the magnitude of the craniovertebral angle are inversely related. Data showed that out of 370 participants 267 students have forward head posture while the remaining 103 have not. Those who have forward head posture also find in the activity like reading books in abnormal posture, playing electronic gadgets while bending their head and carrying a heavy bag pack. Prevalence of forward head posture is found to be 72.2% among the students with the age between 12-16. Forward Head Posture is found more prevalent in boys than girls.

Key Words: Forward Head Posture, Neck Pain, Craniovertebral Angle, Goniometer.

Introduction

Any action that causes a person to tilt their head forward for an extended length of time might cause FHP. Forward head position, sometimes referred to as "text neck" or "nerd neck," is associated with the decrease of muscular mass that occurs with age. Neck discomfort affects over 86% of the general population, which is a high prevalence. As the problem worsens and worsens over time, the stress on the spine increases by 10 to 12 pounds for every inch that the head is tilted forward. Forward head position causes the posterior neck ligaments to gradually stretch, which also causes muscular stiffness, neck discomfort, and an uneven stride. The forward head position causes the deep neck flexors (longus capitis, longus coli), rhomboid, middle and lower trapezius, teres minor, and infraspinatus to weaken and lengthen (1). Increased compressive stresses on the cervical spine, surrounding tissues, ligaments, and notably facet joints result from forward head position. Due to the weakening of the respiratory muscles, it significantly affects respiratory function. Shoulder discomfort and dysfunction may result. According to research done in 2014 by Ruivo RM et al., a forward head position is linked to a high death risk in elderly men and women. The most typical postural abnormality in adolescence, particularly in girls, is forward head position and rounded shoulders (2). A person's ability to balance is harmed by their forward head position when using a computer for longer than six hours. The forward head position is

detrimental to the body's static equilibrium. A healthy spine will naturally curve upward from the top of the chest to the base of the head. It is generally agreed that a forward head position makes it harder to focus and engage in social interactions. A combination of variables, including a decline in neck strength, a restricted range of motion, as well as a tendency to gaze straight ahead in crowds, may be to blame for these unfavorable impacts. This heightened awareness of other people and things may result in less social contact. One of the essential elements of managing forward head position is physical therapy (3). Chronic pain and suffering, as well as irreversible alterations in the alignment of the spine, can result from an untreated forward head position (4). According to certain research, the incidence of the forward head position in children and teenagers might reach up to 80%. This is due to the fact that young people are being exposed to more electronic gadgets and spending more time sedentary activities, both of which might encourage the development of a forward head posture. It is crucial to remember that forward head posture can cause serious musculoskeletal issues if left untreated and is not only a cosmetic concern. Early identification and treatments are therefore essential to avert future issues, lower the likelihood of chronic pain, and avoid disability (5). The craniovertebral angle can also be used to show the differences between various degrees of forward head position in the photographic technique. When using photography, several angles are used to record the image and then those angles are compared to search for changes, especially in the craniovertebral angle (6). Congenital malformation or structural abnormality, reading in bed while reading in bed, carrying a heavy backpack that causes prolonged forward head posture, sewing for a long time, whiplash injury to the spine or repetitive injury, weak upper back muscles, long-term poor posture, slouching, arthritis or bone degeneration are some potential causes of forward head posture. Consequences of a forward-leaning head position include Neck pain and stiffness, headache, breathing difficulties, balance problems, tingling and numbness in the hands and arms, jaw discomfort, stress in the neck and shoulders, bulging discs, or degenerative concern (7).

Rationale:

Carrying large shoulder bags and using technological devices incorrectly cause forward head position to peak early in life. There is research on adults' forward head postures, but none on postures in the first few years of adolescence. In addition to highlighting the causes of FHP, this study will identify the risk variables that contribute to forward head position. Finding the prevalence of Forward Head Posture, particularly in early adolescence, is another major goal of this study.

Methodology

Design

A four-month cross-sectional research was conducted in Faisalabad's private schools to determine the prevalence of forward head position in early adolescence and its risk variables.

Participants

Stratified sampling technique was used to collect sample size of this study is 370 which is calculated by formula with 95% of the confidence interval and 5% of margin of error

Population size (for finite population correction factor or fpc) (*N*):	10000
Hypothesized % frequency of outcome factor in the population (*p*):	50%+/-5
Confidence limits as % of 100(absolute +/- %) (*d*):	5%
Design effect (for cluster surveys-*DEFF*):	1

Inclusion criteria Population of both sexes, 12 to 16 years old, subject.

All individuals who meet the exclusion criteria are excluded, including those with any type of

structural deformity, psychiatric illness, thoracic kyphosis, congenital abnormalities, and fractures.

Methods/Apparatus

I. Screening form
II. Goniometer

Screening Form

Forward head posture is common in early adolescence due to their lifestyle. We didn't get any questionnaire in which multiple factors are examined at a time. Many literatures have questionnaire that is designed to know the effect of one single factor on forward head posture. To know the association of different risk factors with forward head posture, we made a questionnaire in which 3 to 4 questions are designed for one particular risk factor and 4 risk factors are assessed by this questionnaire. After studying the literature about effect of every single factor on FHP independently, we understand that only occurrence of risk factor is not sufficient, we also need to know the severity and duration of that factor. With this reason, this questionnaire is formed to cover up multiple factors at a time.

Experimental Procedure

The HOD of the Department of Rehabilitation Sciences, The University of Faisalabad, provided the data-collection letter from the Physiotherapy department with his or her signature and stamp. The study's sample size was 370 patients, both males and females from various age groups. These patients underwent inclusion and exclusion criteria-based screening. From the medical superintendent of each of the aforementioned schools, a consent document was acquired. The principal and the pupils were informed about the study's objectives and gave their informed consent before participating. Prior to the examination, all of the subjects chosen for this study gave their agreement, and their privacy was maintained. Because the volunteers were not put through an experiment and no medication was administered throughout the trial, there were no ethical concerns. The participants were given the assurance that their data would never be misused and would only be utilized for study.

Statistical Analysis

Data analysis was performed by using SPSS 23.0.

Result

Age of participants

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	12	34	9.2	9.2	9.2
	13	78	21.1	21.1	30.3
	14	48	13.0	13.0	43.2
	15	189	51.1	51.1	94.3
	16	21	5.7	5.7	100.0
	Total	370	100.0	100.0	

Table 1

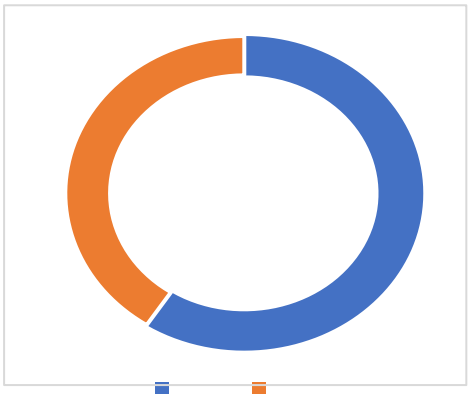
A total of 370 participants were selected in this sample. The 9.2% of the participants were 12 years old. The 21.1% of the participants were 13 years old. The 13% of the participants were 14 years old. The 5.7% of the participants were 16 years old. The 51.1% of the participants were 15 years old.

Gender

Statistics					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	219	59.2	59.2	59.2
	Female	151	40.8	40.8	100.0
	Total	370	100.0	100.0	

Table 2

Pie Chart of Gender Participation



Figure/Chart 1

Craniovertebral Angel with Goniometer

Craniovertebral Angle					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	45-50	97	26.2	26.2	26.2
	40-45	13	3.5	3.5	29.7
	35-40	217	58.6	58.6	88.4
	30-35	43	11.6	11.6	100.0
	Total	370	100.0	100.0	

Table 3

The 26.2% of the participants has CVA in between 45-50 degree, 3.5% of the participants has CVA in between 40-45 degree, 58.6% of the participants has CVA in between 35-45 degree and 11.6% of the participants has CVA in between 30-35 degree.

Forward Head Posture

Forward Head Posture					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	267	72.2	72.2	72.2
	No	103	27.8	27.8	100.0
	Total	370	100.0	100.0	

Table 4

267 (72.2%) of the participants have forward head posture and 103 (27.8%) of the participants have normal posture.

Pain while Reading

Do you feel pain while reading?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	213	57.6	57.6	57.6
	no	156	42.2	42.2	99.7
	Total	370	100.0	100.0	

Table 5

57.6% of the participants feel pain while reading, 42.2% do not feel any pain while they read.

Feel pain while using electronic gadgets

Do you feel pain while using electronic devices?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	162	43.8	43.8	43.8
	no	208	56.2	56.2	100.0
	Total	370	100.0	100.0	

Table 6

43.8% of the participants feel pain while using electronic gadgets and 56.2% do not feel any pain while using electronic gadgets.

Degrees of trunk flexion while carrying a shoulder bag

How you look when you carry your shoulder bag?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no trunk flexion	97	26.2	26.2	26.2
	trunk flexion up to 15°	268	72.4	72.4	98.6
	trunk flexion up to 30°	5	1.4	1.4	100.0
	Total	370	100.0	100.0	

Table 7

26.6% do not have a trunk flexion when carry a shoulder bad, 72.4% have a trunk flexion up to 15° and 1.4% have trunk flexion up to 30° when carry a shoulder bag.

Forward head posture with respect to gender (Cross Tabulation)

Forward Head Posture * Gender					
			Gender		Total
			Male	Female	
Forward Head Posture	yes	Count	153	114	267
		% within Forward Head Posture	57.3%	42.7%	100.0%
	No	Count	66	37	103
		% within Forward Head Posture	64.1%	35.9%	100.0%
Total		Count	219	151	370
		% within Forward Head Posture	59.2%	40.8%	100.0%

Table 8

153 males have FHP and 114 females have FHP.

Forward head posture with respect to carry a bag (Cross Tabulation)

Forward Head Posture * Do you carry heavy bag pack?					
			Do you carry heavy bag pack?		Total
			yes	no	
Forward Head Posture	yes	Count	260	7	267
		% within Forward Head Posture	97.4%	2.6%	100.0%
	No	Count	97	6	103
		% within Forward Head Posture	94.2%	5.8%	100.0%
Total		Count	357	13	370
		% within Forward Head Posture	96.5%	3.5%	100.0%

Table 9

260 participants who have FHP carry heavy bag pack while 7 participants do not use heavy bag pack and have FHP.

Forward head posture related to position in which gadgets (Cross Tabulation)

Forward Head Posture * In which position you use your electronic gadgets?							
			In which position you use your electronic gadgets?				Total
			head bending up to 0°	head bending up to 30°	head bending up to 45°	head bending up to 60°	
Forward Head Posture	yes	Count	54	112	72	29	267
		% within Forward Head Posture	20.2%	41.9%	27.0%	10.9%	100.0%
	No	Count	18	54	25	6	103
		% within Forward Head Posture	17.5%	52.4%	24.3%	5.8%	100.0%
Total		Count	72	166	97	35	370
		% within Forward Head Posture	19.5%	44.9%	26.2%	9.5%	100.0%

Table 10

112 participants have FHP while using gadgets in 30-degree neck bending and 72 participants have FHP when they use gadgets in 60-degree neck bending.

Discussion

Many substantial changes in the body, such as lack of concentration, are brought on by forward head position. FHP is crucial to the biomechanics of the human spine. A person's ability to balance is affected while using a computer for longer than six hours due to their forward head position. Forward head position has a detrimental effect on the body's static equilibrium. The findings of this study revealed that 267 out of 370 kids, or 72.2% of the students, had FHP. People with FHP also do a lot of other things, such reading a book with their neck bent, using technology incorrectly, carrying a big bag, and wearing their glasses for long periods of time. Other research has produced results that are comparable. The results may be attributed to carrying heavy backpacks incorrectly, psychosocial problems like depression or stress, a lack of ergonomic school supplies, spending too much time in class, and bad posture in front of televisions and computers. Additionally, studies have shown that students' necks bend more noticeably when using cellphones. When carrying a backpack on the lower back or sacrum, the center of gravity is moved in the direction of the burden. The child will lean in the other way to oppose this force, moving the head and trunk forward. Students who wear large backpacks are known to have poor posture, neck discomfort, and a reduced Craniovertebral angle, all of which contribute to FHP. A cross-sectional research was done in India in 2018 that revealed how common forward head position was among school-going kids between the ages of 12 and 16. About 63% of the students in this research had forward head position, which was determined by measuring the angle between the C7 vertebra and the tragus of the ear (8). A paper from 2021 with the title Prevalence and Degree of Forward Head Position in School- Going Children was published in the American Journal of Epidemiology and Public Health. According to this article, the forward head position has existed since the start of school and can alter the biomechanics of the cervical spine (9). Additionally, our study reveals that early ages 12 to 16 have a high

prevalence of forward head position due to a variety of environmental circumstances. In the Journal of Kinesiology and Exercise Science, a paper titled "Is the forward head posture a health problem affecting children and adolescence" was published in 2022. In this study, 58 of the 62 individuals had a forward head posture that needed to be rectified (10). A forward-leaning head position is one of the main causes of neck discomfort. A thorough research released in 2019 found that adults with a forward head posture are more likely to develop neck discomfort, whereas teenagers do not exhibit this relationship (11). When carrying a bulky bag pack, to determine the correlation between the prevalence of a forward head posture and carrying a large bag, a Chi-square test of association was used. Carrying a hefty bag pack did not have a statistically significant correlation with the prevalence of FHP (p=.134). Our recent study shows a significant frequency of forward head position in the student population. It illustrates the link between reading time and time spent on devices. Compared to people who used fewer gadgets or none at all, people who used electronic devices for more than six hours were more likely to suffer FHP. The forward head posture is also affected by the usage of a large bag load.

Conclusion

According to this study, 72.2% of 12 to 16-year-old school-going kids at various institutes in Faisalabad, Pakistan, have FHP. The study's findings indicate that students who spent the most of their time reading or using an electronic device in aberrant posture had a prevalence of forward head position of 72.2%. Early onset FHP can be brought on by incorrect positioning whether reading a book or using an electronic device. The forward head position has a significant impact on daily activities.

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