A Study of Relation between Myopia and Head Posture in Young Adult Population

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Abstract

Objective: The objective of this study was to find out the correlation between presence of forward head posture and myopia in young adults. Forward shoulder angle and craniovertebral angle were used for assessing the presence and severity of forward head posture.

Method: There were total 95 subjects who were willing participants of this study. This was a study on presence of forward head posture in myopic young adults. Here we evaluated the degree of forward head using photogrammetric assessment of forward shoulder angle and craniovertebral angle.

Result: There is a relation between forward head posture and myopia in young adults (58.95%). Forward head posture was found more in females (73.21%) compared to males (26.79%). Individuals with myopia for a duration of 5-10 years have the highest prevalence of forward head posture (58.93%). Individuals with myopia ranging from 0 to -1.5D had the greatest prevalence of forward head posture (67.85%).

Conclusion: There is prevalence of forward head posture in young adults with myopia.

Keywords: *Myopia, Forward head posture, young adults, forward shoulder angle, craniovertebral angle.*

Introduction

The human eye is a sensory organ which reacts to light and pressure. It allows the perception of light and provides a three dimensional image. This occurs due to refraction of light.[1]

However, any disturbance in the refraction of light by the eye leads to blurring of vision; known as refractive errors. The various types of refractive errors include Myopia, Hyperopia/ Hypermetropia, Astigmatism and Presbyopia.[2]

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Historically, the concept of myopia was first given by Aristotle (350 BC). He used the term 'muoops' which was derived from 'muein' - to close and 'oops'- the eye. The noun 'Myopia' originated in AD 550 in Latin lusciositas. Efforts have been started to prevent myopia since AD 1600.

It can be defined as refraction anomaly of the non-accommodated eye with a spherical equivalent of -0.5D or more negative.[3]

Classification[4]:

Low Myopia	-	0D to -1.5D
Moderate Myopia	-	-1.5D to -6.0D
High myopia	-	-6.0D or more
Pathological Myopia	-	-8.0D or more

The prevalence of refractive errors has increased many fold. The incidence of myopia alone has increased

from 0.4% (1993) to 34.2% (2016). The highest prevalence of myopia is in South-East Asian countries.

In India, the incidence of myopia in individuals older than 40 years of age is 34.6%

And in children it is 4.7%, 7% and 10.8% in 5, 10 and 15 year olds[5]

It was thought that myopia was caused due to genetic factors. However, recent research points towards the role of environmental factors also. There could be a possibility of these two factors being interrelated. Environmental factors such as near work, visual stress and educational stress have a strong impact on the development of myopia. Some factors such as race (mainly Asian) and age also play an important role. Prematurity, has also been proven to increase the risk of myopia in children.[5,6,7]

Primary myopia is caused by elongation of the visual axis. Other causes include the corneal curvature being too steep, lens swelling, dislocation of the lens and some genetic syndromes. Medicines such as eye drops may also cause myopia.[3]

Generally, the first symptom of myopia is blurring of far objects. Other symptoms such as eye strain, squinting, excessive bending forwards and resultant headaches can also be seen. Abnormal titling of head and excessive blinking may also be present.[8]

A myopic individual may generally squint, tilt their head or lean forwards in a unnatural position to see clearly. This may cause some common musculoskeletal problems like neck pain, tightness of the neck, shoulder and back muscles. These problems are generally ignored by the normal person. . Over time however, these problems worsen and may lead to more severe complications.[9]

Myopia has been linked with numerous postural changes.(pa, Collins, Buehren, Bece and Voetz…).

According to Simensen and Thorud (1994), workers in textile industries who were responsible for detecting and correcting flaws in the fabric. The workers had to lean forwards to carry out this task. A correlation between Myopia development and years of work was found.[10] Adams and McBrian (1992), studied a group of clinical microbiologists who were using microscopes. They worked for a minimum of 20h a week. A high myopia prevalence of almost 71% was found in them.[11]

Collectively, these studies show that there is a high prevalence of myopia in occupations that require working at a close distance for long periods of time.

Forward head posture, defined as excessive anterior positioning of the head in relation to a vertical reference lineis one common postural fault that may occur here.[12] There is excessive flexion of the lower cervical spine and excessive extension of the upper cervical spine. Thus there is a muscle imbalance in the neck as well as the back. It could manifest as tingling or numbness in one or both the arms, headache and neck pain. Burning pain between the shoulder blades is also seen.[13]

Photogrammetry is a commonly used measure to assess theposture by taking a picture of the patient's head and neck from the lateral view or it can be measured manually.[14]

Although this study does not cover the management of forward head posture, it is worth mentioning some of the method most commonly used to treat it. McKenzie exercises, which are a self-therapy exercise programme are used. They include stretching, mobilization and manipulation.[15] Also, Kendall exercises which are known to correct forward head posture by strengthening the deep cervical flexors and shoulder retractors and stretching the pectoral muscles are used.[16] Pilates are also recommended for reduction in pain.[17] Electrotherapy interventions such as Ultrasound and IFT have also been proved effective.[18] Exercises for scapular stabilization are used as well.[19]

To our knowledge, not many studies have been done on the relationship between head posture and myopia. Therefore, focus needs to put on studying head posture at rest as well.

Methodology

A total of 95 individuals were included in this study who fulfilled the inclusion criteria. The procedure was explained and consent was taken from them.

Here, the individual's head posture was assessed using the forward shoulder angle (FSA) and the craniovetebral angle (CVA). The individual was asked to stand as they normally would and to relax. Then a photograph was clicked from the lateral profile and required angles were measured using photogrammetry. After collection of data, the results were compared and statistical analysis was done.

Result

1. Prevalence of Forward Head Posture:

Table No. 1: Distribution of Forward Head Posture

	Forward Head Posture	Percentage
Present	56	58.95%
Absent	39	41.05%
Total	95	100%

Interpretation: From table no. 1, it is suggested that among 95 individuals with myopia 56 individuals had myopia. Hence the prevalence that was found was 58.95%.

2. Distribution of forward head posture in accordance to degree of myopia:

Table no. 2: Distribution of Forward Head in accordance to degree of myopia.

Degree (D)	Total	Presence of Forward Head	Percentage	Mean ± SD
0 to -1.5D	73	38	67.85%	-0.64 ± 0.18
-1.6 to -5.9D	21	17	30.35%	3.12 ± 0.94
>-6D	1	1	1.80%	-6
Total	**95**	**56**	**100%**	

Interpretation: From table no. 2, it was observed that out of 56 individuals with forward head posture maximum 38 (67.85%) had myopia ranging from (0 to -1.5D), 17 individuals had myopia ranging from (-1.6 to 5.9D) and remaining 1 individual had myopia of more than -6D.

3. Distribution of forward head posture in accordance to duration of myopia:

Table no. 3: Distribution of Forward Head Posture in accordance to duration

Duration (Years)	Total	Presence of Forward Head	Percentage	Mean ± SD
0-5	28	14	25%	3.43 ± 1.22
5-10	54	33	58.93%	7.48 ± 1.28
>11	13	9	16.07%	13.22 ± 1.39
Total	95	56	100%	

Interpretation: From table no. 3 it is observed that, out of 56 individuals with forward head posture maximum 38 (58.93%) had myopia for 5-10 years, 14 had myopia for 0-5 years and minimum 9 had myopia for more than 11 years.

4. Association between duration of myopia and forward head posture:

Table no. 4: Association between duration of myopia with respect to craniovertebral angle and forward shoulder angle.

Particulars	Craniovertebral Angle			Forward Shoulder Angle		
	r-Value	df	p- Value	r-Value	df	p- Value
Pearson Correlation Coefficient	-0.3252	93	0.0013(S)	-0.3702	93	0.0002(S)
'N' of Valid Cases	95			95		

Interpretation: Table 4 shows that, association between duration of myopia and craniovertebral angle by Pearson Correlation Coefficient Test, was found to be (-0.3252) with a p-value of 0.0013 which is significant. It also shows that, association between duration of myopia and forward shoulder angle by Pearson Correlation Coefficient Test, was found to be (-0.3702) with a p-value of 0.0002 which is significant.

5. Association between degree of myopia and forward head posture:

Table 5: Association between degree of myopia with respect to craniovertebral angle and forward shoulder angle.

Particulars	Craniovertebral Angle			Forward Shoulder Angle		
	r-Value	df	p- Value	r-Value	df	p- Value
Pearson Correlation Coefficient	-0.4893	93	<0.0001**(S)**	-0.5375	93	<0.0001**(S)**
'N' of Valid Cases	95			95		

Interpretation: Table 5 shows that, association between degree of myopia and craniovertebral angle by Pearson Correlation Coefficient Test, was found to be (-0.4893) with a p-value of <0.0001 which is extremely significant. It also shows that, association between degree of myopia and forward shoulder angle by Pearson Correlation Coefficient Test, was found to be (-0.5375) with a p-value of <0.0001 which is extremely significant.

Fig. 1. Outcome Assessment

Discussion

The purpose of this study was to find out the prevalence of forward head posture in young adults with myopia.

In the beginning, the occurrence of myopia was very less. It was thought to be caused due to genetic factors. However, recent research points towards the role of environmental factors also. There could be a possibility of these two factors being interrelated.

In the present study, out of 95 chosen individuals 56 had forward head posture. This gives a prevalence rate of 58.95%

This may be due to the increasing tendency of students and young adults to adopt inappropriate postures for long period of time. Also the increased used electronic devices and the long study hours have further led to a deterioration in vision and posture.

In this study 95 individuals with myopia were chosen of which maximum 69 were females and remaining 26 were males. The prevalence of forward head posture was more in females(73.21%) as compared to males(26.79%)

This may be due to the fact that females have been found to adopt a 2°-3° more neck flexion compared to males.20 It may also be due to psychosocial issues such as stress which is linked to secondary sexual characteristics.21 Ruivo assessed 275 adolescents, age 15,16 and 17 years reporting FHP to occur more likely in females.[22]

In this study, maximum 54 individuals had a duration of myopia belonging to the group (5-10) years, 28 individuals belonged to group (0-5) years and remaining 13 individuals belonged to the group (>11) years. Out of this, individuals from the group of 5-10 years duration had the highest prevalence of myopia

whereas those belonging to the group>11 years had the lowest prevalence of myopia.

This may be due to there being a discrepancy in the distributionof the samples. The 5-10 years duration group being significantly larger than the other group may have led to a higher prevalence.

In the current study, 73 individuals had myopia between (0 to -1.5D), 21 individuals had myopia between (-1.6 to 5.9D) and remaining 1 individual had myopia greater than 6D. Out of this, individuals with myopia between (0 to -1.5D) had the highest prevalence of forward head posture (67.85%), those with myopia (-1.6 to -5.9D) had a prevalence of 30.35% and the lowest was of those with myopia >-6D (1.80%)

This may be caused due to uneven distribution of the samples. It may also be because greater the severity of myopia; greater is the strain being put on the ocular muscles and consequently the muscles of the head and neck thus leading to a fault in the head posture.

Association was calculated between duration of myopia and the severity of forward head posture. Both the outcome measures were assessed individually.

Association between duration of myopia and craniovertebral angle had a p-value of 0.0013 which is significant. Association between duration of myopia and forward shoulder angle had a p-value of 0.0002 which is significant.

This may be because as the years with myopia increase the postural adaptations also become more and more advanced and fixed thus worsening the overall posture.

Association was calculated between degree of myopia and the severity of forward head posture. Both the outcome measures were assessed individually.

Association between degree of myopia and craniovertebral angle had a p-value of <0.0001 which is extremely significant. Association between degree of myopia and forward shoulder angle had a p-value of <0.0001 which is extremely significant.

This may be because the severity of myopia leads to a rise in postural adaptations such as squinting and leaning forwards which may lead to an increase in the postural abnormality.

Thus more focus needs to put on the relationship between myopia and head posture as it may lead to relief of many head and neck related problems that are often missed and ignored.

Conclusion

On the basis of the results of the study, it was concluded that there is prevalence of forward head posture in young adults with myopia . Forward head posture was found more in females compared to males. Individuals with myopia for a duration of 5-10 years has the highest prevalence of forward head posture. Individuals with myopia ranging from 0 to -1.5D had the greatest prevalence of myopia.

Conflict of Interest: There were no conflicts of interest in this study

Ethical Clearance: Ethical clearance was taken from institutional committee of Krishna Institute of Medical Sciences, Deemed to be University, Karad.

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