

Effectiveness of Ocular Muscle Exercises on Myopic Individuals with Forward Head Posture

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Abstract

Background: The dependence of today’s younger generation on technology is increasing and the work hours spent by professionals in front of computer screens are also increasing. These are the leading causes of myopia. Task related postural adaptation may also cause myopia. However, very few if any people suffering from myopia are being referred to a physiotherapist. There is positive effect of ocular muscle exercises on increasing visual acuity and decreasing stress on the ocular muscles.

Objective: The objective of this study was to find out the effect of ocular muscle exercises on myopic individuals with forward head posture.

Method: There were total 46 subjects who were willing participants of this study. They were divided in two groups one experimental who received exercises while other was control. Pre intervention and post intervention postural assessment were taken and analysed.

Result: There was a significant effect of the ocular exercises on craniovertebral angle of these myopic individuals compared control group ($p = 0.0219$). Its effect on forward shoulder angle was not quite significant ($p = 0.0619$).

Conclusion: Ocular exercises are not quite effective in improving forward head posture.

Key Words: Ocular exercises, craniovertebral angle, forward shoulder angle.

Introduction

Myopia is a refractive defect of the eye in which collimated light produces image focus in front of retina when accommodation is relaxed. Myopia is commonly known as nearsightedness. Here, objects that are close appear clear but distant objects appear blurred.¹

Myopia can be classified as low Myopia to high myopia with dioptres ranging from - 0D to

-8.0D²Incidence of myopia has increased from 0.4% (1993) to 34.2% (2016). In India, the incidence of myopia in individuals older than 40 years of age is 34.6% In children it is 4.7%, 7% and 10.8% in 5, 10 and 15 year olds. Prevalence of myopia in India is 45% (2012).⁴

Prevalence of forward head posture in myopic individuals (2019) is 58.95%.

Forward head posture is defined as excessive anterior positioning of the head in relation to a vertical reference line. The thoracic spine thus goes into kyphosis to compensate for this and the pelvis tilts anteriorly. A myopic individual may generally squint, tilt their head or lean forwards in an unnatural position to see clearly. This leads to problems of neck, upper and lower back causing muscle imbalance. It could manifest as tingling or numbness. Burning pain between shoulder blades is also

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seen.⁷Treatments that alleviate the problem temporarily are used. Over time however, these problems worsen and may lead to more severe complications.⁵

Photogrammetry can be used to measure the angle by taking a picture of the patient’s head and neck from the lateral view or it can be measured manually.⁵ Angles can be measured using Web plot digitizer software. For measuring the angle three dots of an image are transformed onto Cartesian coordinate’s axis and the angles are auto calculated.¹⁵

Symptoms of myopia are blurring of far objects, eye strain, squinting, excessive bending forwards, headaches, abnormal titling of head and excessive blinking.⁵

Posture is rarely mentioned by researchers, although in a study it was found that head posture is correlated with myopia. Workers in textile industries who had to lean forwards to carry out the task of detecting and correcting flaws in the fabric in which correlation between myopia and duration of work was found.⁵ in another study of a group of clinical microbiologists who worked for a minimum 20 hours per week. A high prevalence of myopia of 71% was found in them.⁶A study on analysis of head position used by myopes and

emmetropes when performing a near-vision reading task proved that posture might play some role in myopia development. The effect of extraocular muscles on eye ball could cause myopia.³In a study ocular exercises were designed and were implemented on student population which showed improvement in the visual acuity. ¹²Therefore, focus needs to be put on studying effect of ocular muscle exercises on myopic individuals with forward head posture.

Methodology

An approval for the study was obtained from the Protocol committee and the Institutional Ethical Committee of KIMSDU. 80 individuals were approached and screened out of which 46 were selected according to the inclusion criteria of age 18-32years, duration of myopia for 1 years and above and Myopia of -0.25 to -6.0D degree of. The procedure was explained and written informed consent was taken. Exercises were explained thoroughly which included palming exercises, swinging exercises, eye muscle exercises, cross crawl, tibetan eye chart. Exercises were given twice a week for six weeks. Pre and post intervention postural assessment was taken and analysed.

Result

1. DISTRIBUTION OF FORWARD SHOULDER ANGLE:

2. Forward shoulder angle	Mean ± ± SD				Paired t-test	
	Pre Intervention		Post Intervention		t- value	p- value
Group A	64.22 ± ± 12.82		53 ± ± 8.23		1.796	0.0862(NQS)
Group B	56.87 ± ± 14.15		58.26 ± ± 9.77		0.4427	0.6623(NS)
Unpaired t-test	t- value	p- value	t- value	p- value		
	1.846	0.0797	1.916	0.0619 (NQS)		

Interpretation: Table no 1 shows that the mean Forward shoulder angle in group A pre intervention was 64.22 ± ± 12.82 and post intervention was 53 ± ± 8.23. In group B it was 56.87 ± ± 14.15 pre intervention and 58.26 ± ± 9.77 post intervention. The paired t test for Group A angle had t-value 1.796 and p-value 0.0862 which is not quite significant. For Group B, angle had t-value 0.4427 and p-value 0.6623 which is not significant. Intergroup post-test values according to unpaired t-test t-value was 1.916 and p-value was 0.0619 which is not quite significant.

2. DISTRIBUTION OF CRANIOVERTEBRAL ANGLE:

Table no 2: Distribution of craniovertebral angle:

Craniovertebral angle	Mean \pm SD				Paired t-test	
	Pre Intervention		Post Intervention		t- value	p- value
Group A	44.39 \pm 4.85		54.39 \pm 6.34		2.019	0.0559(NQS)
Group B	56.65 \pm 5.16		56.65 \pm 7.35		0.000	>0.9999(NS)
Unpaired t-test	t- value	p- value	t- value	p- value		
	1.542	0.1302	2.377	0.0219(S)		

Interpretation: Table no 2 shows that the mean Craniovertebral angle in group A pre intervention was 44.39 \pm 4.85 and post intervention was 54.39 \pm 6.34. In group B it was 56.65 \pm 5.16 pre intervention and 56.65 \pm 7.35 post intervention. The paired t test for Group A angle had t-value 2.019 and p-value 0.0559 which is not quite significant. For Group B, angle had t-value 0.000 and p-value >0.9999 which is not significant. Intergroup post-test values according to unpaired t-test, t-value was 2.377 and p-value was 0.0219 which is significant.

Discussion

The aim of this study was to find out the effect of ocular muscle exercises on myopic individuals with forward head posture. The objectives of this study were to assess young adults with myopia for forward head posture. To assess the severity of the postural misalignment in relation to the degree of myopia. To assess the severity of the misalignment in relation to the duration of myopia and to observe the effect of ocular muscle exercises on forward head posture. An effort to find the association between the effects of the ocular muscle exercises with the effects of not administering any exercise program was made.

Total 80 myopic individuals were screened for forward head posture and 46 individuals fulfilling inclusion and exclusion criteria were selected. 46 subjects of both the genders of age group 18-32 and degree of myopia ranging -0.25 to -6.0 D were selected.

They were divided into two groups, A and B respectively where group A was administered an exercise protocol and group B underwent no form of exercise protocol. Palming, cross crawl, swinging exercises, eye muscle exercises and Tibetan eye chart were included in the exercise protocol for group A. Exercises were given twice a week for six continuous weeks. Forward shoulder angle and craniovertebral angle were measured using Web Plot Digitizer and Pre and post measurement for posture was taken.

The mean Forward shoulder angle in group A pre intervention was 64.22 \pm 12.82 and post intervention was 53 \pm 8.23. In group B it was 56.87 \pm 14.15 pre intervention and 58.26 \pm 9.77 post intervention. Forward shoulder angles were measured pre-intervention and post-intervention, the effect of exercise was not quite significant as seen by p value of 0.0862 of group A and not significant p value of 0.6623 of group B. Intergroup post-test values according to unpaired t-test t-value was 1.916 and p-value was 0.0619 which is not quite significant.

The mean Craniovertebral angle in group A pre intervention was 44.39 \pm 4.85 and post intervention was 54.39 \pm 6.34. In group B it was 56.65 \pm 5.16 pre intervention and 56.65 \pm 7.35 post intervention. Effect of exercise on craniovertebral angle was also found to be not quite significant as seen by p value 0.0559 of group A and not significant p value >0.9999 of group

B. Intergroup post-test values according to unpaired t-test, t-value was 2.377 and p-value was 0.0219 which is significant.

Higher amount of near work load, head positions during performing tasks could also make these exercises insufficient even if the eye exercises are effective in bringing about a change, which could have been a possibility in present study. Stress on eyes, exposure to electronic devices, improper postural adaptations, head position while a near task was performed etc, may be the factors due to which the exercises may not be effective in improving visual acuity.²¹ Increasing the interventional period could help improve the effectiveness of ocular muscle exercises on posture.

Rahul Pandey et al. studied effect of eye exercise on myopia in children aged between 10-15 years and concluded that visual acuity and ocular health was improved with eye exercises in children with myopia.

The reason for this discrepancy in this study results may be due to various factors. The study included myopic children with a degree of myopia under -3D only whereas this study had a mean degree of -3.25D which is significantly more than their study. Also, the study was conducted in children in contrast to this present study which was on young adults. These young adults will comparatively have myopia for more duration compared to the children. Poor postural habits and stress over the neck and eyes have had a greater time to build in young adults compared to children and thus may be more difficult to treat.⁶

Thus, the present study concluded that the ocular muscle exercises were not quite effective in improving the forward head posture or degree of myopia. There are multiple studies supporting the result but there are also considerable number of studies that contradict the present result. On the basis of this it is safe to say that more detailed and precise research must be conducted to find conclusive results. This can be done by increasing the frequency and duration of exercises, including individuals with uniform demographic data and using more efficient outcome measures. As a result, there is immense scope for further research in this topic.

CONCLUSION:

On the basis of the results of the study, there was some improvement in forward head posture however it was statistically not quite significant. There was a

difference in alteration of both forward shoulder angle and craniovertebral angle measurements in Group A and Group B pre and post treatment but were not quite significant.

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.

Source of Funding: Krishna Institute of Medical Sciences Deemed to be University, Karad

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