



## Original Article

# Correlation of Asthenopic Symptoms with Refractive Errors in Young Adults.

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**Objective:** To evaluate relationship of asthenopic symptoms (Headache, watering, blurry vision, diplopia) with refractive errors including hypermetropia, myopia, astigmatism, anisometropia and to assess in which age group asthenopia is more common.

**Method:** A descriptive cross-sectional study was conducted among people having refractive errors and asthenopic symptoms. A total of 172 patients presented to Mayo Hospital Eye OPD were examined. They were divided into two age groups. 15 to 25 years named as group 1 and 26 to 36 years named group 2. Visual acuity, refraction and fundoscopy evaluation were done by using Snellen chart, retinoscopy and ophthalmoscope respectively.

**Results:** Participants of Group 1 were having asthenopic symptom complaints about 48.26%. Most common complaint of the patient was headache (96.5%). The complaint of asthenopia was more in female patients (57.56%) than males (42.40%). Myopia and astigmatism had a significant relation with asthenopic symptoms that is 56.4% and 59.3% respectively. Each symptom had a significant relation with different refractive errors with statistically significant value  $p < 0.05$ . Pearson's correlation was used to find out the correlation among asthenopic symptoms and refractive errors. Headache was significantly associated with myopia ( $r = -0.167$ ,  $p = 0.028$ ), blurring was also positively correlated with myopia ( $r = 0.276$ ,  $p = 0.0001$ ) double vision had significance with both hypermetropia. ( $r = 0.009$ ,  $p = 0.001$ ) and anisometropia ( $r = 0.312$ ,  $p = 0.001$ ) Blurring in vision had implication with astigmatic ( $r = 0.305$ ,  $p = 0.001$ ) refractive errors. Mann-Whitney U test was applied and significant value was  $p < 0.05$ .

**Conclusions:** Detailed examination of patients including visual acuity, refractive errors and by questioning their complaints about symptoms helped in making conclusion that there is a close correlation between refractive errors and asthenopic symptoms of Group 1 and headache was most common complaint of them.

**Keywords:** Asthenopia, Refractive errors, Correlation



## Introduction:

Mackenzie first described the word asthenopia which mean "eye devoid of stability" that eye is stressed even in usual routine. Primarily optical experts and practitioners recognized ocular strain through concentration difficulties, thus problems like near sightedness, far sightedness and changes in lens with the passage of time.<sup>1</sup>

Asthenopia is a typical complain in children, most probably as a result of school activities and referred as a large number of symptoms like blurring, trouble in focusing at various distances, pain in eyes or disturbance, brow ache, photophobia, lacrimation, burning or itchiness, sensation of ocular dryness, double vision, headache on continuous use of eyes that is reduced with the correction of refractive errors.<sup>2,3</sup>

Asthenopia has three main types:

1. Refractive asthenopia: This arises due to refractive errors such as near-sightedness, farsightedness, astigmatism and anisometropia.
2. Muscular asthenopia: This takes place due to neuromuscular abnormalities or extra ocular muscle weakness. It is more common in patients of squint and nerve palsies. The causes of this may be heterotopia, hetrophoria, accommodative insufficiency and inability of eyes to move together. Another more frequent form of it is accommodative type which occurs due to accommodative anomalies such as spasm, accommodative insufficiency, and accommodative fatigue. It may be considered both as refractive or muscular type. In current studies it is considered as the section of muscular. In current society, these symptoms are more common because of near work at computers needs constant fixation, generally for hours, which induces stress on visual system for close work.<sup>4,5</sup>

Asthenopia may be internal or external. Inside the eye sense of ocular pain and strain is felt in internal form. Midpoint may be due to accommodation variances, convergence divergence anomalies and uncorrected refractive errors. In external form, itching and dryness on outer surface of eye may be seen. It also may be associated with environmental factors such as glare from intense light and quality of image may be altered due to low contrast and inappropriate angle of gaze and vibrating target like computer exhibitions.<sup>2,6</sup>

Asthenopia is one of the public health complaints. It may occur due to some factors like different changes in ways of life, wide usage of computers and refractive errors. Many other ocular disorders are similar to it. Complete assessment of patient's symptoms differentiates between ocular disorder and asthenopia. According to evaluation we do further

management plan through which symptoms could be relieved. The points which are important in the management are complete history both ocular and general then do refraction and prescribe glasses contact lens according to need and then do fundus examination.<sup>7</sup>

Asthenopic pain may be located in the orbits or more widespread as a general headache, and may implicate the neck and the eye brows as well. Further symptoms include the sensation of heavy eyelids and drowsiness, hyperesthesia of the scalp, vertigo, and gastric disturbances including indigestion, dyspepsia, nausea, and vomiting. It is important to note that these symptoms form a significant subset of symptoms characteristic of the simulator-sickness complex.<sup>8</sup>

Dry eye like indications are important element of asthenopia in individuals functioning at near. Earlier revisions have recommended small flicker frequency to be a reason of dehydrated eye indicators connected with supercomputer work. Also shorter blink period is possible to be a tool for dry eye like signs related with close up work the exterior signals of asthenopia like clouding, itching and ocular dryness. Reduction of blink time through extended close up work could cause tear disruption that have potency to disrupt optical conditions and asthenopia. Superficial ocular associated indications may outcome from ecological aspects creating corneal desiccating suppress wink rate and inadequate blinking. Decrease blinking can also aggravate the symptoms of pre-existent dry eye that may worsened by additional features of the work setting.<sup>9</sup>

Asthenopia is normally linked by states wherever the convergence, divergence and accommodative methods are more intensively used like in those who work prolonged watching at video display unit (VDU). While children are using automated devices, such as laptops with growing occurrence, the popularity of asthenopia in this age group is not exactly known. This is a significant break in composition, because when it disturbs children, visual weariness may be related to difficulties involving reading, writing and knowledge impairment, attention and memory, as well as school performance. Visual tiredness may also show the presence of complex disorders such as dyslexia, which need distinctive management.<sup>10</sup>

Hypermetropia is a type of refractive error in which focal point of distant object forms on back side of retina, when accommodation is being relaxed. In this situation clear image of object is obtained through accommodation or convex lenses. Formerly accommodation is compromised in hyperopic and ciliary muscle strain occurs during continuous near work. Correction of it is not always necessary because adult patient can accommodate to compensate their refractive error so get clear distance and near vision. If degree of farsightedness is more than the amplitude of accommodation,

then these types of symptoms occur. In these children, convex lens is used for correction of hypermetropia and this will reduce accommodation need and binocular single vision is achieved. Myopia is a type of refractive error in which distant object image formed in front of retina when accommodation is being undisturbed. To get clear image of distant object concave lenses are used. Myopia is a most common form of refractive error in school going children. If a child is unable to get clear image of the object then he or she will complain about a symptom like strain headache and blurry print.<sup>11</sup>

### Methodology:

Ethical clearance to conduct this study regarding was obtained from College of Ophthalmology and Allied Vision Sciences, KEMU, Lahore. A descriptive cross sectional study was utilized. The size of obtained sample was 170. The demographic details were also noted which included age, gender and occupation. Visual acuity asthenopic symptoms, refractive errors were also noted. The patients who had asthenopic symptoms (watering, double vision, redness) and cooperative patients of Eye OPD of Mayo Hospital of age 15 to 36 years were included. The patients who had any ocular pathology were excluded. Informed consent was also obtained. Information was gathered by self-designed Performa in the form of hard copy by asking verbally from every patient. Data was captured using SPSS version 20 and Microsoft Excel 2010.

### Results:

**Table 1.**

**Correlations**

	Emmetropia r values	Myopia r values	Hypermetropia r values	Astigmatism r values	Anisometropia r values
Headache	0.059	-.167*	0.047	0.1	0.025
watering	-0.121	0.139	-0.098	0.082	-0.052
Doublevision	-0.085	0.011	.322**	0.088	.312**
Blurring	-.364**	.276**	0.009	.305**	0.023

\*\* . Correlation is significant at the 0.01 level (2-tailed)

\* . Correlation is significant at the 0.05 level (2-tailed)

Pearson's Correlation showed that there was a significant relation between blurring and myopia. ( $r=0.276$ ) Headache was also significantly related with myopia but that was negative correlation ( $r=-0.167$ ). Blurring was significant in emmetropia ( $r=-0.364$ ) but negatively correlated. Double vision was significant both in anisometropia ( $r=0.312$ ) and hypermetropia ( $0.322$ ).

### P values:

**Table 2: Correlations**

	Emmetropia P values	Myopia P values	Hypermetropia P values	Astigmatism P values	Anisometropia P values
Headache	0.444	0.028	0.742	0.19	0.74
watering	0.113	0.069	0.495	0.284	0.49
Doublevision	0.027	0.089	0	0.254	0.00
Blurring	0	0	0.764	0	0.76

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

This table showed that there was a significant correlation between blurring and Emmetropia and myopia. Double vision correlated both with hypermetropia and anisometropia and blurring is significantly correlated with astigmatism

### Mann-Whitney U Test:

Emmetropia was significantly correlated with blurring ( $p=0.001$ ). Asthenopic symptoms may be present when there were no refractive errors. But that ratio was small.

**Table 3: Mann-Whitney U test results**

	Headache	Watering	Double vision	Blurring
Mann-Whitney U	1132.500	1005.000	1087.500	427.500
Asymp.Sig.	0.442	0.112	0.268	0.00

Myopia was significantly correlated with headache and blurring. Mann-Whitney test showed ( $p=0.001$ ) significant correlation between them. Double vision and watering were not significantly correlated with myopia.

**Table 4:**

	Headache	Watering	Double vision	Blurring
Mann-Whitney U	3412.5	3291	3617.5	2639.5
Asymp.Sig.	0.29	0.7	0.889	0

### Discussion:

Ocular disorders of an individual do not always reflect by the ocular symptoms although symptoms are particular for particular disorder. Complete ocular investigation is necessary to rule out the cause of problem. Examining aged individual showed a great incidence of presbyopia (92.5%) and cataract (85.6%). On the other hand, the complaints of the applicants were redness and swelling in

eyes and further linked to ocular dryness than to the noticed ocular conditions.

In this study, detailed examination including visual acuity, refraction (by autorefractometer and retinoscopy) funduscopy, of 172 patients was done. Most of them came with different symptoms like diplopia, watering, watering and blurring of vision. Different causes were diagnosed by taking history of these patients. Refractive status of these patients was tested by using autorefractometer and retinoscopy. Having refractive errors like hypermetropia, myopia, anisometropia and astigmatism, these patients told about their symptoms correlated with these errors. These refractive errors were the major cause of asthenopic symptoms of these patients. Some of them were diagnosed with another factor which can cause these symptoms like excessive near vision work like computer users, remote near point of convergence and near point of accommodation. Large population of young patients having ages range from 15-30 were suffering from such complaints because of excessive usage of electronic devices and not properly checked up for any refractive error in early years of their lives. A number of patients also were there who had no refractive errors but were having symptoms of eye ache and headache during their daily routine work. These types of complaints without any type of refractive error could be because of muscle fatigue. These patients were asked about their screen time in a day, which was more than normal range.

This study showed that population of female patients was more 57.6% than male who were 42.4% visiting in Mayo Hospital OPD. Out of four asthenopic symptoms (Watering, double vision, blurring and headache) most common of these were headache (96.5%) and blurring of vision (58.1%). These were the common complaints of a normal person though and also in those patients wearing their glasses prescription in these days and in mostly school going children blurring and headache is the most common because of excessive near work and muscle of the eye goes fatigued and can't be relaxed in general and become painful because contraction of muscle most of the time.

This study showed that asthenopia was more common in Group 1 (15 to 25 years). Most of them come with the complaint of headache, because they performed activities which require high concentration or focusing power. Due to which their accommodation or convergence disturbed. Constant reading and writing was another major cause of asthenopia in this group. Mobile phones, laptops, games were a cause of asthenopia in this group.

Another cross-sectional review was done, in which school children was examined and sample record was 1109. Majority of the patients were complaint of pain in head, mostly these are who visit the author's optometric training. Common cause of asthenopia was astigmatism in this study. Headache

was most common complaint in them.<sup>12</sup>

In this study, result shows that refractive status had direct and major role in the common complaints of patients like asthenopic symptoms. Four types of symptoms which were most collective in these populations linked with different refractive error, like blurring of vision was major complaint with myopia and double vision with anisometropia and headache and watering were finding with hypermetropia. And headache was the main symptom told by the patients having refractive error called astigmatism.

### Conclusion:

Detailed examination of patients including visual acuity, refractive errors and by asking their complaints about symptoms helped in making conclusion that there is close correlation between refractive errors and asthenopic symptoms. Headache was the most frequent complaint among patients.

Astigmatism was the most recurrent cause of asthenopia. Female patients had more asthenopic symptoms than male patients. Asthenopia was more common in Group 1.

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