https://doi.org/10.35845/kmuj.2023.23247

ORIGINAL ARTICLE

Association of asthenopia with refractive errors in madrassa students

Sharmeen Shahid[1]✉, Sania Abdul Rauf[1], Shanza Dastgir[1], Farhana Ali[1], Rabia Saifullah[1], Uswa Fatima[1]

ABSTRACT

OBJECTIVE: To determine the association of presenting clinical features of asthenopia in madrassa students with different refractive errors.

METHODS: This cross-sectional study was conducted from September-November 2022 at different Madrassas in Lahore, Pakistan. Study was performed on a sample of 108 patients, who had different refractive difficulties. Informed consent was taken from the patients aging ≥18 years and from parents/ guardians of patients aging <18 years. A self-designed questionnaire was used to gather the data of all patients. Patients with different refractive errors within the range of 8-25 years were taken into consideration. Data were analyzed by using SPSS version 25. A statistically significant p-value of 0.05 was considered.

RESULTS: Out of 108 patients, 38 (35.2%) were males and 70 (64.8%) were females. Majority (n=59; 54.6%) were >16 years of age. Common asthenopic symptoms included hazy vision (n=106; 98.1%), headache (n=93; 86.1%), discomfort (n=79; 73.1%), pain (n=76; 70.4%) and eye strain (n=72; 66.7%). Common refractive errors were myopia (n=59; 54.6%), hypermetropia (n=25; 23.2%) and astigmatism (n=24; 22.2%). Severity of refractive errors was mild in majority of cases of myopia (n=24/59; 40.7%) and hypermetropia (n=12/25: 48%) and moderate in astigmatism (n=16; 64%). Headache, eye strain and blurring of vision had significant association with myopia, hypermetropia, and astigmatism.

CONCLUSION: Myopia and hypermetropia are the most common refractive errors; hazy vision and headache are the common asthenopic symptoms. There is a strong association between asthenopic symptoms and refractive errors.

KEYWORDS: Refractive Errors (MeSH); Asthenopia (MeSH); Myopia (MeSH); Hypermetropia (MeSH); Astigmatism (MeSH); Headache (MeSH)

THIS ARTICLE MAY BE CITED AS: Shahid S, Rauf SA, Dastgir S, Ali F, Saifullah R, Fatima U. Association of asthenopia with refractive errors in madrassa students. Khyber Med Univ J 2023;15(2):101-5. https://doi.org/10.35845/ kmuj.2023.23247

1. University Institute of Optometry and Vision Sciences, The University of Lahore, Lahore, Pakistan

Cell #: +92-344-4441100
Email✉: sharmeen.shahid@ahs.uol.edu.pk

Date Submitted: November 10, 2022
Date Revised: April 19, 2023
Date Accepted: May 16, 2023

INTRODUCTION

Asthenopia, or ocular strain, is a condition resulting from eye fatigue or overwork, often during intense focus activities like digital screens, reading or other close-up tasks. Common symptoms include blurred vision, photophobia, headaches, stinging sensations, diplopia, eye ache, epiphora, and foreign body sensations.[1] It's often linked to refractive errors and can cause dry eye.[2] Patients might bring items closer to their eyes while reading, increasing convergence and exacerbating asthenopia.[3]

Headache associated with refractive errors is abbreviated as HARE.[4] The usage of portable digital gadgets is usually associated with asthenopia.[5] All patients with uncorrected refractive defects should have adequate and accurate corrections to reduce the symptoms of ocular tiredness.[6]

Worldwide, thirty-six million people are estimated to be blind, 188.5 million have mild visual impairment, and 216.6 million have moderate to severe visual impairment.[7] Uncorrected refractive errors are the leading cause of visual impairment. Globally, nineteen million children of <15 years' age are visually impaired. 7-31% of childhood blindness is avoidable in developing countries, 3-28% is preventable and 10-58% is treatable.[8]

Refractive errors have become one of the most common problems among school going children, especially in madrassa students who are neglected by the lack of school health services. A study on 168 madrassah students found 81.1% myopic, 7.6% hyperopic, and 11.3% astigmatic refractive errors, highlighting the need for awareness screening for potential blindness among madrassa students.[9] Another cross-sectional study at Al-Shifa Trust, found that 29% of 410 male madrassa students in Rawalpindi had uncorrected refractive errors, with mobile use being 9 times more common than non-mobile users. Family history of refractive errors and outdoor activities were associated with refractive errors in madrassa students. Myopia was the most common refractive error, followed by astigmatism and hyperopia.[10] Uncorrected refractive errors can lead to other eye diseases such as amblyopia and even blindness therefore it must be detected as early as possible.[11]

Although, there have been a few studies on the prevalence of refractive errors among madrassa students and the associated risk factors, there seems to be a lack of comprehensive awareness and screening programs for potential blindness among this specific student population in Pakistan. This gap suggests the need for further research and interventions aimed at addressing refractive errors and promoting eye health among madrassa students, particularly in terms of preventive measures and timely detection.

Table I: Demographic data distribution of the study participants

Variable		Number (n=108)	Percentage
Age (years)	8 to 12	25	23.1
	>12 to 16	24	22.2
	>16 to 21	27	25.0
	>21 to 25	32	29.6
Gender	Males	38	35.2
	Females	70	64.1
Refractive errors	Myopia	59	54.6
	Hypermetropia	25	23.2
	Astigmatism	24	22.2

Table II: Frequency of asthenopic symptoms in study subjects

Variables	Frequency	Percentage
Hazy Vision	106	98.1
Headache	93	86.1
Discomfort	79	73.1
Pain	76	70.4
Eye Strain	72	66.7
Photophobia	55	50.9
Watering	55	50.9
Tearing	43	39.8
Itching	39	36.1
Burning Sensation	30	27.8
Diplopia	26	24.1
Vertigo	24	22.2

Given that madrassa students perform a lot of close work and that there are numerous obstacles to screening madrassa students due to a lack of health services, we decided to investigate the relationship between asthenopic symptoms and refractive errors among this group of students

METHODS

The study was carried out in different madaris from September-November, 2022. The sample size was calculated through a non-probability convenient sampling technique. One hundred and eight patients were included in this study according to this sample formula =z21-d/2 p(1-P)=(0.96)2(0.62)(1-0.62)/(0.05)2

Both gender males and females having different types of refractive errors were included in this study with an age range of 8-25 years. Patients of all other ages, and having any other ocular or systemic disorders were excluded from the study. Data was collected by taking informed consent from Madrassa heads and parents of children. Study approval was taken from the institutional review board. All the patients were screened by taking their visual acuity on Snellen's chart. After screening 206 patients 108 were included in the study who had refractive errors. Retinoscopy was performed to assess their visual status and then their refraction was carried out. Ophthalmoscope was used to examine fundus to rule out any ocular pathology. So patients who had only refractive errors were included. Patients who had amblyopia, strabismus or another pathology were excluded. Data were analyzed by using SPSS version 25. Categorical variables' results were expressed as percentages and proportions. Continuous data were described using the mean and standard deviation. Pearson chi-square test was applied to analyze the association between refractive errors and asthenopic symptoms. A statistically significant p-value of 0.05 was considered.

RESULTS

Among 108 patients, 38 (35.2%) were males and 70 (64.8%) were females. Most of the asthenopic subjects belong to age group 16 to 25 years while the most common refractive error was myopia. We have checked all types of refractive errors which included 59 myopic, 25 hypermetropic and 24 astigmatic patients (Table I). The most common asthenopic symptom was hazy vision 106 (98.1%), headache 93 (86.1%), discomfort 79 (73.1%), eyestrain 72 (66.7%), diplopia 26 (24.1%) itching 39 (36.1%) watering 55 (50.9%) burning sensation 30 (29.8%), pain 76 (70.9%) tearing 43 (39.8%), photo-phobia 55 (50.9%), vertigo 24(22.2%) [Table II].

Table III shows that refractive errors are associated with asthenopic symptoms. Headache is the most common associated complaint. It has a significant association with myopia, hypermetropia, and astigmatism. The blurring of vision and eye strain is also significantly associated with all refractive errors. Discomfort is significantly associated with astigmatism and myopia. Itching is significantly reported in hypermetropia. Astigmatism and hypermetropia are significantly associated with watering. Vertigo is significantly associated with astigmatism. Astigmatic and hypermetropic patients report significant photophobia. Hypermetropic individuals report a significant complaint of pain in the eyes. The burning sensation was not clinically significantly observed in all refractive errors.

Severity of the refractive errors is presented in Table IV. Majority of the study subjects presented with mild myopia and mild to moderate hypermetropia while, moderate astigmatism is found in most of the cases.

DISCUSSION

According to our study myopia is the most common refractive defect among students and so are the asthenopic symptoms, followed by hyperopia and then astigmatism regardless of severity. Myopia is a significant concern among

Table III: Association of different refractive errors with asthenopia in study

Symptoms	Refractive Errors	P value
Headache	Astigmatism	0.05
	Hypermetropia	0.03
	Myopia	0.05
Eye strain	Astigmatism	0.03
	Hypermetropia	0.04
	Myopia	0.03
Blur vision	Astigmatism	0.05
	Hypermetropia	0.02
	Myopia	0.004
Discomfort	Astigmatism	0.01
	Hypermetropia	0.11
	Myopia	0.01
Itching	Astigmatism	0.28
	Hypermetropia	0.02
	Myopia	0.34
Watering	Astigmatism	0.002
	Hypermetropia	0.005
	Myopia	0.11
Vertigo	Astigmatism	0.03
	Hypermetropia	0.24
	Myopia	0.53
Photophobia	Astigmatism	0.01
	Hypermetropia	0.01
	Myopia	0.1
Diplopia	Astigmatism	0.29
	Hypermetropia	0.33
	Myopia	0.44
Pain	Astigmatism	0.08
	Hypermetropia	0.05
	Myopia	0.14
Burning Sensation	Astigmatism,	0.07
	Hypermetropia,	0.12
	Myopia	0.21

Table IV: Association of different refractive errors with asthenopia in study

Severity of Refractive Errors	Myopia (n=59)	Hypermetropia (n=25)	Astigmatism (n=24)
Mild	24 (40.7%)	12 (48%)	5 (20%)
Moderate	23 (39%)	10 (40%)	16 (64%)
High	12 (20.3%)	3 (112%)	4 (16%)

madrassah students as their near work is much more than other school-going students. Females are more affected than males as their ratio is higher in the general population. The most common asthenopic symptom is blurry vision followed by headache, discomfort, pain, eye strain, photophobia, watering, tearing, itching, burning sensation, diplopia, and last but not least vertigo. Depending upon socioeconomic status and age group the best possible treatment to minimize the asthenopic symptoms are spectacles.

Farva et al.,[2] conducted a study in which detailed examination of patients including visual acuity, and refractive errors, and questioning their complaints about symptoms helped in concluding that there was a close correlation between refractive errors and asthenopic symptoms were tested. 48.26% reported asthenopic symptoms. The most common complaint of the patient was headache (96.5%). The complaint of asthenopia was more in female patients (57.56%) than in 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 values $p<0.05$.[2]

Our study also shows similarities that there was a close correlation between Refractive errors and asthenopia. But differences show that there is high prevalence of myopia followed by hyperopia and astigmatism and the most common asthenopic symptom related to Refractive error was blurry vision while their study shows high prevalence of astigmatism followed by myopia and headache was the most common asthenopic symptom related to them.

Jing wang et al., conducted a study on myopia; patients were inquired about their eye habits and were requested to complete an asthenopia questionnaire and ocular examinations. Age, gender, occupation, anisometropia, eye care education, weekly outdoor activity time, duration of continuous near work, daily screen time, dry eye, near phoria, and binocular accommodative facility were calculated. Out of the 65 myopic patients, 57% showed asthenopia, 52% experienced blurry vision, 37% felt their eyes hurt or sore, and 28% felt tired when performing close work. Asthenopia patients were older than patients without asthenopia. Daily screen time, continuous near-work time, eye care education, and dry eye were positively correlated with asthenopia ($\chi^2 = 8.64$, $p=0.003$; $\chi^2 = 13.873$, $p < 0.001$, $\chi^2 = 9.643$, $p=0.002$; $\chi^2 = 7.035$, $p=0.008$).[12]

Kuswanto V et al.,[11] conducted a research in a public elementary school in Indonesia, SDN Penjaringan 10, in 2019 in which 111 students aged 10-13 years old were included. A questionnaire was used to assess asthenopia and the Snellen Chart, trial frames, and trial lenses were used for refractive errors examination. It was demonstrated that 87.4% of respondents experienced asthenopia,

and 53.2% of respondents suffered from uncorrected refractive errors, mostly due to myopia. Fisher's exact test results showed an association between refractive errors and asthenopia (p=0.019) with all myopic students experienced asthenopia. However, there was no significant association between astigmatism and asthenopia (p=0.754).[11]

Our study also shows that asthenopia related to blurry vision has the highest prevalence in myopia.

A crossectional study was on 300 students in madrrasas of Hairpur. Myopia was the leading refrective error in maddarssas population.[13] A similar study was carried out among madrassas of Lahore on 200 students between age of 9-19 years. Myopia was the most frequent refractive error.[14]

A comparative retrospective study was conducted on 90 patients to evaluate headache associated with refrective errors (HARE). A significant association was found between ametropia and headache. Moderate hyperopia had (p=0.01) and astigmatism p(0.03) were found risk factors of HARE.[15]

Our study concludes regardless of the duration and onset of refractive error which asthenopic symptoms are affecting different types of refractive errors. But this study doesn't provide the correlation of refractive errors and asthenopia in patients less than 8 years and above 25 years of age. Data sample size is very less and it has been taken from limited locality on single visit. We did not include strabismus and amblyopic patients they should also be considered in future. So in the future studies should be conducted that in a broader view.

CONCLUSION

Myopia and Hypermetropia are the most common refractive errors; hazy vision and headache are the common asthenopic symptoms. There is a strong association between asthenopic symptoms and refractive errors

The most prevalent complaints among students who took part in this study were headaches and hazy eyesight. Myopia and Hypermetropia are the most common refractive errors. The uncorrected refractive errors cause significant asthenopic symptoms. To avoid them, all patients with untreated refractive problems should be advised to rectify their refractive defects. Eye camps and social media should be used to do this.

REFERENCES

1. Hashemi H, Saatchi M, Yekta A, Ali B, Ostadimoghaddam H, Nabovati P, et al. High prevalence of asthenopia among a population of university students. J Ophthalmic Vis Res 2019;14(4):474-82. https://doi.org/10.18502/jovr.v14i4.5455
2. Afzal F, Hussain A. Correlation of Asthenopic Symptoms with Refractive Errors in Young Adults. Ophthalmol Pak 2019;9(3):7-11.
3. Twenge JM, Campbell WK. Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. Prev Med Rep 2018;12:271-83. https://doi.org/10.1016/j.pmedr.2018.10.003
4. Uchino M, Schaumberg DA, Dogru M, Uchino Y, Fukagawa K, Shimmura S, et al. Prevalence of dry eye disease among Japanese visual display terminal users. Ophthalmology 2018;115(11):1982-8. https://doi.org/10.1016/j.ophtha.2008.06.022
5. Xu Y, Deng G, Wang W, Xiong S, Xu X. Correlation between handheld digital device use and asthenopia in Chinese college students: a Shanghai study. Acta Ophthalmol 2019;97(3):e442-7. https://doi.org/10.1111/aos.13885
6. Heus P, Verbeek JH, Tikka C. Optical correction of refractive error for preventing and treating eye symptoms in computer users. Cochrane Database Syst Rev 2018;4(4):CD009877. https://doi.org/10.1002/14651858.CD009877.pub2
7. Bourne RRA, Flaxman SR, Braithwaite T, Cicinelli MV, Das A, Jonas JB, et al. Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis. Lancet Glob Health 2017;5(9):e888-97. http://dx.doi.org/10.1016/S2214-109X(17)30293-0
8. Kong L, Fry M, Al-Samarraie M, Gilbert C, Steinkuller PG. An update on progress and the changing epidemiology of causes of childhood blindness worldwide. J AAPOS 2012;16(6):501-7. http://dx.doi.org/10.1016/j.jaapos.2012.09.004
9. Zahra T, Hussain I, Munawar S, Baig S, Bokhari NM. Prevalence of refractive errors and the factors related to it among madrassa students in district Sialkot. Professional Med J 2020;27(1):143-51. https://doi.org/10.29309/TPMJ/2019.27.01.4006
10. Rehman AU, Sughra U, Kausar S, Riaz A, Suleman M. Uncorrected Refractive Error among Male Students of Madrassas in Rawalpindi–Pakistan. Pak J Ophthalmol 2022;38(2). https://doi.org/10.36351/pjo.v38i2.1327
11. Kuswanto V, Kurniawan F, Amita ASD. Association between Refractive Error Types and Asthenopia in Primary School Students. Majalah Kedokteran Bandung (Bandung Med J) 2021;53(3):126-31. https://doi.org/10.15395/mkb.v53n3.2236
12. Wang J, Zeng P, Deng XW, Liang JQ, Liao YR, Fan SX, et al. Eye habits affect the prevalence of asthenopia in patients with myopia. J Ophthalmol 2022;2022:8669217. https://doi.org/10.1155/2022/8669217
13. Atta Z, Arif AS, Ahmed I, Farooq U. Prevalence of refractive errors in Madrassa students of Haripur district. J Ayub Med Coll Abbottabad 2015;27(4):850-2.
14. Altaf A, Khalid M, Raza AH. Prevalence of refractive errors in madrassa students of Lahore. Ophthalmol Update 2018;16(2).
15. Lajmi H, Choura R, Achour BB,

Doukh M, Amin Z, Hmaied W. Headache associated with refractive errors: Characteristics and risk factors. Revue Neurologique 2021;177(8):947-54.

AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

SS: Concept and study design, analysis and interpretation of data, drafting the manuscript, critical review, approval of the final version to be published

SAF, SD, FA, RS & UF: Acquisition of data, drafting the manuscript, approval of the final version to be published

RS & UF: Concept and study design, acquisition, analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE

Authors declared no specific grant for this research from any funding agency in the public, commercial or non-profit sectors

DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request

KMUJ web address: www.kmuj.kmu.edu.pk
Email address: kmuj@kmu.edu.pk