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A REVIEW OF THE FREQUENCY AND TYPES OF AMBLYOPIA AND REFRACTIVE ERRORS IN THE MADRASA STUDENT POPULATION

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Abstract

Background: *The common causes of visual impairment in children are amblyopia, uncorrected refractive errors such as myopia, hypermetropia and astigmatism. More often, students in madrasas spend more hours in near-point activities and therefore constitute a population with high risk for developing vision disorders with different illumination conditions.*

Purpose: *This review highlights the frequency and prevalence of amblyopia and types of refractive errors in madrasa students, emphasizing the importance of vision testing and the impact and effect of environmental factors on the visual health of madrasa students.*

Materials and Methods: *The madrasa students were gone through ophthalmic examinations using the eye examination instruments like Trial Box, Snellen chart, Ishihara plates, and Pelli-Robson contrast sensitivity chart. Data collection was done and recorded through a structured proforma on the frequency and prevalence of types of refractive errors and amblyopia in madrasa student population.*

Results: *This article review indicated that the frequency and prevalence of myopia was higher in madrasa students as compared to hypermetropia, astigmatism, and amblyopia. The most common refractive error was myopia (31.1%) then astigmatism (14.9%) and hyperopia (3.5%). 8.1% of the students were diagnosed with amblyopia. Most students had normal vision, though a small percentage showed moderate impairment. Spectacle use was low despite the presence of refractive errors. Environmental and behavioral factors such as inadequate lighting and shorter reading distances were commonly reported.*

Conclusion: *The included studies concludes that myopia is the most prevalent refractive error among madrasa students, followed by amblyopia at a significant rate. Undesirable environmental and behavioral factors contribute significantly to these visual problems, such as inadequate lighting, short distances of reading, and the continuous performance of near-work activities. Regular vision screening programs, better illumination of classrooms, and creating awareness about visual hygiene can help reduce the burden of undiagnosed refractive errors and amblyopia*

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in madrasa communities.

INTRODUCTION

Visual impairment is a degree of loss of vision that requires an aid and sometimes cannot be corrected by any means, whereas blindness is complete or near-complete vision loss. According to WHO uncorrected refractive errors (43%), cataracts (33%), and glaucoma (2%) are the most common causes of visual impairment. The estimated pool prevalence of myopia, hyperopia and astigmatism in children globally is 11.7%, 4.6% and 14.9% respectively. In children <15 years an estimated 19 million are visually impaired, of these 12 million are due to refractive error.[i] Refractive errors have become one of the most prevalent problems among school-going children-especially in the madrassa students left behind by the lack of school health services. A previous included studies 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.[ii] These problems can be addressed and the loss of educational performance can be prevented through provision of eye glasses or medication and relevant vision therapy.[iii]

Amblyopia a neurodevelopmental visual disorder characterized by a reduction in best-corrected visual acuity. The etiology of amblyopia is multifactorial, and strabismus is one of the most important and preventable causes in pediatric populations.[iv] and is mainly associated with conditions such as strabismus, amblyopia, anisometropia, and binocular vision anomalies.[v]

The amblyopia treatment studies (ATSs) helped change the outlook on amblyopia therapy. The ATS 3 clearly showed that amblyopia therapy can improve VA in children till the age of 17 years.[vi] Amblyopia is commonly of either refractory, strabismic, sensory deprivation or of meridional type.[vii] The refractive errors are seldom fully corrected and result in fatigue in the eye as a result of accommodation compensation mechanism and have a spectrum of symptoms up to headaches.[viii] The prevalence is reported to be 1–6% in children and 1.43–5.64% in adults. Patients with amblyopia have reduced reading speed, abnormal fine motor skills, and reduced stereo acuity. [ix]

Since amblyopia is primarily a childhood disease, parents should be aware and have sufficient knowledge of the disorder to seek medical intervention for optimal outcomes.[x]

Material and Methods

The studies included was conducted in the Madrasa. This setting was chosen because the target population was easily accessible, and a sufficient number of madrasa students were available and are affected by refractive errors. The environment provided a diverse sample with varied visual conditions, hence being very suitable for included studiesing the prevalence and pattern of refractive errors and amblyopia. The fact that most madrasa authorities were very cooperative and the students willing to participate contributed to smooth data collection.

The students underwent comprehensive ophthalmic examinations using the Trial Box, Snellen chart, Ishihara chart, and Pelli-Robson contrast sensitivity chart. Data collection was done through a structured proforma with emphasis on the prevalence of various types of refractive errors and amblyopia.

The included studies were adequate for conclusions regarding to the frequency and prevalence of types of refractive errors and amblyopia in the madrasa student population. The large sample helped for reliability in data analysis.

The inclusion criteria were strictly defined to ensure enrollment of only relevant participants in the studies. Students from madrasas were included in the studies. Participants with refractive errors or amblyopia were considered eligible, and normal individuals without any visual impairment were also included in order to establish comparison. Both male and female subjects, aged between 5 to 15 years, were included in the studies. Consistency of evaluation was ensured by examining both eyes of each participant.

To keep the results accurate and on target, some participants were excluded. Children below 5 years of age and those above the age of 15 years were excluded. Additionally, mentally challenged persons were excluded due to the problem that arises in

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getting an appropriate response and cooperation when test of procedures is being conducted. Individuals with eye diseases other than refractive error and amblyopia have not been included because other disorders will affect the results and bias the result as well.

Results and Findings

The included studies in the review present an overview of the demographic characteristics such as age and gender, vision status in madrasa students highlighting eye health and associated risk factors in the madrasa student population. Most participants were adolescents, particularly between age 13 to 15 years of age. The older students were more prominently as compared to younger students in the madrasas.

Table 1 shows that visual health assessments of madrasa students revealed many ocular conditions, as half of the students in madrasas were affected by refractive errors and a smaller ratio were diagnosed with amblyopia. A small proportion of students had one non-seeing eye means the eye with amblyopia, while most students maintained very useful eye vitals in both eyes. The majority of madrasa students had never undergone amblyopic eye patch therapy, due to a huge gap in awareness, lack of accessibility and utilization of standard treatment options for amblyopia. The distribution of specific types of refractive errors in the review showed that myopia was the most common visual defect in madrasa students, followed by astigmatism, while hypermetropia was least common.

Table 1

Category	Variable	Result (%)	Interpretation
Demographics	Gender	Females: 60.5% Males: 39.5%	Higher representation of females among participants.
Demographics	Age Distribution (5–15 years)	13–15 yrs: 60.3% 5–9 yrs: 20% 9–12 yrs: 19.7%	Majority belong to early teenage group.
Refractive Errors	Myopia	31.1%	Most common refractive error.
Refractive Errors	Astigmatism	14.9%	Second most common refractive error.
Refractive Errors	Hyperopia	3.5%	Least prevalent refractive error.
Visual Health	Amblyopia	8.1%	Affects a smaller subset of the population.
Behavioral Factors	Included studies / Screen Time	56.5% included studies 2–5 hrs/day	Indicates moderate daily included studies habits.

Only a small ratio of students was affected those who wear spectacles. Spectacle wearing routine reflected another important factor of visual care. Not using glasses was linked to easy access to optometric and eye services, non-compliance, financial issues, or cultural beliefs regarding spectacles or glasses wear.

Environmental and research studies relevant were also included. Most of the madrasa students preferred studying under natural sunlight and bright light, thus emphasizing awareness of adequate light condition for maintaining eye comfort and preventing ocular strain.

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Half of the madrasa students were possessed normal color vision, while minority of the students exhibited abnormal color vision. Most students demonstrating normal levels of contrast sensitivity though a notable population of madrasa students exhibited reduced contrast sensitivity that effect reading proficiency and ocular comfort under different lighting conditions.

All students had normal and intact visual field and peripheral vision. The evaluation of visual fields demonstrating overall normal and healthy visual function with very minimal conditions affecting the visual pathways or retina of the eyes. But important drawbacks were demonstrated, such as high rates of refractive conditions, non-compliant to spectacles, limited easy access to amblyopic therapies and awareness, and a notable frequency, prevalence and incidence of abnormalities in color and contrast sensitivity in madrasa students. These findings explain the importance of the need for regular school-based eye screenings, follow-ups, and education regarding eye-health to ensure normal eye development and academic potential in madrasa students.

Discussion

The collected results from different included studies demonstrate that lazy eye was cause because of developmental visual disorder result in reduced best-corrected visual acuity in one or both eyes, without any recognizable structural and fundus abnormality of the visual pathway.[xi] Refractive errors are the most common among its etiological factors. The relationship between refractive error and lazy eye is significant. Anisometropia can cause blur vision in the more ametropic eye means in the eye with more refractive error, resulting in suppression of eye vitals and subsequent amblyopia or lazy eye.[xii] Half association of amblyogenic risk are with hypermetropic and astigmatic patients and they may be asymptomatic until visual screening has done.[xiii]

Studies demonstrate that uncorrected amblyopia increase the risk of anisometropic refractive errors, more than 1.00–1.50 D in hypermetropia or 2.00 D in astigmatism[xv]

In younger madrasa population, refractive error correction can lead to significant visual improvement. The Pediatric Eye Disease Investigator Group (PEDIG) correctly explains the importance of early spectacle correction improved visual acuity in about 77 percent of anisometropic lazy eye patients.[xvi] Adjunctive amblyopic therapies such as occlusion therapy or atropine penalization yield sufficient improvement in many cases.[xvii]

The timing duration of amblyopic therapy like occlusion therapy is another crucial factor. Neural plasticity of the visual cortex declines with age; therefore, amblyopia therapy is most effective when initiated before the age of 7–8 years.[xviii] Nonetheless, recent studies suggest that improvement is still possible in older children and even adults, albeit to a lesser extent.[xix] This finding challenges the traditional notion of a rigid critical period for amblyopia treatment.

Despite progress in understanding amblyopia's refractive basis, challenges persist in screening and public awareness. Many cases of refractive amblyopia remain undiagnosed until after the critical period, especially in low-resource settings.[xx] Hence, integrating vision screening programs in early childhood education is essential for timely detection and management.

Conclusion

The combined findings of all the reviewed studies that myopia is much more widespread than other refractive abnormalities and amblyopia among students in the madrasa community. The distribution of myopia did not differ by gender, suggesting that boys and girls are afflicted at comparable rates. Environmental and behavioral factors within the learning setting particularly suboptimal room illumination, short reading distance, and complicated or poorly timed reading intervals appear to be the major contributors to visual strain and impaired eyesight. Data obtained from different madrasas indicated greater incidence of myopia as compared to hypermetropia, astigmatism, and amblyopia, emphasizing a need for primary prevention of amblyopia. Enhancing classroom and study room light conditions at reading distances, and taking frequent studies breaks while using screen, and promoting routine eye examinations should be the top priorities for interventions in amblyopic patients. Referrals for glasses and parent awareness initiatives may significantly reduce the burden of uncorrected

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refractive error and promote improved visual health and academic performance.

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