RESEARCH ARTICLE

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Myopia and Vision Related Quality of Life: A Closer Look at Need of Vision Screening in School-Aged Children

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Abstract

Aim: This study was conducted to assess the need for vision screening and vision-related quality of life in school-aged myopic children. **Method:** The cross-sectional study was conducted from October 2023 to January 2024 on 248 school-going children using convenient sampling. A comprehensive eye examination was carried out to rule out myopia. A validated questionnaire was used to collect the data which contained three sections: Academic-related activities, sports/ physical activities and psycho-social life along with the participant's demographic data. Informed consent was obtained from the principal of the school. Ethical approval was taken from the Institutional Ethical Committee. The data was analysed using SPSS version 22. **Results:** Out of a total of 248 participants, 44.75% (111) were male and 55.24% (137) were female with a mean age of 11±1.6 years. The majority of participants 51.20% (127) were from rural areas. Of the total, 54.43% (135) were from private schools and 45.56% (113) were from government schools. The majority of the children belonged to the age group 14-16 years and had mild myopia. The overall impact of uncorrected myopia on vision-related quality of life was 39.44% on academic activities at school and home, 31.38% on physical and sports-related activities and 12.90% on psycho-social behaviour. **Conclusion:** The vision screening program was found to be useful in the early detection and timely management of refractive error. Myopia depends on the age and gender of the individual and it increases with increased age. Uncorrected myopia has a negative impact on the vision-related quality of life of school-aged children with respect to their academic activities, physical and sports-related activities and psycho-social behaviour. Near-sighted activities like reading books, doing homework and playing carom are less affected as compared to activities requiring distant vision such as telling the time from the wall clock, reading and coping from the classroom board and focusing on the ball while playing, etc.

Major Finding: Myopia is increasing day by day because of the increasing demand for near-work and digital devices. Vision screening camps were found to be useful to rule out Myopia among school going & Myopia had a negative impact on the vision-related quality of life among which also hamper academic activities, physical and sports-related activities and psycho-social behavior of school aged Children.

Keywords: Myopia, Quality of Life, Refractive Error, Vision, Vision Screening

1. Introduction

Vision, one of the five senses, gives people the ability to see, which is necessary for everyday life and normal growth. To see well, one needs a pair of eyes, which serve as a receiver for signals sent to the brain via the optic nerves for interpretation of information. Reduced vision, if left untreated, might result in blindness due to abnormality in the eye or nerves. While impaired vision is typically linked to ageing and the elderly, it can also

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affect the youth, with consequences that include lost educational or job opportunities and a general decline in quality of life due to disengagement from the outside world[1]. According to recent studies and reports from the World Health Organisation (WHO), refractive errors account for 43% of visual impairment, making them the primary cause of visual impairment affecting people of all ages and races and the second cause of visual loss globally[2,3]. Uncorrected refractive error was a priority of the VISION 2020: The Right to Sight program because of the necessity for interventions, such as spectacles, contact lenses and surgery to enable the light to focus on the retina so that one can have clear vision[4]. The condition known as myopia, often referred to as shortsightedness or nearsightedness, is brought on by the increased axial length of the eye, which causes light to focus in front of the retina which can be treated with the help of glasses or contact lenses[3].

The number of individuals with myopia has been predicted to increase from 1.4 billion in 2000 to 2.6 billion in 2020 and 3.4 billion in 2030 due to changes in lifestyle, such as less time spent outside and more near-work activities[3]. A child's visual function is essential to their general health and well-being and is crucial to their physical, mental, social and emotional growth. In the educational context, vision matters. Improved vision has been linked to enhanced academic achievement[5].

A pediatric vision screening is an examination intended to identify decreased visual acuity and/ or risk factors endangering the development of the child's eye and visual system[6]. Vision screening is crucial in identifying visual disorders in children who do not exhibit symptoms of disease or impairment. This helps with early diagnosis and treatment, minimising the negative effects of untreated conditions on children's development of their vision, as well as their educational and social outcomes[7].

Refractive errors result in an unfocussed image falling behind or in front of the retina, causing blurred vision of different types[8]. Uncorrected refractive error is associated with reduced Quality-of-Life (QoL) and loss of economic productivity and educational and employment opportunities[9].

2. Materials and Methods

This cross-sectional study was conducted in Moradabad, Uttar Pradesh between October 2023 to January 2024. The study aimed to assess the need for vision screening among school-going myopic children of Moradabad, Uttar Pradesh. The study was conducted on 248 school-going children. The inclusion criteria were myopic school-going children without any other ocular anomalies. Convenient sampling was used for the study. An organised, self-administered, validated questionnaire was used to collect the data. The questionnaire was presented in English and Hindi language to make it suitable for children to understand. The questionnaire contained the following three sections: Academic-related activities, Sports/ physical activities and Psycho-social life along with the participant's demographic data. Informed consent was obtained from the principal of the school before conducting the examination and filling out the questionnaire from students. The data was collected from the schools of rural and urban areas through a vision screening camp.

2.1 Data Analysis

The data was analysed using SPSS version 22. Descriptive analysis was used including frequency, average, percentage and standard deviation. One-way ANOVA was used as inferential statistics. A P-value of less than 0.05 was considered as significant.

3. Results

3.1 Demographic Details of Participants

This cross-sectional study was conducted among 248 myopic school-going children aged 8 to 16 years in Uttar Pradesh. Out of the total participants, 44.75% (111) were male and 55.24% (137) were female with an average age of 11±1.6 years as shown in Figure 1. Out of the total participants, 48.79% (121) were from urban areas and 51.20% (127) were from rural areas. Of the total, 54.43%

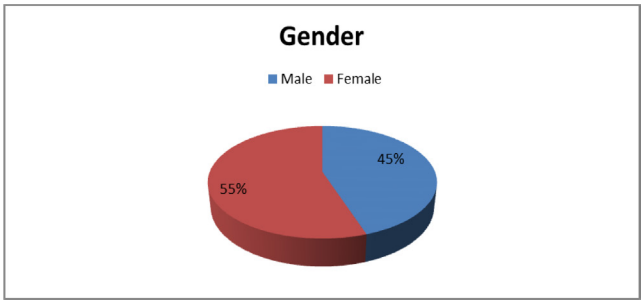


Figure 1. Gender distribution of participants.

(135) were from private schools and 45.56% (113) were from government schools.

3.2 Distribution of Myopia According to its Severity in Different Age Groups among Male and Female Myopes

Table 1 shows that the total number of participants having mild myopia was 66.12% (164). Out of the total mild myopia participants, 25.80% (64) were male and 40.32% (100) were female. Out of a total of 25.80% (64)

Table 1. Myopia in different age groups among myopic male and female participants

Grade of Myopia (As per AOA*)	Age (in Years)			Total	P-value
	8-10	11-13	14-16		
Male					
Mild (Less than 3.0D)	6.45% (16)	8.46% (21)	10.88% (27)	25.80% (64)	0.00
Moderate (3.0 D to 6.0D)	00	00	12.50% (31)	12.50% (31)	
Severe (More than 6.0D)	00	1.20% (3)	5.24% (13)	6.45% (16)	
Female					
Mild (Less than 3.0D)	5.64% (14)	6.45% (16)	28.22% (70)	40.32% (100)	0.00
Moderate (3.0 D to 6.0D)	2.01% (5)	2.82% (7)	7.66% (19)	12.50% (31)	
Severe (More than 6.0D)	00	00	2.41% (6)	2.41% (6)	
AOA-American Optometry Association					

Table 2. Vision-related quality of life of myopic participants

Parameters	Response	
	Yes	No
Limitation of Academic-Related Activities		
At Home		
Difficulty in doing homework.	14.19% (37)	85.08% (211)
Difficulty in telling the time from a wall clock.	57.66% (143)	42.33% (105)
Difficulty in reading books	24.59% (61)	75.40% (187)
At School		
Difficulty in reading and copying from the board.	69.35% (172)	30.64% (76)
Copy from a friend/ ask the teacher to dictate.	31.45% (78)	68.54% (170)
Mean Response	**39.44% (98.20)**	**60.39% (149.80)**
Limitation of Physical / Sports-Related Activities		
Difficulty to focus and track the ball while playing.	52.01% (129)	47.98% (119)
Difficulty to aim while playing Carom.	18.14% (45)	81.85% (203)
Limitations Related to Mobility		
Bumping into objects while walking.	9.27% (23)	90.72% 225)
Difficulty in cycling.	13.30% (33)	86.69% (215)
Difficulty in moving around in the dark.	74.19% (184)	25.80% (64)
Mean Response	**31.38% (82.80)**	**66.60% (165.20)**
Psycho-Social Impact		
Difficulty in interacting with people due to your vision problem.	12.90% (32)	87.09% (216)

male participants, 6.45% (16) belonged to the age group 8-10, 8.46% (21) belonged to the age group 11-13 years, 10.88% (27) belonged to age group 14-16 years. Similarly, of the total, 40.32% (100) female participants, 5.64% (14) belonged to the age group 8-10 years, 6.45% (16) belonged to the age group 11-13 years and 28.22% (70) belonged to age group 14-16 years.

Similarly, the total number of participants having moderate myopia was 25% (62). Out of the total moderate myopia participants, 12.50% (31) were male and 12.50% (31) were female. Among 12.50% (31) of males having moderate myopia, all belonged to the age group 14-16 years. Similarly, of the total 12.50% (31) female moderate myopic participants, 2.01% (5) belonged to the age group 8-10 years, 2.82% (7) belonged to the age group 11-13 years and 7.66% (19) belonged to the age group 14-16 years.

Similarly, the total number of participants having severe myopia was 8.86% (22). Out of the total severe myopia participants, 6.45% (16) were male and 2.41% (6) were female. Out of the total 6.45% (16) male participants having severe myopia, 1.20% (3) belonged to the age group 11-13 years and 5.24% (13) belonged to the age group 14-16 years. Similarly, of the total, 12.50% (31) female myopes had severe myopia and 2.41% (06) belonged to the age group 14-16 years.

3.3 Vision-Related Quality of Life

Evaluation of the limitations of academic-related activities at home shows that among 248 participants, 14.19% (37) myopic students had faced difficulty in doing homework whereas 85.08% (211) students haven't faced any difficulty in doing homework. Similarly, 57.66% (143) myopic students reported difficulty in telling the time from a wall clock whereas 42.33% (105) myopic students had reported that they did not face any difficulty in doing so. Similarly, 24.59% (61) of myopic students had limitations in reading books.

While assessing the limitations of academic-related activities at school, among all the 248 participants, it was observed that 69.35% (172) myopic students faced difficulty in reading and copying from the board whereas 30.64% (76) myopic students had reported that they did not face any such problems. Similarly, 31.45% (78) of myopic students had reported that they felt the need to ask the teacher to dictate again or a friend for a copy, whereas 68.54% (170) of myopic students did not face this problem.

When assessing the limitations of physical / sports-related activities, it has been found that 52.01% (129) myopic participants were facing difficulty focusing and tracking the ball while playing while 47.98% (119) were not. Similarly, 18.14% (45) myopic participants were unable to aim while playing carom as against 81.85% (203) myopic participants who did not share a similar experience.

Further, while assessing the limitation related to mobility, it has been observed that 9.27% (23) of myopic participants had bumped into objects while walking. About 13.30% (33) myopic participants were facing difficulty in cycling whereas 86.69% (215) myopic participants were not facing any problems while cycling. Similarly, 74.19% (184) myopic participants were facing difficulty in moving around in the dark while 25.80% (64) myopic participants did not face similar issues.

Psycho-social impact of myopia was observed as 12.90% (32) myopes reported that they felt uncomfortable while interacting with people due to their vision problem as shown in Table 2.

4. Discussion

Screening programme was found to be very effective in the early detection of various ocular anomalies including refractive error in the pediatric age group. One study conducted by Silverstein *et al.* reported that vision screening led to the detection of 18 ocular conditions with refractive error as the most common[10].

The prevalence rate of myopia was 12.20% in this study while Wadhwani M *et al.*, reported that the prevalence rate of myopia was 3.7% in their study. Also, it was found that 51.1% of male and 48.9% of female children were myopic and the prevalence of myopia increased with increasing age. This study showed that the prevalence of myopia was higher in the higher age group (14-16 yrs) among both male 63.96% and female 69.34% participants[11]. Similarly, the prevalence of myopia was 8.5% and 6.1% in urban and rural children as reported by the study conducted by Agarwal D[12]. The prevalence of myopia was 17.5% in the study conducted by Gopal Krishnan A. *et al.*, which was quite near to the findings of the current study. The prevalence of myopia was higher in females at 55.24% as compared to males at 44.75% in this study. Similarly, boys had a slightly lower prevalence

of myopia at 14.8% than girls at 15.5%, but there was no statistically significant difference reported in the study conducted by Gopal Krishnan A. *et al*. They found that the frequency of myopia in the 13-16 age groups was also much greater than in the 11-12 age groups. Boys had a slightly lower prevalence of myopia at 14.8% than girls at 15.5%, but there was no statistically significant difference. The frequency of myopia varied statistically significantly between students attending urban schools (16.4%) and suburban schools (12.5%)[13].

The prevalence of myopia was 27.1% in the study conducted by Peng W *et al*, which reported that myopia was substantially correlated with the following factors: gender, grade, mother's and father's educational levels, children's academic levels, number of after-school tutoring sessions per week, amount of homework completed on weekends and frequency of extracurricular reading. Myopia was more common in males at 24.9% than in girls at 29.5%, with a statistically significant difference[14]. Makhdoum H *et al.* reported that Al-Madinah and its provinces showed a 57.3% prevalence rate of myopia among college students, with 87.9% of them having myopia in both eyes[15]. While the study conducted by Zhang *et al.* in Shenyang showed that 60% of children enrolled in elementary and intermediate schools had myopia in 2021. They reported that male students, had a frequency of 57% of myopia, and female students had a greater incidence of myopia at 63% which was similar to the current study[16].

It has been observed that the prevalence rate of myopia was higher in China as compared to India as shown in the study conducted by Zhang D *et al.* and Zhou *et al.* in China[16,17].

Zhou *et a.l* found the prevalence of myopia at 94% among high school students[17].

The study conducted by Ziqian Zhu *et al.* showed that students with varying visual states also showed substantial differences in general vision, near and far activities, social functioning, mental health, role challenges, reliance, colour vision, peripheral visual and total scores. Regarding overall health or ocular discomfort in students, there were no significant changes between the myopes and emmetropes. A current study showed that more than 25% of myopic participants had reduced VRQOL (academic-related activities, sports/physical activities and psycho-social behaviour) due to undetected and uncorrected myopia. A similar trend was observed in the study conducted by Ziqian Zhu *et al.* which showed myopes had worse overall quality of life ratings on the NEI VFQ-25 than those with normal vision. According to the correlation analysis, study time had a negative association and wearing glasses had a positive correlation with the overall quality of life ratings of myopia students. Study time, wearing spectacles, and age were risk variables impacting myopia students' quality of life[18]. Rewri P *et al.* found that across all age categories, hyperopia was the most prevalent form of refractive error. Ametropia did not significantly differ in frequency or pattern based on gender[19]. Yadav RK *et al.* suggested that education to teachers and parents about the consequences of not using refractive correction adequately is crucial. Education towards eye care can be incorporated into the curriculum of children so that the compliance rate or spectacle utilisation can be enhanced and visual impairment and its burden on individuals and society can be reduced[20].

5. Conclusion

It has been concluded that the incidence of myopia is increasing day by day because of the increasing demand for near-work and digital devices. Vision screening camps were found to be useful in the early detection and timely management of refractive error. The myopia depends on the age and gender of the individual. Myopia increases with increased age. Uncorrected myopia had a negative impact on the vision-related quality of life of school-aged children in reference to their academic activities, physical and sports-related activities and psycho-social behaviour. Near-sighted activities like reading books, doing homework and playing carom are less affected as compared to the activities related to distant vision such as watching time from the wall clock, reading and copying from the class board and focusing on the ball while playing, etc.

6. References

1. Ebeigbe JA, Kio F, Okafor LI. Attitude and beliefs of Nigerian undergraduates to spectacle wear. Ghana Med. J. 2013; 47(2):70-3.
2. Misra V, Vashist P, Malhotra S, Gupta SK. Models for primary eye care services in India. Indian J Community Med. 2015; 40(2):79-84. https://doi.org/10.4103/0970-0218.153868

3. IAPB. Uncorrected refractive error [Internet]. Available from https://www.iapb.org/learn/knowledge-hub/eye-conditions/uncorrected-refractive-error/ Cited in 2024.
4. Mahjoob M, Nejati J, Hosseini A, Bakhshani NM. The effect of the Holy Quran voice on mental health. J. Relig Health. 2016; 55:38-42. https://doi.org/10.1007/s10943-014-9821-7
5. Michael SL, Merlo CL, Basch CE, Wentzel KR, Wechsler H. Critical connections: Health and academics. J Sch Health. 2015; 85(11):740-58. https://doi.org/10.1111/josh.12309
6. Olsen TW, Harris J, Mizuiri D, Ambrus A, Lum FC. Pediatric eye evaluations preferred practice pattern (R) I. Vision screening in the primary care and community setting II. Comprehensive Ophthalmic Examination Pediatric. Ophthalmol. 2018; 125(1):P184-227. https://doi.org/10.1016/j.ophtha.2017.09.032
7. Atowa UC, Wajuihian SO, Hansraj R. A review of paediatric vision screening protocols and guidelines. Int J Ophthalmol. 2019; 12(7):1194. https://doi.org/10.18240/ijo.2019.07.22
8. Kaphle D. Validation and use of quality of life impact of refractive correction questionnaire in spectacle wearers in Malawi: A clinic-based study. Malawi Med J. 2020; 32(2):54-63. https://doi.org/10.4314/mmj.v32i2.2
9. Alvarez-Peregrina C, Villa-Collar C, Andreu-Vazquez C, Sánchez-Tena MÁ. Influence of vision on educational performance: A multivariate analysis. Sustainability. 2021;13(8):4187. https://doi.org/10.3390/su13084187
10. Silverstein M, Scharf K, Mayro EL, Hark LA, Snitzer M, Anhalt J, Pond M, Siam L, Tran J, Hill-Bennett T, Zhan T. Referral outcomes from a vision screening program for school-aged children. Can J Ophthalmol. 2021; 56(1):43-8. https://doi.org/10.1016/j.jcjo.2020.07.009
11. Wadhwani M, Vashist P, Singh SS, Gupta V, Gupta N, Saxena R. Myopia prevalence in a population-based childhood visual impairment study in North India-CHVI-2. Indian J Ophthalmol. 2022; 70(3):939-43. https://doi.org/10.4103/ijo.IJO_974_21
12. Agarwal D, Saxena R, Gupta V, Mani K, Dhiman R, Bhardawaj A, Vashist P. Prevalence of myopia in Indian school children: Meta-analysis of last four decades. PloS one. 2020; 15(10):e0240750. https://doi.org/10.1371/journal.pone.0240750
13. Gopalakrishnan A, Hussaindeen JR, Sivaraman V, Swaminathan M, Wong YL, Armitage JA, Gentle A, Backhouse S. Prevalence of myopia among urban and suburban school children in Tamil Nadu, South India: Findings from the Sankara Nethralaya Tamil Nadu Essilor Myopia (STEM) Study. Ophthalmic Physiol Opt. 2022; 42(2):345-57. https://doi.org/10.1111/opo.12943
14. Peng W, Zhang Z, Wang F, Sun S, Sun Y. Association of educational environment with the prevalence of myopia: A cross-sectional study in central China. Front. Public Health. 2023; 11:1188198. https://doi.org/10.3389/fpubh.2023.1188198
15. Makhdoum H, Alrehaili A, Albelowi A, Aljabri GH, Alamri RA, Alawfi B, Alsaedi S, Garah RA. Prevalence of myopia and its related factors among university students in Madinah, Saudi Arabia. Cureus. 2023; 15(11). https://doi.org/10.7759/cureus.49656
16. Zhang D, Sun B, Wu M, Liu H, Zhou L, Guo L. Prevalence and associated factors of myopia among school students in Shenyang, China: A cross-sectional study. Front Public Health. 2023; 11:1239158. https://doi.org/10.3389/fpubh.2023.1239158
17. Zhou Y, Huang XB, Cao X, Wang M, Jin NX, Gong YX, Xiong YJ, Cai Q, Zhu Y, Song Y, Sun ZM. Prevalence of myopia and influencing factors among high school students in Nantong, China: A cross-sectional study. Ophthalmic Res. 2023; 66(1):27-38. https://doi.org/10.1159/000524293
18. Zhu Z, He Y, Yang J, Li Q, Cheng H, Zhong L, Wang T, Wang T, Ling S. Study time, glasses utilization and age affect quality of life among senior first-year Chinese myopia students. Eur J Ophthalmol. 2021; 31(6):2969-76. https://doi.org/10.1177/1120672120982528
19. Rewri P, Nagar CK, Gupta V. Vision screening of younger school children by school teachers: A pilot study in Udaipur city, western India. J Ophthalmic Vis Res. 2016; 11(2):198. https://doi.org/10.4103/2008-322X.183920
20. Yadav RK, Rani A, Chander A. Spectacle adherence and barriers towards spectacle wear among primary school going children. Int J Res Med Sci. 2023; 11:967-70. https://doi.org/10.18203/2320-6012.ijrms20230582

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