ASSESSMENT OF REFRACTIVE ERRORS IN SCHOOL GIRLS IN A RURAL SETTING

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ABSTRACT

Background: Among children, undiagnosed refractive error is the second most common cause of curable blindness and the major cause of visual disability these days. Children often do not complain of visual problems and may not even be aware of their symptoms. Ophthalmic screening programs in school children are not only essential but are also valuable School screening programs assist in early detection of amblyopia and its risk factors such as strabismus, refractive errors and media opacities

Methods: A total of 155 schoolgirls between ages 5 to 18 years were included in the screening process at a Government Higher Secondary School in April 2019. The students were asked to fill in a self-devised questionnaire for a superficial ocular assessment. Next, visual acuity was measured with Snellen distant vision chart. Data was analyzed using IBM SPSS Version 23. Data was checked for normality of distribution by Shapiro-Wilk test. Frequency and percentages of refractive errors were determined. A p-value ≤ 0.05 was considered statistically significant.

Results: The frequency of girls having right eye error was more than those having it in left eye and the percentage of girls having failed visual acuity in either eye i.e VA<6/12 was 17.4%. Pearson Chi Squared test was applied to determine any relationship between categorical variables and it showed significance between reading from books, threading the needle 0.000 and parents wearing glasses. (p-value<0.05).

Conclusion: Awareness about causes of refractive errors must be prioritized. Annual screening should be made mandatory in schools of both urban as well as rural setting, health education programs, walks, seminars should be conducted in order to create awareness amongst the general masses, and last but not the least smartphone usage hours should be restricted in children in order to prevent them from the deleterious effects of this gadget.

key words: Refractive errors, Screen time, School girls.

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INTRODUCTION

Vision plays a pivotal role in the intellectual growth of a child. Visual impairment in children is a global problem these days and one of the major root causes of childhood morbidity. Most of these can either be easily prevented or treated through early detection. It is estimated that across the globe 1.5 million children are suffering from blindness and out of these almost one million are Asian. [1]

Among children, undiagnosed refractive error is the second most common cause of curable blindness and the major cause of visual disability these days. Uncorrected refractive errors accounts for over 11.4% of the blindness in Pakistan. Most of the children with uncorrected refractive errors show no symptoms and hence screening helps in timely detection and appropriate intervention.[2] Compared to environmental factors; genetic factors may attribute to early development of refractive errors in children.[3]

Children often do not complain of visual problems and may not even be aware of their symptoms. They may

adjust to visual impairment by adopting certain strategies like shifting position in the classroom, moving articles closer and avoiding tasks that involve more visual concentration. Therefore, screening of children for early detection and intervention is strongly recommended so that they can have the best opportunities to learn and develop.[4] Increasing refractive errors worldwide including Pakistan is due to increased screen time among school going children due to overuse of electronic devices and other gadgets like mobile phones.[5]

This problem has hit both rural and urban population equally. Rapid urbanization in rural areas may be attributed to higher prevalence of refractive errors and with greater access to electronic devices due to changes in social behavior and economic conditions, along with the easy availability of electricity which has encouraged children to become inactive. They remain indoors and become involved in activities like gaming on mobiles which cause more strain on eyes and are harmful.[6] The recent societal shift to indoor activities is contributing to the myopia epidemic and is adversely affecting children's eyes worldwide.[7] It has been known for many years now that blue light emitted from these devices is phototoxic for the retina. However, the percentage transmission of blue light is age related and is higher in children than adults.[8]

Ophthalmic screening programs in school children are not only essential but are also valuable. School screening programs assist in early detection of amblyopia and its risk factors such as strabismus, refractive errors and media opacities.[9]

Refractive errors in children in Pakistan is a big public health problem that requires immediate collaborative efforts from diverse stakeholders including the health care providers, educationists and parents to manage this issue. The purpose of this study was to ascertain the prevalence of refractive errors and the associated factors in school-aged children (5 to 18 years old).

METHODS

A total of 155 schoolgirls between ages 5 to 18 years were included in the screening process at Government Primary and Secondary Girls School, Nankana Sahib in April 2019. The students were asked to fill a self-devised questionnaire for a superficial ocular assessment. Next, visual acuity was measured with Snellen distant vision chart. If uncorrected vision was less than 6/12 in either eye, the child was identified to have defective vision (Failed visual screening). Visual acuity categories were defined as normal vision (6/6 in both eyes), mild impairment in the better eye (> 6/12 to ≤ 6/9), moderate impairment in the better eye (> 6/60 to ≤ 6/12), and blindness (≤6/60 in both eyes). Children with vision less than 6/12 or those having other defects like squint, ptosis, amblyopia or red eye etc. were referred to Lahore General hospital for detailed ophthalmic examination.

Data was analyzed using IBM SPSS Version 23. Data was checked for normality of distribution by Shapiro-Wilk test. Frequency and percentages of refractive errors were determined. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

The frequency of girls having right eye error was more than those having it in left eye and the percentage of girls having failed visual acuity in either eye i.e VA<6/12 was 17.4% as shown in the table 1:

Table:1 Frequency and Percentage of Visual Acuity of both eyes in the study population

Visual acuity	Right Eye Frequency (%)	Left Eye Frequency (%)
6/6	77(49.7)	83(53.5)
6/9	41(26.5)	35(22.6)
6/12	14(9)	13(8.4)
6/18	8(5.2)	14(9)
6/24	10(6.5)	5(3.2)
6/36	5(3.2)	5(3.2)

We asked all the girls that were screened to answer the following questions and recorded their answers on a questionnaire proforma.

Table: 2 Frequency and Percentage of Questions asked from the Study Population

Question asked by the researcher	Refractive Error Frequency (%)	No Error Frequency (%)
Difficulty seeing a car or bus number plate	60(38.7)	95(61)
Difficulty in looking at the board even when you are sitting near it	35(22.6)	120(77.4)
Difficulty in finding a pen or pencil that falls on the floor	21(13.5)	134(86.5)
Difficulty in threading a needle	80(51.6)	75(48.4)
Place book very near to the eyes while reading	66(42.6)	89(57.4)
Need to go near the board to see what is written on it	63(40.6)	92(59.4)
Difficulty in identifying colors	12(7.7)	143(92.3)
Need to blink many times to see the board clearly	87(56.1)	68(43.9)
Difficulty in going up or down the stairs	28(18.1)	127(81.9)
Difficulty in going home in the evening	67(43.2)	88(56.8)
Use mobile phone	100(64.)	55(36.5)

Use mobile phones for at least 1-2 hours each day	87(56)	68(43.8)

The girls that answered yes to the questions in above proforma were further asked following questions and their answers are summarized in table:

Table: 3 Frequency and Percentage of study population that said Yes to most questions in first interview

	Refractive Error	Refractive error absent	Chi Square test p-value
Daily phone use for at least 1-2 hours	60(60)	40(40)	0.178
Difficulty in looking at the black board	25(71.5)	10(28.5)	0.035
Difficulty in threading a needle	57(71.2)	23(28.75)	0.000
Difficulty in reading books	52(78.7)	14(21.2)	0.000
Blinking repeatedly to clearly look at words while book reading	57(65.5)	30(34.4)	0.010
Parents wear glasses	49(49)	51(51)	0.000

Table: 4 Frequency and percentage of Girls that use mobile phone every day.

Time duration/day	Response was yes	
Mobile Phone Used	Frequency	%
1-2hours	87	56.1
2-3hours	7	4.5
More than three hours	7	4.5

Pearson Chi Squared test was applied to determine any relationship between categorical variables and it showed significance between reading from books, threading the needle 0.000 and parents wearing glasses. (p-value<0.05)

DISCUSSION

The purpose of this study was to assess the prevalence and potential risk factors triggering refractive errors in school-aged girls in a rural setting. Our study revealed that out of a total of 155 students, 88 girls (56.8%) had reduced visual acuity. The maximum number of these girls were between age group 11-16 years with highest prevalence of reduced visual acuity of 6/9. According to our study, a large proportion of visual field defects can be ascribed to excessive mobile phone usage, with 64.5% of the girls being mobile phone users. Out of this percentage, 4.5% of the girls used mobile phone for more than 2 hours daily. This is in line with a study conducted in Japan which positively correlated smartphone usage with refractive error abnormality. The study reveals that excessive screen time elongates the axial length of the eyeball thus leading to pathological myopia[10]. According to Dirani et al [11]deficit of enough outdoor activity is leading to the increase in digital screen time and is causing sedentary behavior in children. A similar study conducted in Delhi found a higher percentage of children with myopia studying in private schools than children enrolled in government schools[12.] This sheer contrast is a reflection of the hi-tech syllabi, indoor school activities and provision of gadgets to enhance psychomotor skills in children of private schools than children in government schools. However, Li et al. found no connection between screen dependence and visual abnormalities in children[13]. On the other hand, our study on rural population unfolded "screen time" in school-aged girls with 56.1% of girls spending time on phone for 1-2 hrs. This clearly shows that now in our country trends are changing and contrary to our belief, children in rural setting also have access to electronic media. Our study also highlighted the fact that 49% of the girls with visual impairment had parents who also wore spectacles. Therefore, it must be kept in mind that external influences as well as genetics play a key role in predisposing children to myopia [14]

There are certain limitations. First, our population was confined to girls hence the results cannot be generalized to children at large. Secondly, the information collected was through a self-devised questionnaire, which might have jeopardized the true results.

CONCLUSION

Awareness about causes of refractive errors must be prioritized. Annual screening should be made mandatory in schools of both urban as well as rural setting, health education programs, walks, seminars should be conducted in order to create awareness amongst the general masses, and last but not the least smartphone usage hours should be restricted in children in order to prevent them from the deleterious effects of this gadget.

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AUTHOR'S CONTRIBUTIONS

HNL: Concept, manuscript writing, statistical analysis, data collection, editing
NK: Data collection, Editing and proof reading
MA: Data collection, Editing
TI: Editing and proof reading
MS, SC: Concept, data collection and supervision