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Research Article

**PREVALENCE OF MYOPIA AMONG PUBLIC SECTOR
SECONDARY SCHOOL CHILDREN IN ISLAMABAD
PAKISTAN; A PREVALENT STUDY**

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Abstract:

Background: Refractive errors are considered as major public health issue as these are most common type of eye disorders. Uncorrected refractive errors are the main cause of avoidable visual impairment which can lead to educational and social disability in adulthood.

Objective: To find out the prevalence of refractive errors among secondary school children in Islamabad Pakistan.

Methodology: This was a cross sectional study with sample size of 1430 secondary school students. The age of participants was 11-16 years. Data was collected through multistage sampling technique. Vision screening was carried out by Snellen chart and for students with visual acuity $\leq 6/12$ refractive status was measured by auto-refractor. Subjective refraction was done according to auto-refractor's results. Myopia, Hypermetropia and astigmatism were defined as Spherical Equivalent (S.E) of ≥ -0.5 diopter (D), $\geq +1.0$ diopter (D) and ≥ 0.75 D respectively. Students detected with refractive errors were evaluated for different variables. Data was analyzed using SPSS version 23 software program, frequencies and percentages were calculated.

Results: After screening of 1430 students 240 were detected with refractive errors. Overall prevalence of refractive errors was calculated as 16.78%. Out of 240 students with refractive errors myopia was found in 135 (56.3%) student and hyperopia was detected in 46 (19.2%) students. Myopic and hypermetropic astigmatism was prevalent in 43 (17.9%) and 16 (6.7%) students respectively.

Conclusion: It was concluded that a considerable proportion of secondary school students were affected by refractive errors. Prevalence of myopia is very high and needs to be addressed.

Keywords: Visual impairment, Refractive error, Myopia, Hypermetropia, Astigmatism.

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INTRODUCTION:

Refractive errors are considered as major public health issue as these are most common type of eye disorders. [1] Uncorrected refractive errors are the main cause of avoidable visual impairment which can lead to educational and social disability in adulthood. [2]

Visual impairment affects 285 million people globally, that is 4.25% of the world population. Visual impairment includes 86% low vision and 14% blindness and about 85% of visual impairment is avoidable. Uncorrected refractive errors are a major cause of avoidable visual impairment. According to World Health Organization's report globally 2.3 billion people are living with refractive errors among these 153 million people are living with uncorrected refractive errors. [3]

Visual impairment due to refractive errors can be avoided by spectacles use which is a simple treatment for refractive errors. Detection and management of refractive errors in childhood is very important to avoid visual impairment. Vision screening programs at school are helpful to detect and correct refractive errors. [4]

Uncorrected refractive errors adversely affect academic performance and social activities in school aged children. [5] Similar findings were obtained by another study that reduced independence and mobility, social isolation, poor educational performance and reduced employment opportunities are linked with uncorrected refractive errors. [6]

It was reported that daily life and academic performance was improved by spectacle use. [7] Similar findings were observed by another study that children with good compliance to spectacle use shows better academic records when compared with those having less compliance to spectacle use. [8]

This cross sectional study was done to collect baseline data for an interventional study planned to improve compliance rate towards spectacle use among secondary school children with the aim to reduce avoidable visual impairment related to refractive errors.

METHODOLOGY:

A cross sectional survey including 240 children with refractive errors was done from July, 2018 to September 2018. Data was collected from public sector secondary school children of Islamabad. The study protocol was approved by the Ethical Committee of ISRA University Islamabad Campus.

A permission letter was obtained from the Federal Directorate of Education (FDE) and a written consent was obtained from Principals and parents.

List of public sector secondary schools for boys and girls was obtained from Federal Directorate of education Islamabad. Multistage sampling technique was used to recruit the participants. In the first stage four boys and four girls schools were selected randomly. In the second stage one section (cluster) of each 6th, 7th, 8th and 9th class were selected by simple random sampling from each selected school. Four clusters of students were selected and all together 32 clusters 16 boys clusters and 16 girls clusters were selected.

Secondary school children of age 11 to 16 years from randomly selected schools were included in the study. Students of 10th grade were excluded from the study as the interventional study was almost one year long and this grade could not be available for follow ups. Students with eye disorders other than refractive errors were also excluded.

A total of 1430 students were screened for vision to recruit 240 students with refractive error. Students who participated in the vision screening include 748 (52.3%) boys and 682 (47.7%) girls with age ranging from 11 to 16 years. Students who participated in the study completed a questionnaire for basic information. After this optometric examination began and visual acuity was tested at 6 meters with Standard Snellen Chart. Pinhole visual acuity was obtained to confirm refractive error for those who cannot read below 6/12. In case of having spectacles vision was measured with glasses, without glasses and with pinhole.

In case of visual acuity \leq 6/12 auto-refractor was used to measure refractive error. Subjective refraction was done according to auto-refractor findings, in case vision was not improved up to 6/9 students were referred to public sector hospital. Students with eye problems other than refractive errors were also referred to the hospital. Data was analyzed using SPSS, version 23 software program. Frequencies and percentage were used to describe the prevalence of refractive errors.

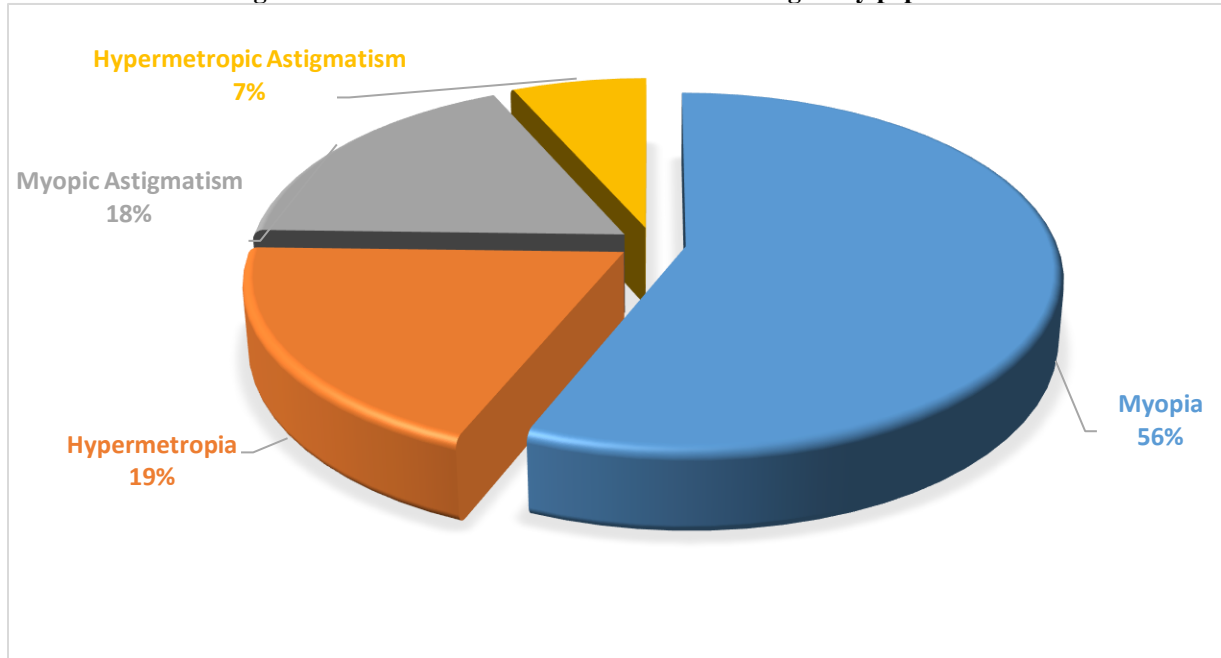
RESULTS:

Vision screening of 1430 students with age ranging 11-16 years was done out of these 748 (52.3%) were boys and 682(47.7%) were girls. From this vision screening 240, 120 boys & 120 girls, students were detected with refractive errors. The mean age and standard deviation of the students with refractive

errors was calculated as 13.51 ± 1.55 years. Mean and SD for refractive error was 1.63 ± 1.12 . Out of 240 students 107(44.6%) were in the age category of 11-13 and 133(55.4%) were in the age category of 14-16 years. Highest number of students 60 (25.0%) was found in the age group of 14 years.

The overall prevalence of refractive errors among secondary school children was 16.78%, Myopia was more prevalent found in 135 student as 56.3% of the total detected refractive errors. Hypermetropia was detected in 46 students as 19.2% of the cases. Myopic and Hypermetropic Astigmatism was found in 43 (17.9 %) and 16 (6.7%) cases respectively.

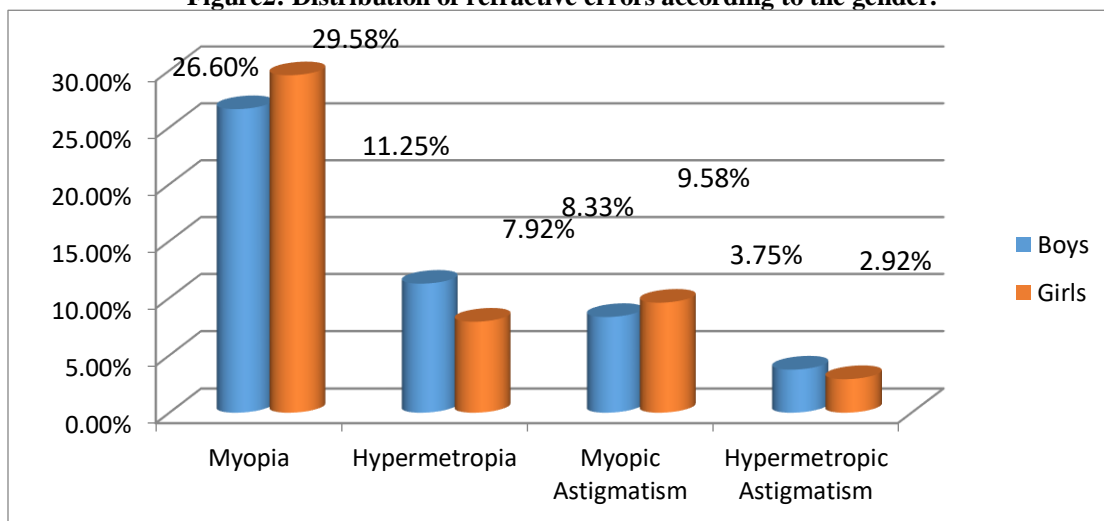
Figure 1: Distribution of Refractive Errors among study population.



Prevalence of refractive errors was slightly higher in girls (17.6%) as compared with boys (16.0%) but this difference is not statistically significant with p -value > 0.05 . Myopia was prevalent 26.60 % in boys and 29.58 % in girls. Hypermetropia was found 11.25 %

among boys and 7.92 % among girls. Myopic Astigmatism was observed 8.33 % in boys and 9.58 % in girls. Hypermetropic astigmatism was found 3.75% and 2.92% among boys and girls respectively.

Figure 2: Distribution of refractive errors according to the gender.

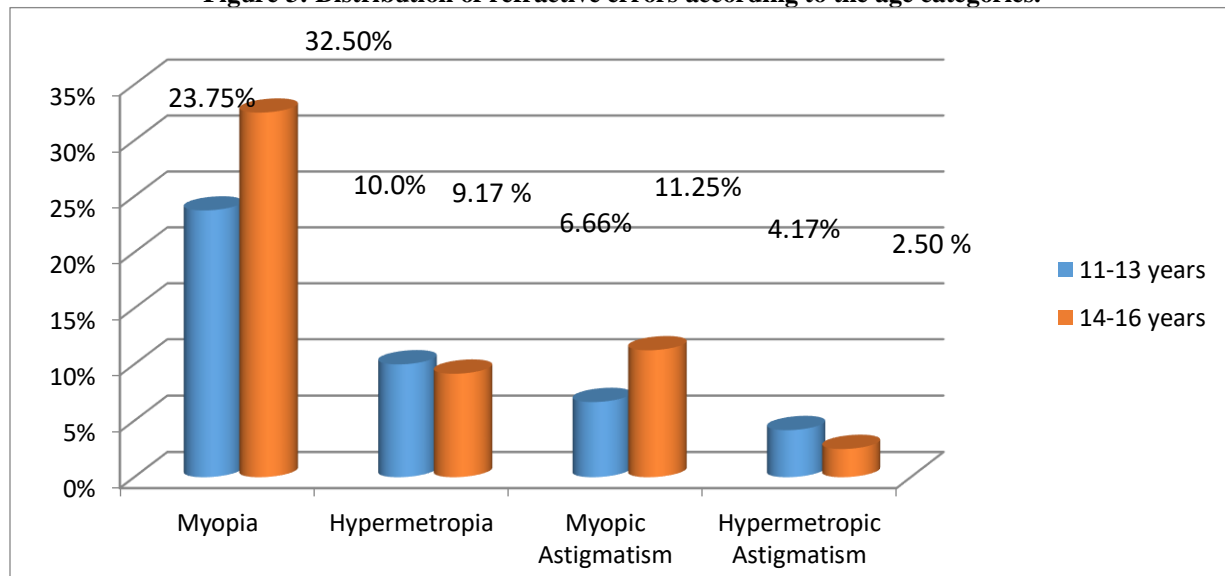


Among this study population 60 (25%) were in 6th grade, 54 (22%) were in 7th grade, 66 (27%) were in 8th grade and 60 (25%) were in 9th grade. Highest prevalence of refractive errors was found in 8th grade as 27 % of all cases.

As for distribution of refractive errors according to age categories concerned myopia was more prevalent

in age category of 14-16 years. 23.75% myopia was observed in the age category of 11-13 years and 32.50% in the age category of 14-16 years. Prevalence of hypermetropia was found as 10% and 9.17% in the 11-13 year and 14-16 years categories respectively.

Figure 3: Distribution of refractive errors according to the age categories.



Myopic astigmatism was prevalent as 6.66 % in 11-13 years category and 11.25% in 14-16 Years category. Hyperopic astigmatism was detected as 4.17% and 2.50% in 11-13years and 14-16years respectively Unaided visual acuity among students with refractive errors ranged as $\geq 6/12 - \leq 6/60$. Visual acuity from 6/12 to 6/18 was considered as mild, VA from 6/24 to 6/36 as moderate and VA $\leq 6/60$ as severe visual impairment. Numbers and percentages of children among different visual acuity categories are shown in the table below. Visual impairment was measured as 61 % mild, 29% moderate and 10 % severe.

DISCUSSION:

Uncorrected refractive errors are a main cause of avoidable visual impairment and are considered as major public health issue. Uncorrected refractive errors are responsible for educational, employment, economic difficulties and also result in a poor quality of life.⁵ Corrective spectacles provide cost effective management of refractive error. [9] School screenings to detect and manage refractive errors is the most effective strategy. [10]

In the present study over all prevalence of refractive

errors was 16.78 % which is higher than 8.9% in a study conducted in Karachi Pakistan. [11] Also higher than 10% measured by a study conducted in Peshawar Pakistan. [12] Reasons for this difference are that the previous studies also includes children less than 10 years of age and mean ages of the children were 9.49 ± 2.5 and 6 years respectively. In the Peshawar study 74 % children were between 3-10 years of age. Where as in the present study mean age of the students was 13.51 ± 1.55 years and maximum students were in the age group of 14 years. In the previous study criteria for selecting the cases was visual acuity less than 6/12 and Visual acuity of 6/12 was not included but in the present study the criteria for selecting the cases was visual acuity $\leq 6/12$ therefore children with visual acuity 6/12 were also included. Prevalence in the present study is also higher than 3.5%, 8.6 % and 7.7 % in Iran [13] Nepal [14] and Malaysia [15] respectively. Prevalence found in the present study is lower than 19.8%¹⁶ 20.07 %¹⁷ and 20.43 %¹⁸ reported by similar studies conducted in Pakistan.

In the present study most prevalent refractive error was myopia with 56% prevalence more than 43 %¹⁶ and less 61.70% [17] reported in Pakistan, However

myopia was reported as most common refractive error by these studies. Present prevalence of myopia is higher than 36 % [12] however same study observed high prevalence of myopia in school going children.

High prevalence of myopia in age group 11-16 years is in agreement with the findings of studies conducted in Pakistan [16] and China [19]. It was revealed by China study that myopia at 5 years increased with the growing age (5-15 years) by 36.7% and 55% in males and females respectively. It was also observed that mild hyperopic babies when grow up can develop myopia due to growth of the eye. These findings are according to the natural process of emetropization.

Prevalence of hypermetropia was found as 19 % which is higher than 14 % [17] but lower than 21.5%¹⁶ and 58 % [12] reported by studies from Pakistan. Lower prevalence of hypermetropia can be explained by the findings of the China [19] study that hypermetropia at 5 years of age decreased by 8.8% and 19.6% in adult males and females respectively.

Astigmatism both myopic and hyperopic was measured as 24.6% which is less than 35.5%, [16] and more than 6.0 % [12] Reported in Pakistan.

Present study observes myopia as most common refractive error than astigmatism and hypermetropia was found as least common refractive error. Similar findings were reported by the study [16] in secondary schools of Lahore, Pakistan.

CONCLUSION:

This study reveals high prevalence of refractive errors among secondary school children of Islamabad. Most important finding of this study is high prevalence of myopia in secondary school children and visual impairment due to refractive errors is a common problem.

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