

# Prevalence and Comparison of Undetected Refractive Errors among Children of age b/w 5-10 years in Public & Private Sector Schools

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## ABSTRACT

**Aim:** To estimate the prevalence of undetected refractive errors among school going children aged 5-10yr.

**Methods:** The study was conducted in 2017 in four schools of Lahore. This study is an institutional based cross-sectional study in which structured pre-tested questionnaire was used and 200 students aged 5-10 years were visually examined. Student who had visual acuity less than 6/12 were advised to get proper eye examination and correction by trained professionals. Data was analyzed by using SPSS version 21.

**Results:** A total of 200 students were examined. According to the results, the students involved in this study had a mean age of 7 years  $\pm 1.7$  years with 47% being females and 53% males. 116 students included in the study belong to age group 5-7 years (58%) and 84 belong to age group 8-10 years (42%). The results revealed that 35 out of 200 students (17.5%) had refractive errors. Myopia was affecting 28 out of 35 students being more common than hypermetropia which affected 7 out of 35 students. Strong correlation was found between a positive family history of wearing glasses, watching television closely, overindulgence in video and computer games, close study habit and studying in dim light

**Conclusion:** Myopia was the most common refractive error occurring among students examined. It was concluded that a strong association was present between a positive family history of refractive error, watching television at close distance and over indulgence of students in playing video and computer games. It is recommended that eye care services should be integrated in the schools and annual eye examination of all students should be done to timely detect the presence of refractive errors.

**Keywords:** Prevalence, Refractive error, Children.

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## INTRODUCTION

A refractive error is a very common eye disorder. It occurs when the eye cannot clearly focus the images from the outside world. The result of refractive error is blurred vision, which is sometimes so severe that it causes visual impairment<sup>1</sup>.

According to WHO 285 million people are estimated to be visually impaired worldwide. 39 million are blind and 246 million have low vision. About 90% of the world's visually impaired live in developing countries. Globally uncorrected refractive errors are the main cause of the visual impairment but cataract remains the leading cause of blindness in middle and low-income countries. Globally uncorrected refractive errors (myopia, hypermetropia,

astigmatism) account for 43% of visual impairment, Un-operated cataract 33% and glaucoma 2%. An estimated 19 million children below age 15 are visually impaired of these 12 million children due to refractive errors, a condition that could be easily diagnosed and corrected. 1.4 million Are irreversibly blind for rest of their lives<sup>2</sup>.

11.4 % of blindness in Pakistan is due to uncorrected refractive errors and is the third most common cause of blindness in Pakistan after cataract (66%) and corneal opacity (12.6%)<sup>3</sup>.

Refractive error is the second most common eye disorder in pediatric age group after vernal catarrh<sup>4</sup>. The study was conducted to find the prevalence of undetected refractive errors among school children and promote the acquisition of eye care services in schools and the periodic examination of the vision in the schools so as to timely detect the refractive errors in students and prevent their complications.

The study hypothesis was to find out the association of refractive errors with factors such as family history of wearing glasses, overindulgence in playing video

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and computer games, prolonged television and computer watching etc.

Normally, the rays of light entering the eye are focused on fovea centralis of retina after passing through cornea, aqueous humour, lens and vitreous humour when the refractive power and axial length of eye correlates with each other. When these two factors do not correlate with each other the rays of light entering the eye ball will not be focused on fovea centralis and the image will not be correctly formed. This condition is known as refractive error.

**MATERIAL AND METHODS:**

This cross sectional study was conducted in 2 public and 2 private schools of Lahore. Two schools each from public and private sector was selected by simple random sampling technique. 50 students were selected from each school belonging to 5-10 years of age group. Sampling size was 200 children. Students of 5-10 years of age were included in the study in the selected schools. Students below 5yrs and above 10yrs of age were excluded and those already wearing glasses were also excluded from the study.

**Data collection tools:** A written questionnaire attached at the end. Standard Snellen’s chart and Jagger’s chart. WHO criteria for recording vision<sup>16</sup>

| Category                     | Presenting distance visual acuity    |                          |
|------------------------------|--------------------------------------|--------------------------|
|                              | Worse than:                          | Equal to or better than: |
| Mild or no vision impairment |                                      | 6/18                     |
| Moderate vision impairment   | 6/18                                 | 6/60                     |
| Severe vision impairment     | 6/60                                 | 3/60                     |
| Blindness                    | 3/60                                 | 1/60*                    |
| Blindness                    | 1/60*                                | light perception         |
| Blindness                    | No light perception                  |                          |
|                              | * Or counts fingers (CF) at 1 meter. |                          |

**Data analysis plan:** SPSS version 21.

**Test of significance applied:** As the study include qualitative variables, frequency tables were drawn and frequency percentages were calculated. Data is graphically represented by pie and bar charts. Chi-square and t-test were applied as test of statistical significance.

**Hypothesis formation:** Null hypothesis: There is no association of refractive errors with factors such as positive family history of wearing glasses, overindulgence in video and mobile games, prolonged television and computer watching etc. Alternate hypothesis: There is an association of refractive errors with factors such as positive family history of wearing glasses, overindulgence in video and mobile games, prolonged television and computer watching etc.

**RESULTS**

A total of 200 students were examined. The results showed that the students had a mean age of 7 years ±1.7years with 47% being females and 53% males. 116 students included in the study belong to age group 5-7 years (58%) and 84 belong to age group 8-10 years (42%). The results revealed that 35 out of 200 students (17.5%) had refractive errors of which Myopia was the most common refractive error affecting 28 out of 35 students while only 7 out of 35 students were having hypermetropia. Strong association was present between a positive family history of refractive error, watching television at close distance, spending more time playing video and computer games.

**Comparison of vision between students of public and private schools:** The results are significantly different between the students of public and private sectors. The results showed that refractive errors are more common in students of private schools as compared to students of government schools (p value 0.003). The following tables shows the difference in recording the far vision among private and public schools.

Table 1: Comparison between students of Government and Private Schools for Far vision of Right Eye checked by Snellen’s Chart

| Far vision right eye | Govt. School | Private School |
|----------------------|--------------|----------------|
| 6/36                 | 0 (0.0%)     | 1 (1.0%)       |
| 6/24                 | 0 (0.0%)     | 6 (6.0%)       |
| 6/18                 | 9 (9.0%)     | 12 (12.0%)     |
| 6/12                 | 13 (13.0%)   | 24 (24.0%)     |
| 6/9                  | 30 (30.0%)   | 32 (32.0%)     |
| 6/6                  | 48 (48.0%)   | 25 (25.0%)     |
| Total                | 100          | 100            |

p Value 0.003

Table 2: Comparison between students of Government and Private Schools for Far vision of Left Eye checked by Snellen’s Chart.

| Far Vision Left Eye | Govt. School | Private School |
|---------------------|--------------|----------------|
| 6/36                | 0 (0.0%)     | 0 (0.0%)       |
| 6/24                | 0 (0.0%)     | 6 (6.0%)       |
| 6/18                | 8 (8.0%)     | 11 (11.0%)     |
| 6/12                | 13 (13.0%)   | 21 (21.0%)     |
| 6/9                 | 40 (40.0%)   | 35 (35.0%)     |
| 6/6                 | 39 (39.0%)   | 27 (27.0%)     |
| Total               | 100          | 100            |

p Value 0.028

**Difference in time spent on risk factors like video games and TV watching etc. between students of private and public schools:** The results showed significant statistical difference in the time spent

playing computer, video and mobile games and TV watching (p value 0.000). This is in accordance with higher prevalence of decreased visual acuity in private school children as compared with government school children.

This is shown by following table.

Table 3: Comparison between students of government and private schools according to time spent on playing video games or mobile games in a day. (Table-3)

| Time spent playing video games | Govt. School | Private School |
|--------------------------------|--------------|----------------|
| Don't Play                     | 0 (0.0%)     | 22 (22.0%)     |
| 1 Hour                         | 71 (71.0%)   | 49 (49.0%)     |
| 2 Hours                        | 16 (16.0%)   | 6 (6.0%)       |
| 3 Hours                        | 11 (11.0%)   | 9 (9.0%)       |
| More than 3 Hours              | 2 (2.0%)     | 14 (14.0%)     |
| Total                          | 100 (100%)   | 100 (100%)     |

p value 0.000

Recording of vision according to WHO criterion:

Table 4: Uncorrected visual acuity of Right Eye

| Visual Acuity                   | Frequency | %age |
|---------------------------------|-----------|------|
| Severe Decrease (<6/60)         | 0         | 0    |
| Moderate Decrease(6/24 – 6/36)  | 7         | 3.5  |
| Mild Decrease(6/12 – 6/18)      | 58        | 29   |
| Normal to Borderline(6/6 – 6/9) | 135       | 67.5 |
| Total                           | 200       | 100  |

The table 4 shows that of the children with decreased visual acuity the majority i.e. 26.5% are present within the range of Mild Decrease (6/12-6/18) in visual acuity and 3.5% are present within the range of Moderate Decrease (6/24-6/36) while none had Severe decrease(<6/60) in visual acuity.

Table 5: Uncorrected visual acuity of Left Eye

| Visual Acuity                   | Frequency | %age |
|---------------------------------|-----------|------|
| Severe Decrease(<6/60)          | 0         | 0    |
| Moderate Decrease (6/24 – 6/36) | 6         | 3    |
| Mild Decrease(6/12 – 6/18)      | 53        | 26.5 |
| Normal to Borderline(6/6 – 6/9) | 141       | 70.5 |
| Total                           | 200       | 100  |

Table 6: 28/35 students had myopia and 7/35 had hypermetropia. The following table shows school wise distribution of refractive errors.

| Schools    | Refractive error present | Refractive error absent | Total |
|------------|--------------------------|-------------------------|-------|
| Government | 12 (12.0%)               | 88 (88.0%)              | 100   |
| Private    | 23 (23.0%)               | 77 (77.0%)              | 100   |
| Total      | 35 (17.5%)               | 165 (82.5%)             | 200   |

p value 0.040

The table 6 shows that 12/100 (12%) students studying in government schools had refractive errors and 23/100 (23%) in private schools suffer from refractive errors. This result is highly significant statistically (p value 0.040).

## DISCUSSION

In this study 35 out of 200 school children had refractive errors. Of these 12 students belong to government schools depicting a prevalence of 12% of undetected refractive errors and 23 students belong to private schools depicting a prevalence of 23% of undetected refractive errors. The difference is statistically significant (p value 0.040).

The results are in accordance with the study conducted by the Department of Ophthalmology, Mayo hospital Lahore in 2007 which shows a prevalence of 18.9%<sup>8</sup>.

The results are also in accordance with study conducted by the Department of Community Ophthalmology Baqai Medical University Karachi. This study was conducted only in public sector schools and shows a prevalence of 8.9%<sup>12</sup>.

The results are in accordance with a study Refractive error among school children conducted in Jhapa, Nepal which also shows that prevalence of refractive errors significantly higher in private schools than in government schools and myopia being the most common type<sup>9</sup>.

The results are also in accordance with the study conducted in Chongqing city of Western China which also shows higher prevalence of myopia than other refractive errors especially in academically challenging schools<sup>13</sup>.

## CONCLUSION

It is concluded that undetected refractive error does occur in school going children affecting their visual acuity of which myopia is the common. The prevalence of refractive errors is higher in private run schools as compared with government run schools and is also influenced by factors like increase indulgence in video games, computer games, television watching etc. by students of private run schools.

## RECOMMENDATIONS

- It is recommended that eye care services should be provided in the schools.
- Annual eye examination should be made mandatory in all schools.
- Optometrists or health care staff should be appointed in the schools to timely detect the

undiagnosed or ignored refractive errors among children.

- Children should be educated about sitting at proper distance for TV watching and playing video games on computer through teachers, health care staff and media.
- Parents should be educated to allocate fixed timings for computer usage and for playing video games.
- Any complaints of headache, discharge from eyes, pain in eyes and difficulty in seeing board should not be ignored, instead advice should be sought from doctor.
- Proper lightening of class rooms should be done in government run schools.

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**Disclaimer:** We declare the abstract and article has not been previously presented or published in a conference, or other relevant information.

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