

## A Cross-sectional Study on Prevalence of Refractive Errors Among Primary School Children

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### Abstract

**Background:** The eventual moulding of a person's identity and ability depends on his nature, surroundings and quality of eye sight. The eyes are wonderful sensory organs, which help the people to learn about the world in which they live. The visual system constructs a mental representation of the world surround us. After cataract, the refractive error is the second largest cause of treatable blindness. **Aim:** To teach eye exercise and refer them to higher institution. **Subjects and Methods:** Quantitative approach design was used for the study. Cluster sampling technique were used to select school, simple random (lottery method) was used to select the class. Total sample was 420 primary school children in selected schools at Puducherry. Data collection was done with structured questionnaire to assess clinical variables and snellen's chart to assess visual acuity. It has three section. Section A: Demographic variables, Section B: Clinical variables and Section C: A complete eye examination which included inspection of eye and visual acuity. Snellen's chart (E chart and alphabet chart) was used to assess the visual acuity of primary children. The Resultrevealed that in the Right eye 56 (13.3%) of children had myopia whereas 364 (86.7%) had normal vision and in Left eye 57 (13.6%) of children had myopia whereas 363 (86.4%) had normal vision. Considering the association between the Visual impairment of Right Eye and Left Eye among primary school children with their selected demographic variables is it was found that the demographic variables on mothers wearing spectacles and siblings wearing spectacles had a highly statistical association at the level of  $p < 0.001$  in the right eye and gender, mothers education had shown significant association in the left eye at the level of  $p < 0.001$ . Association between the Visual impairment of Right Eye and left eye with their selected clinical variables pain in eyes had shown significant association at the level of  $p < 0.05$ . **Conclusion:** The Researcher concluded that the parents, and teachers must be educated about the early detection of refractive error, eye exercise and correction with spectacles to prevent progression of visual impairment. Periodical eye screening of school children is needed.

**Keywords:** Refractive errors; Primary school children.

### Introduction

The visual system constructs a mental representation of the world surround us. This contributes

to our ability to successfully navigate through physical space and objects in our environments. For most of the people "catching the sunrise, seeing a master artwork in a museum or looking at a loved one's face" seems like an ordinary events but 285 million people around the world who are blind or vision impaired in their life.<sup>1</sup> After cataract, the refractive error is the second largest cause of treatable blindness.<sup>2</sup> A person becoming blind due to cataract in his old age may suffer more than a person becoming blind due to an uncorrected refractive error at a young age. Such persons place a greater socio-economic burden on the Nation.<sup>3</sup>

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Children are at the higher risk of developing refractive errors, because they are more vulnerable being subjected to the strain of over work due to demanding academic schedule.<sup>4</sup>

Refractive error which is a root cause of blindness, has not received much scrutiny because many definitions of blindness have been based on best corrected distance visual acuity, including the definition used in International Statistical Classification of disease and related health problems. Because of the rising recognition of the immense need for correction of refractive error worldwide, this condition had been studied as one of the priorities of launched global initiatives for the elimination of avoidable blindness: vision 2020 – The right to sight. The vision 2020 global initiative exclusively endorse awareness of the depth of uncorrected refractive errors and the means for correcting them.<sup>5</sup> The comprehensive proportion of refractive errors in India has been found to vary between 21% and 25% of the patients attending eye outpatient department. Diminished vision by virtue of uncorrected refractive errors is a leading public health problem of school children in India.<sup>6</sup>

Globally, uncorrected refractive errors are the main cause of visual impairment common in children aged 5–15 years. It is well known that refractive errors, as a leading cause of blindness can affect not only social life and economic prospect of an individual but has also enormous bearing on psychological development. Due to ignorance, stigmas and cost related issues, spectacles are less utilized for refractive errors.<sup>7</sup> Refractive errors cannot be foreseen, but they can be diagnosed by an eye examination and it can be dealt with corrective glasses, contact lenses or refractive surgery. Though it is corrected in time by eye-care professionals, they do not obstruct the full development of good visual function. Based on the age of the person, the defects are corrected.<sup>8</sup> Children do not normally complain of visual problems as they adjust to the poor eyesight by sitting near the blackboard, holding the books closer to their eyes, squeezing the eyes and even avoiding work requiring visual concentration.<sup>9</sup>

Sometimes, due to lack of awareness of the parents, though the child complains of the earliest signs of refractive errors like eye strain with or without redness, with watering and headache the parents may not take the child for the treatment. Early detection and timely treatment of eye disease is essential to rule out vision problems and eye morbidities, which could alter their learning ability, identity and adjustment in school.<sup>10</sup> Globally, it is

predicted that approximately 1.3 billion people live with distant or near vision impairment. About 80% of blindness is preventable and treatable. People with vision impairment are more likely to experience the socio-economic burden among the individual's family and society than the normal person. In future, the need for eye care will be high due to increasing population. As predicted, 19 million children are visually impaired worldwide of which 12 million are due to refractive errors which could be easily corrected.<sup>11</sup> Children spend a significant portion of the time in the school, engaging themselves in academic activities. So, it is important to identify the refractive errors in the early stage itself. Periodic screening helps to detect the refractive error in children at an early stage.

### **Objectives**

- To identify the type of Refractive errors among Primary School Children.
- To assess the visual acuity among Primary School Children.
- To associate the Visual impairment among Primary School Children with their selected demographic and clinical variables.

### **Materials and Methods**

Research methodology is the fundamental procedure for conducting the study. In order to achieve the objectives a quantitative research approach was found to be appropriate. Research design used for this study was descriptive survey research design. The study was conducted in Government Primary Schools at Puducherry. The Sample size was 420 Primary School Children. Sampling technique was used in this study was 5 stage Cluster sampling technique. First stage: There were a total of 16 number of Government primary schools in Zone-I Puducherry. In the second stage, the 16 Government Primary schools were clustered into 4 direction (North, South, East, and West). At the third stage, the clustered (4) direction had following number of schools that North direction (2), East direction (10), West (2), and South direction (2) Government Primary Schools. In the fourth stage, through simple random (lottery method) the researcher had taken East direction in that 10 schools were selected for study. In the fifth stage, from each of the selected schools IV and V standard children were the sample for the study. Inclusion criteria of sample were Primary school children who were of both sex, age

group of 5–11 years, willing to participate and able to understand and speak Tamil or English. The tool description was divided into three sections. Section A: This section contained of Demographic variables included Age, Class, Gender, Father's Education, Father's Wearing Spectacles, Mother's Education, Mother's Wearing Spectacles, and Siblings Wearing Spectacles. Section B: This section contained of structured questionnaire of dichotomous type on clinical variables with 6 items which include double vision, Blurred vision, Pain in eyes, Irritation of eyes, Redness Din eyes and Headache. Section C: A complete eye examination which included inspection of eye and visual acuity. Snellen's chart (E chart and alphabet chart) was used to assess the visual acuity of primary children. The chart was placed on a wall at a distance of 6 meters from the students. Each eye will be tested one by one keeping the other eye covered. A Snellan chart usually consists of letters or numbers printed in lines of decreasing size that a child identifies from a fixed distance. Interpretation of scores were Normal vision 6/6, Mild vision 6/9 to 6/18, and Moderate vision 6/24 to 6/60. After completion of pilot study, the researcher conducted the study from 27/8/2018 to 22/9/2018 at Government Primary School Children at Puducherry. Investigator obtained a formal permission from institutional ethical committee and Educational department for conducting the study. The investigator introduced herself and the purpose of the study was clearly explained to the Children, Headmaster and Class teacher. Informed written consent was obtained from the class teacher prior to the data collection.

## Results

The result showed that majority 222 (52.9%) of samples were in the age group of 10 years, 254 (60.5%) of the sample were female, 239 (56.9%) belongs to 5<sup>th</sup> standard, 264 (62.9%) of the children's father had primary education, 73 (17.4%) of the children's father were wearing spectacles, 255 (60.7%) of the children's mother had primary education, 43 (10.2%) of the children's mother were wearing spectacle, 35 (8.3%) of the children's siblings were wearing spectacles, and Visual Impairment among primary school children 4 (1%) children had double vision, 7 (1.7%) Children had blurred vision, 3 (0.7%) children had pain in eyes, 3 (0.7%) children had irritation of eyes and 2 (0.5%) children had redness in eyes and 20 (4.8%) children with headache (Table 1).

**Table 1:** Distribution of Demographic and clinical variables among primary school children (N = 420)

Sl. No	Demographic and Clinical Variables	Frequency (N)	Percentage %
1.	<i>Age</i>		
	8 years	179	42.6%
	9 years	16	3.8%
	10 years	222	52.9%
2.	<i>Gender</i>		
	Male	166	39.5%
	Female	254	60.5%
	<i>Class</i>		
3.	4 <sup>th</sup> standard	181	43.1%
	5 <sup>th</sup> standard	239	56.9%
4.	<i>Father Education</i>		
	No formal education	43	10.2%
	Primary education	264	62.9%
	High school	97	23.1%
5.	<i>Father wearing spectacles</i>		
	Graduate	16	3.8%
5.	Yes	73	17.4%
	No	347	82.6%
6.	<i>Mothers Education</i>		
	No formal education	44	10.5%
	Primary education	255	60.7%
	high school	108	25.7%
7.	<i>Mothers wearing spectacles</i>		
	Graduate	13	3.1%
7.	Yes	43	10.2%
	No	377	89.8%
8.	<i>Siblings wearing spectacles</i>		
	Yes	35	8.3%
9.	<i>Double vision</i>		
	No	385	91.7%
9.	Yes	4	1%
	No	416	99%
10.	<i>Blurred vision</i>		
	Yes	7	1.7%
11.	<i>Pain in eyes</i>		
	No	413	98.3%
11.	Yes	3	0.7%
	No	417	99.3%
12.	<i>Irritation of eyes</i>		
	Yes	3	0.7%
13.	<i>Redness in eyes</i>		
	No	417	99.3%
13.	Yes	2	0.5%
	No	418	99.5%
14.	<i>Headache</i>		
	Yes	20	4.8%
14.	No	400	95.2%

Table 2 reveals that presence of Visual Impairment among Primary School Children had majority of 364 (86.7%) Children had Normal Visual and 56 (13.3%) Children had Mild Visual Impairment in Right Eye. In Left Eye 363 (86.4%) Children had normal visual and 57 (13.6%) Children had mild visual impairment.

Table 3 Reveals that Association between the Visual impairment of right Eye among primary

school children with their selected demographic and clinical variables was found that mothers wearing spectacles, and siblings wearing spectacles had significant association at the level of  $p < 0.001$ , pain in eyes and father wearing spectacles had significant association at the level of  $p < 0.05$ .

Table 4 reveals Association between the Visual impairment of Left Eye among Primary School Children with their selected demographic variables

**Table 2:** Frequency and percentage distribution of Visual Impairment on Right and left Eye among Primary School Children.

(N = 420)

Visual Impairment Among Primary School Children	Visual Acuity for Right Eye		Visual Acuity for Left Eye	
	No.	%	No.	%
Normal visual	364	86.7%	363	86.4%
Mild visual impairment	56	13.3%	57	13.6%

**Table 3:** Association Between the Visual Impairment of Right Eye among Primary School Children with their Selected Demographic and Clinical Variables.

(N = 420)

Sl. No	Demographic Variables	Visual Impairment of Right Eye				X <sup>2</sup>	DF	p-Value
		Normal		Mild				
		No	%	No	%			
1.	<i>Mothers wearing spectacles</i>							
	Yes	27	62.8	16	37.2	23.6	1	0.000**
	No	337	89.4	40	10.6			S
2.	<i>Siblings wearing spectacles</i>							
	Yes	18	51.4	17	48.6	41.0	1	0.000**
	No	346	89.9	39	10.1			S
3.	<i>Pain in eyes</i>							
	Yes	1	33.3	2	66.7	7.43	1	0.048*
	No	363	87.1	54	12.9			S
4.	<i>Father wearing spectacles</i>							
	Yes	62	84.9	11	15.1	5.04	1	0.037*
	No	302	87	45	13			S

\* $p < 0.05$ , significant and \*\* $p < 0.001$ , highly significant

**Table 4:** Association Between the Visual Impairment of Left Eye among Primary School Children with their Selected Demographic Variables.

(N = 420)

Sl. No	Demographic Variables	Visual Impairment of Right Eye				X <sup>2</sup>	DF	p-Value
		Normal		Mild				
		No	%	No	%			
1.	<i>Mothers wearing spectacles</i>							
	Yes	27	62.8	16	37.2	22.8	1	0.000**
	No	336	89.1	41	10.9			S
2.	<i>Siblings wearing spectacles</i>							
	Yes	19	54.3	16	45.7	33.6	1	0.000**
	No	344	89.4	41	10.6			S
3.	<i>Gender</i>							
	Male	150	90.4	16	9.6	3.62	1	0.038*
	Female	213	83.9	41	16.1			S
4.	<i>Pain in eyes</i>							
	Yes	1	33.3	2	66.7	7.26	1	0.050*
	No	362	86.8	55	13.2			S

\* $p < 0.05$ , significant and \*\* $p < 0.001$ , highly significant

was found that gender and mothers education had a significant association at the level of  $p < 0.05$ . It was also found that the demographic variables like mothers wearing spectacles and siblings wearing spectacles had significant association at the level of  $p < 0.001$ . Visual impairment of Left Eye among primary school children with their selected clinical variables was found that blurred vision and pain in eyes had significant association at the level of  $p < 0.05$ .

## Discussion

The result showed that 56 (13.3%) children were found with presence of Myopia in Right eye and 57 (13.6%) children were found with presence of Myopia in Left eye.

The present study was supported with the study conducted by Sharma DK, (2016). It was found that the prevalence of refractive errors was 23.5% among school children. Myopia was the major refractive error (81.92%) among total refractive errors followed by astigmatism and hypermetropia. Majority of the myopic children were of low degree myopia. This study reveals that only 24.47% students were already wearing spectacles whereas remaining 75.53% of students are unaware about their problems.<sup>12</sup>

The present study was supported with the study conducted by Saha M *et al.* (2017). they conducted a cross-sectional study on prevalence of refractive errors among the school going children at a tertiary center of west Bengal. Total 1840 children were examined. There was a significant association between the family history of parents and siblings having refractive errors.<sup>13</sup>

The present study was supported with the study conducted by John DD *et al.* (2017) conducted study on prevalence of Refractive Errors and number needed to screen among rural high school children in southern India. It was a Cross-sectional Study performed in 22 Government Schools with 4739 children. The result revealed that all 4138 (87.3%) who were present and underwent screening; 98 children were affected with refractive errors.<sup>14</sup>

The present study was supported with the study conducted by Assefa Woldeya Red *et al.* (2012) conducted study on prevalence of refractive errors among school children in Gondar town, Northwest Ethiopia. In this study they took 1852 students as a subjects from 8 elementary schools. The study parameters were visual acuity (VA) evaluation

and ocular examination. The result showed that presence of refractive errors in either eye among 174 (9.4%) children. Low myopia was the most common refractive error which affected 61 (49.2%) children and 68 (50%) children for the right and left eyes respectively.<sup>15</sup>

## Conclusion

The study results indicated that out of 420 Primary School Children, 56 (13.3%) children were found with presence of Myopia in Right eye and 57 (13.6%) children were found with presence of Myopia in Left eye. The study result revealed that hereditary factors influence the refractive errors among primary school children. Refractive error needs careful diagnosis and preventive care, otherwise it will lead to impaired quality of life and interfere with their daily lifestyle. The researcher concluded that parents, and teachers must be educated about the early detection of refractive error. Eye exercise and correction with spectacles to prevent progression of visual impairment. Periodical eye screening of school children is needed.

## Recommendation

- Replication of the study may be done with the large sample in different settings to generalize the study findings.
- Future study can find out the effectiveness of interventional strategies with refractive errors.
- A descriptive study on knowledge, about prevalence of refractive errors can be imparted to school teachers.
- A comparative study can be conducted to find the prevalence of refractive errors among primary school children in rural and urban.

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