

Original Research Article

# Refractive errors in school children in Nizamabad district area

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	International Archives of Integrated Medicine, Vol. 3, Issue 10, October, 2016. Copy right © 2016, IAIM, All Rights Reserved. Available online at <a href="http://iaimjournal.com/">http://iaimjournal.com/</a> ISSN: 2394-0026 (P) ISSN: 2394-0034 (O)
	Received on: 08-09-2016 Accepted on: 20-09-2016 Source of support: Nil Conflict of interest: None declared.
	<b>How to cite this article:</b> K. Ravi Sekhar Rao, N. Krishna, G. Vasantha. Refractive errors in school children in Nizamabad district area. IAIM, 2016; 3(10): 21-26.

## Abstract

**Background:** Refractive errors are one of the known cause of visual impairment and a main cause of blindness worldwide. In children, refractive errors make us learning disabilities and also prevent academic progression.

**Aim:** To study the prevalence of refractive errors in children of school going age.

**Materials and methods:** This was a descriptive study in which children were screened for refractive errors. Children aged 4 to 15 years whose parents were willing to sign the informed consent form. This study was done from 2011 to 2015.

**Results:** Total 531121 children were screened in which 13206 having refractive errors, incidence of 2.4% in the present local area. The most common age group affected is 8-11 years of these were boys 2706 (20.4%) and 3491 (26.4%) girls.

**Conclusion:** The major cause of visual impairment worldwide is refractive errors and have immediate and long term consequences in children.

## Key words

Refractive errors, Visual impairment, Myopia, Hypermetropia, Astigmatism.

## Introduction

Refractive error is said to exist when the eye fails to bring parallel light (distant objects) to focus on the retina. There are 3 types of refractive error: myopia, hypermetropia and astigmatism. In the myopic (short-sighted) eye, distant objects are

brought to focus in front of the retina. This may be because the eyeball is too long (axial myopia) in the hypermetropic (long-sighted) eye [1], distant objects are brought to focus behind the retina. This may be because the eyeball is too short (axial hypermetropia) or the refractive elements of the eye are inadequate (refractive

hypermetropia). In astigmatism, the refractive power of the eye varies depending on which meridian light enters the eye. If these meridians lie at 90° to each other then regular astigmatism is said to exist. If the meridians lie at 90° to each other but not necessarily in the horizontal or vertical meridians, this is termed 'oblique astigmatism'. If the meridians do not lie at 90° to each other then this is termed 'irregular astigmatism' and is difficult to correct with lenses. Refractive errors are affecting commonly a third of the general population. There is good evidence to support a genetic etiology for myopia and hypermetropia [2]. The role of environmental factors such as near work is less certain. Ocular trauma is an important cause of acquired astigmatism that is often difficult to treat. As an alternative to spectacle and contact lenses, treatment modalities in the form of excimer laser are increasing in popularity.

### Materials and methods

This was a descriptive study in which children were screened for refractive errors in Department of Ophthalmology with help of optometrist and trained teachers.

### Inclusion criteria

Children aged 6 to 10 years whose parents were

willing to sign the informed consent form.

### Exclusion criteria

Children who were in fear to undergo the examination even though their parents authorised by signing the informed consent form. Children who were sick. Personal details of each child were recorded and the child must undergo standard ophthalmic examination and all findings were recorded. Refraction was done using retinoscopy after instillation of cyclopentolate eye drops in the eyes at least 15 minutes previously. Those children who underwent retinoscopy were those who had visual acuity of less than 6/6 in at least one eye.

### Results

Total 5,31,121 children screened and 13,206 were diagnosed with refractive errors were given consent forms to take to their parents. Out of these 13206 children were all examined. 6029 are boys and 7177 are girls in study with refractive errors (**Table – 1**). Total 531121 patients were screened in which 13206 showing incidence of 2.4% in the present local area (**Table – 2**). Age group of 8-11 years are the most common age group of people with refractive errors of 46.8% (**Chart – 1**).

**Table - 1:** Refractive errors in the school children in the area for a period of 5 years.

Number of patients	2015	2014	2013	2012	2011	Total
Children Screened	122513	32694	74792	222438	78684	531121
With refractive errors	4868	495	979	4302	2562	13206

### Discussion

Total 531121 patients were screened in which 13206 showing incidence of 2.4% in the present local area. In the study, a total of 13206 children aged between 4-15 years attending schools at Nizamabad district had a visual acuity testing done at school using protocol.

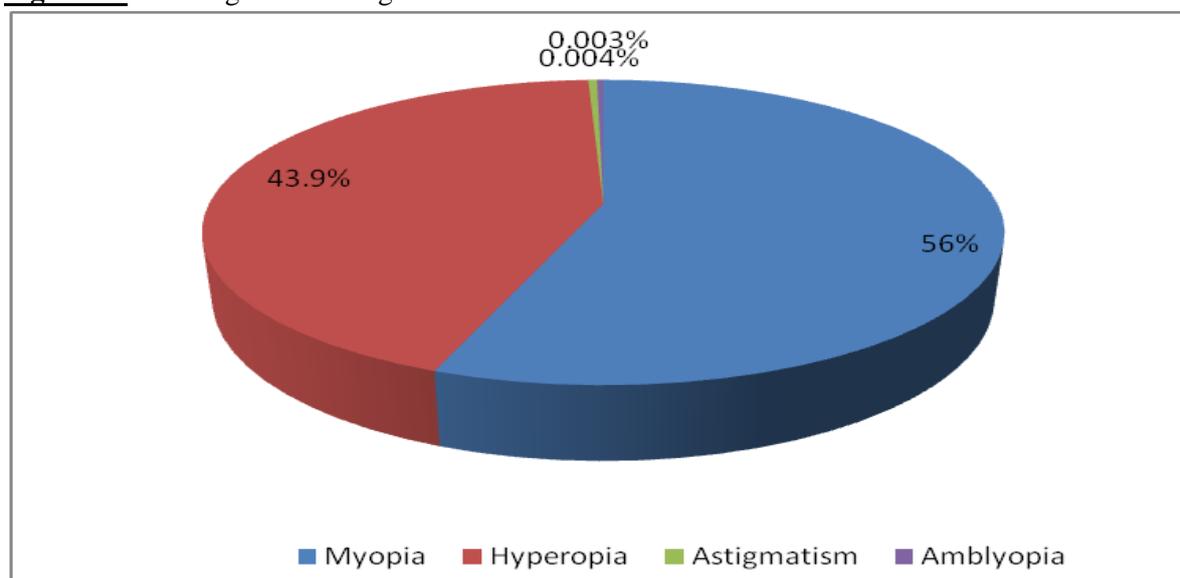
The most common age group affected is 8-11 years of these were boys 2706 (20.4%) and

3491 (26.4%) girls. Myopia and hypermetropia are common refractive errors. It concluded that significant refractive errors occur among primary school children aged 8 to 11 years at a prevalence of approximately 46.8%. Therefore, there is a need to have regular and simple vision testing in primary school children at least at the commencement of school so as to detect those who may suffer from these disabilities.

**Table - 2:** Prevalence of Types of refractive errors in the school children.

Age Group	Gender	Number of subject	Myopia	Hyperopia	Astigmatism	Amblyopia
4-7 years	Male	1891(14.3%)	754(5.70%)	1137(8.6%)	3(0.0002%)	0(0.000%)
	Female	2310(17.5%)	1456(11.02%)	854(6.46%)	5(0.0003%)	1(0.0001%)
8-11 Years	Male	2706(20.4%)	1897(14.3%)	1574(11%)	18(0.0013%)	12(0.0009%)
	Female	3491(26.4%)	1809(13.7%)	897(6.79%)	12(0.0009%)	10(0.0008%)
12-15 Years	Male	1432(10.8%)	740(5.6%)	782(5.92%)	11(0.0008%)	9(0.0008%)
	Female	1376(10.4%)	758(5.73%)	548(4.14%)	7(0.0007%)	8(0.0007%)
Total		13206	7414(56.0%)	5792(43.9%)	56(0.004%)	40(0.003%)

**Figure - 1:** Pie diagram showing refractive errors in school children.



Many studies have been reported regarding refractive errors in children. Medi Kawuma, et al. [3], their study was a cross-sectional, descriptive study which was done in Kampala district, Uganda. In the study, a total of 623 children aged between 6 and 9 years had a visual acuity testing done at school using the same protocol; of these 301 (48.3%) were boys and 322 (51.7%) girls. The results were that seventy-three children had a significant refractive error of 0.50 or worse in one or both eyes, giving a prevalence of 11.6% and the commonest single refractive error was astigmatism which accounted for 52% of all errors. This was followed by hypermetropia, and myopia was the least common. It concluded that significant refractive errors occur among primary school children aged 6 to 9 years at a prevalence of approximately 12%.

Sandra Jobke, et al. [4], in their study, the parents (aged 24–65 years) and their children (516 subjects aged 2–35 years) were asked to fill out a questionnaire about their refractive error and spectacle use. Emmetropia was defined as refractive status between +0.25D and -0.25D. Myopia was characterized as -0.5D and hyperopia as +0.5D. All information concerning refractive error were controlled by asking their opticians. The results were the prevalence rates of myopia differed significantly between all investigated age groups: it was 0% in children aged 2–6 years, 5.5% in children aged 7–11 years, 21.0% in adolescents (aged 12–17 years) and 41.3% in adults aged 18–35 years (Pearson's Chi-square,  $p = 0.000$ ). Furthermore, 9.8% of children aged 2–6 years were hyperopic, 6.4% of children aged 7–11 years, 3.7% of adolescents, and 2.9% of adults ( $p = 0.380$ ). The prevalence of

myopia in females (23.6%) was significantly higher than in males (14.6%,  $p = 0.018$ ). The difference between the self-reported and the refractive error reported by their opticians was very small and was not significant ( $p = 0.850$ ). This study concluded that in Germany, the prevalence of myopia seems to be somewhat lower than in Asia and Europe. There are few comparable studies concerning the prevalence rates of hyperopia. A study was conducted in Kolkata on Refractive errors among school children. It was a cross-sectional study, which involved the students in the age group of 5-10years. Out of the 2317 students examined, 582(25.11%) were found to be suffering from refractive errors [5].

A study to assess the prevalence of ocular disorders in school children in rural area surrounding Bhubaneswar, Orissa, revealed that, out of the 976 children, aged 9-16 years, from 10 rural schools, who were screened, refractive errors was present in 16.6%. On detailed assessment of 129 children, 77% had mild, 19.6% had moderate and 3% had severe degree of visual impairment [6]. In Gujarat, a study was conducted to assess the prevalence of refractive errors in school children aged, 7-15 yrs. It was a comparative study in Urban and Rural areas. Multi stage sampling technique was used. Out of the 452 children examined, refractive error was 2.7%, 2.6% and 0.78% for myopia, hyperopia and astigmatism respectively [7]. A cross-sectional study conducted in Ahmedabad city, revealed that, out of 1647 children (828 males and 819 females), 25.32% were found to have refractory errors. Of these 47% were females and 53% were males. The distribution of refractive errors was: Myopia-63.5%, Hypermetropia-11.2% and astigmatism-20.4% [8].

A study was conducted among adolescents in New Delhi. The study included 1000 adolescents in the age group of 12-17 years. It was a cross sectional study. Snellens chart was used. The overall prevalence of refractive errors in the study was found to be 12.5%, which included, myopia 55.6%, hyperopia 16.9% and

astigmatism 24.7% cases. This study also revealed that, refractive error increased with increase in age [9]. A cross sectional study was conducted on rural school children in Hyderabad. Cluster Sampling was used. The examination included visual acuity measurements and retinoscope. Out of the 4417 children, who were selected from 4876 households, the prevalence rate was myopia 4.1%, hyperopia 0.8% and astigmatism 0.98%. Refractive error was the cause in 61% of eyes with vision impairment [10].

A descriptive study was done to assess the prevalence of refractive errors on children, aged 5-15 years, from 11 schools (5 urban; 6 rural) in Ludhiana city and district. A total of 19610 students were examined over 3 years. Of these, 11200 were males and 8410 were females. There were 8834 students in the age group of 5-10 years. The number of students who had decreased vision (visual acuity of 6/9 or less) was 2485. Of these, there was a total of 1366 myopes; 748 hyperopes; 284 with astigmatism and 87 amblyopic children [11]. The study, which was conducted to assess the prevalence of refractive errors in school children in rural block of Haryana revealed that, out of 1265 students examined, myopia was present in 12.1%, hypermetropia, 1.5% and astigmatism was present in 5.46% [12].

A study was done to determine the prevalence of visual impairment due to refractive errors and ocular eye diseases in lower middle school children of Hyderabad. Out of the 4029 children, who were in the age group of 3-18years, selected from 9 schools, prevalence of myopia was 8.6%, hyperopia 22.6% and astigmatism 10.3% [13]. In Iran, a study was conducted in the city of Qazvin, from 2002-2008. It was a cross-sectional study; performed in 5913 school children. The examination included visual acuity measurements and retinoscopy. The distribution of refractive errors was myopia 65%, hyperopia 12.46% and astigmatism 16.1% respectively. An increased prevalence of refractive error, especially myopia was found in this study [14]. A

cross sectional descriptive study was conducted among lower primary school of Kampala district, Uganda. The setting was the primary school of Kampala District. The sample size was 649. Multi stage sampling technique was used for the study. The result of this study was that, 73 children had significant refractive errors, giving a prevalence of 11.6% and the commonest single refractive error was astigmatism which accounted for 52% of all errors. This was followed by hypermetropia and myopia was the least [15].

A study was conducted in Mechizone, Nepal it was a cross sectional study in which cluster sampling was used. Out of the 5067 children examined, it was revealed that refractive error was found in 2.9%, 2.85 and 1.4% of children respectively [16]. Another study was conducted in Ghana, to assess the prevalence of refractive errors among school children (aged 5-19 years). It was a cross-sectional descriptive study. The sampling technique used for the study was Cluster sampling. It revealed that out of the 1103 children studied, 25.6% had refractive errors [17]. A descriptive study conducted among the children with special needs in Oman revealed that out of the 565 school children, who were selected for the study, 18.14% had refractive errors [18]. The above studies depict the variation of the prevalence of refractory errors in school children.

## Conclusion

The major cause of visual impairment worldwide is refractive errors and have immediate and long term consequences. This study has clearly illustrated the need to screen young children regularly or at least on first attending school. This will enable identification of those with visual disability so that corrective measures may be recommended at the earliest time possible.

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