

## Pattern of refractive error in paediatric patients coming to rural tertiary care hospital of Central India

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### Abstract

**Background:** Refractive error is an important cause of low vision in paediatric age group. If uncorrected it can lead to severe visual impairment in paediatric age group. Around 12.8 million children in age group range of 5-15 years have undiagnosed refractive error or under corrected refractive error. In India, refractive error as a social health problem is not yet defined. The untreated refractive error can cause amblyopia and poor school performance, which in long run can lead to financial and social loss for the rest of life. The purpose of the present study is to know the different types of refractive errors in a tertiary care rural hospital.

**Materials and methods:** A cross-sectional study to know the different types of refractive error in paediatric patients in a tertiary care rural hospital of central India from January 2015 to June 2015. The patients of birth to up to the age of 15 years were included. The patient particulars were noted. The patient name, age, sex, residence, visual acuity, refractive error were noted.

**Results:** The total number of 848 patients enrolled in the present study from eye OPD of UPRIMS & R, Saifai, UP from January 2015 to June 2015. The age of patients ranges from birth to 15 years of age. Out of these refractive error is seen in 260 patients (31.37%, 168 male, 92 female). So, refractive error was the cause of hospital consultation in around 1/3<sup>rd</sup> of the patients. The most common refractive error noted was myopia in 160 patients (61.53%, 95 males, 65 females), followed by astigmatism in 40 patients (23.85%, 32 males, 6 females) and hypermetropia in 38 patients (14.61%, 32 males, 6 females). The common age of presentation was from 11-15 years (130 patients, 50%), followed by 6-10 years age (70 patients, 26.92%) and lastly less than 5 years age group (60 patients, 23.08%).

**Conclusion:** In India, refractive error as a public health problem is not yet defined. The untreated refractive error can cause amblyopia and poor school performance, which in long run can lead to financial and social loss for the rest of life.

**Keywords :** Amblyopia, Childhood disorder, Refractive error.

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### Introduction

Uncorrected refractive error is one of the important causes of visual impairment in childhood. Some 12.8 million children in the age group 5–15 years are visually impaired from uncorrected or inadequately corrected refractive errors. Paediatric ocular disorders can seriously impact developmental milestones, educational difficulties, job opportunities and the upcoming quality of life. The untreated refractive error can cause amblyopia and poor school performance, which in long run can lead to financial and social loss for the rest of life. These complications of untreated refractive error are more common in developing countries like India.

Refractive error is one of the common and treatable causes of childhood ocular morbidity leading to visual

disability. Prescription of glasses for refractive error is a cost-effective method to decrease the visual disability. Hence in India along with global partnership of the programme VISION 2020 for the elimination of blindness has included refractive errors under sub-heading of childhood blindness[1]. Around 153 million people above the age of 5 years are having visual impairment due to uncorrected refractive errors, out of these around 8 million are blind (WHO data 2006). On detailed analysis it has been found that around 12.8 million are from the age group of 5-15 years are visually impaired due to under correction of refractive error or uncorrected refractive errors, global prevalence of 0.96%, with highest prevalence reported in urban and highly developed urban areas in south-east Asia and China[2].

In order to understand the developmental evolution of the refractive status from infancy to childhood. The refractive state of the infant varies between +2.00 D to +3.00 D,[3-5] but as the age advances to six to seven years, most of the children show either no change or a slight increase in hypermetropia[6-9]. Later, in the years of rapid growth, the hypermetropia tends to lessen or gives way to myopia.[7-11] In India, no such study had been carried out in children, but in 1966 Agarwal et

al reported a high prevalence of refractive error in school going childrens[12]. In 5-15 years age group uncorrected refractive error is of multifactorial origin, which includes lack of screening, lack of awareness, unavailability and non affordability are also important causes in developing country like India. Cultural practice can play a role in early detection and treatment of refractive errors. When a survey was done in country where screening and provision of refractive correction is free of cost has also noted compliance was poor in these areas[13].

In the age group 5–15 years, non-correction of refractive errors is due to several factors: the lack of screening, the availability and affordability of refractive corrections are the most important. Most of the children with uncorrected refractive errors remain asymptomatic, so screening is the only way possible is early detection and early treatment.

Myopia is the most common refractive error in children and its correction can prevent amblyopia or permanent visual disability[14]. Myopia is corrected by giving concave lens in glasses. The second common refractive error is astigmatism, which can also lead to amblyopia if not corrected in growing age or permanent visual disability. Astigmatism is treated by prescribing cylindrical number in glasses. The another common refractive error is hypermetropia. The hypermetropia is corrected by giving convex lenses. A study by Dandona et al[15], in rural population of Andhra Pradesh, prevalence of uncorrected refractive error was 2.7%. The refractive error was the cause of visual impairment in 61% cases, and amblyopia in 12% cases of childhood. Myopia -0.50 D or more was seen in 4.1% of the cases. The prevalence of myopia increases with increasing age in both sexes.

In a South Indian population, study by Kalikivayi et al, revealed prevalence of myopia around 8.6%, Hyperopia 22.6%, astigmatism 10.3% and amblyopia 1.1%[16].

With our study we tried to find out the pattern of refractive error in paediatric rural population of central India which is missing. This will help in assessment of the extent of the refractive error in children and will be useful in preventing visual impairment in paediatric age group.

## Material and Method

A cross sectional study to know the different types of refractive error in paediatric patients in a tertiary care rural hospital of central India from January 2015 to June 2015. The patients of birth to upto the age of 15 years were included. The patient particular were noted. The patient name, age, sex, residence, visual acuity, refractive error were noted.

Visual acuity is measured on Snellen “E” chart at 6 metre. The visual acuity categorised as  $\geq 6/18$ ,  $<6/18-6/24$ ,  $<6/24-6/60$ ,  $<6/60-3/60$  and  $<3/60$ -NLP. All children less than 5 years underwent retinoscopy under atropine ointment for the detection of refractive error. All children above 5 years underwent subjective refraction. Posterior segment examination done with Indirect ophthalmoscopy or direct ophthalmoscopy.

Patients age was divided into  $<5$  years, 6-10 years and 11-15 years.

Ethical Committee clearance was taken from Institute ethics board and study follows declaration of Helsinki.

## Results

The total number of 848 patients enrolled in the present study from eye OPD of tertiary care rural hospital of central India from January 2015 to June 2015. The age of patients ranges from birth to 15 years of age. Out of these refractive error is seen in 260 patients i.e 30.66% patients (168 male)[64.61%], 92 female[35.38%] **Table 1**. So, refractive error was the cause of hospital consultation in around 1/3rd of the patients. The most common refractive error noted was myopia in 160 patients (61.53%, 95 males, 65 females), followed by astigmatism in 40 patients (23.85%, 32 males, 6 females) and hypermetropia in 38 patients (14.61%, 32males, 6 females) **Table 2**. The common age of presentation was from 11-15 years (130 patients, 50%), followed by 6-10 years age(70 patients, 26.92%) and lastly less than 5 years age group (60 patients, 23.08%) **Table 3**.

**Table 1: Showing percentage of refractive error amongst boys and girls**

Sex of children	Total number	Percentage
Girls	92	35.38%
Boys	168	64.61%
Total	260	

**Table 2 : comparison of various types refractive errors in the pediatric population of rural india**

Refractive error	Total	Girls	Boys
Myopia	160	95	65
	61.53%	59.38%	40.62%
Hypermetropia	38	32	6
	14.61%	84.21%	15.79%
Astigmatism	62	40	22
	23.85%	69.52%	35.48%

**Table 3: Age wise distribution of refractive errors in the rural population of central India**

Age groups	Numbers enrolled	Percentage
<5 years	60	23.08%
5-10 years	70	26.92%
11-15 years	130	50%

From this above stated data it can be concluded myopia was most common refractive error (61.53%) in both sexes. The prevalence of hypermetropia and astigmatism was more in girls than boys ( $p < 0.001$ ).

### Discussion

The main limitation is that it's a hospital based study not a population based study, so it may not represent the real distribution in general population. Selection bias also comes in, whenever hospital based studies are done. The childhood ocular disorders are very difficult to diagnose and manage as they cannot speak about their problems due to less developmental age and are not cooperative for ocular examination[17]. The present study was performed to know the pattern of distribution of refractive error in paediatric population of age less than 15 years in central India, as no such data is available till date.

In our study, 64.61% were male and 35.38% were female. The refractive error was more in male compared to female.

Seema et al. reported little higher pre-valence of RE as 23.7% in female and only 12.2% in males[19]. Similar results were observed by Pavithra et al. where prevalence in female children (9%) compared to male children (5.3%) showing little lesser prevalence in female compared to male[20]. Tay et al. studies in Singapore relates this high prevalence rates to earlier onset of puberty along with higher growth rate in female than male[21].

In present study refractive error were more common in females than males. Similar results seen in Riyadh, Saudi Arabia done intermediate school children where 11.75% were female and 8.35% were male[22]. Similar reports seen Qatar with prevalence of refractive error in females of 23.7% and males 15.5%[23], another study in India by prema et al with 17.2% females and 13.4% males[24-26].

Myopia is the most common refractive error in children in our study. A study by Dandona et al[15], in rural population of Andhra Pradesh, prevalence of

uncorrected refractive error was 2.7%. The refractive error was the cause of visual impairment in 61% cases, and amblyopia in 12% cases of childhood. Myopia-0.50 D or more was seen in 4.1% of the cases. Similar pattern reported by Murthi et al and Batra et al.[27-28]

In present study prevalence of astigmatism was slightly higher (28.85%). Similar results have been reported from Qatar (70%) (Al-Naimi et al., 2010)[23], Ghana (49.3%) (Ovenseri-Ogbomo & Assien, 2010)[25], Jordan (20.4%) (Bataineh & Khatatbeh 2008)[29], Pakistan (35.5%) (Ali et al., 2007)[30] and in Nepal (9.2%) (Pokharel, 2010)[31] and China (8.3%) reported by Rose et al. in 2010 [32]

### Conclusion

Screening of school children for the detection of refractive error in developing countries like India serves as good programme for early detection and prescription of glasses for refractive errors and thereby preventing the visual impairment. School-age children constitute particularly a highly vulnerable group where uncorrected refractive error may have a dramatic effect in child's development, learning and educational performance[33].

The present study shows refractive error to be the commonest cause for visual impairment in children <15 years. Thus recommending a school screening program in developing countries at regular periodic intervals as most of the refractive error can be easily corrected with spectacles and can improve the educational performance and development of the child. Once the performance in school improves, the children get better opportunities in further studies and the child has a bright future. Hence, it is very important to detect preventable cause of visual impairment at the earliest

stage and hence prevent visual impairment due to uncorrected refractive error.

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