

Prevalence of Refractive Errors among School Going Children – A Cross Sectional Study

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Abstract:

Background: Children's vision development is crucial for learning and communication. Visual impairment has a detrimental effect on academic and socioemotional development. The majority of cases of visual impairment are caused by refractive errors. Uncorrected refractive error, particularly in school-age children, has grown to be a significant concern for health care policy makers. **Methods:** School-based cross-sectional study was conducted and screening was done in children of 5 to 16 years of age in both urban and rural areas of Kurnool district. The main outcome measures were presenting, uncorrected, and best-corrected visual acuity. **Results:** A total of 37329 children were examined during the study period comprising 19934 (53.4%) males and 17395 (46.6%) females; and age range 5 to 15 years. Refractive error was the principal cause of visual impairment which was seen in 14075 children (37.7%). Of the refractive errors, myopia accounted for 42.7% (n=6643), hyperopia for 10.5% (n=1479) and astigmatism for 42.3% (n=5953). **Conclusion:** The study provides a useful baseline data about the refractive error amongst the school children of kurnool district. Refractive error, especially myopia, is common in India. Screening programs should be conducted in all the schools to detect vision problem as early as possible enabling timely intervention.

Keywords: refractive error, screening, amblyopia, visual impairment

Introduction:

Vision plays a very important role in the development of child for learning and communication.¹ Ametropia or Refractive error is caused when the optical system of the non-accommodating eye fails to bring parallel rays of light to focus on the retina.²Uncorrected refractive error has grown to be an important concern for healthcare policy-makers.³ Uncorrected refractive error (URE) is the second leading cause of blindness and the main cause of vision impairment worldwide⁴, The recent evidence available suggests that URE among school-aged children is a significant public health issue in India.⁵Hence, it is one of the key focuses of Vision 2020: The Right to

Sight, a global program led by the World Health Organization and several non-governmental organizations.⁶ The eye tends to be slightly hyperopic at birth, and during the following few years, this error decreases. A variety of socioenvironmental factors, an indoor lifestyle, and spending more time on schoolwork and other near-work duties are all linked to an increased risk of myopia in children.^{7,8} Urban areas are linked to myopia, yet near tasks involving smartphones, tablets, and other technology are frequent and have an impact on refractive error in both rural and urban areas. India's recent improvements in children's access to education in schools⁹ may have increased the prevalence of myopia. Active screening and prompt intervention at the appropriate time can influence a child's growth and

development in addition to assisting with eyesight restoration.¹⁰ A school health committee set up by the Indian government in 1960 advised that students be examined medically when they first enroll in school, however this recommendation has seldom been followed in India.¹¹ This study shows the prevalence of refractive errors among school-going children in Kurnool district.

Materials and methods:

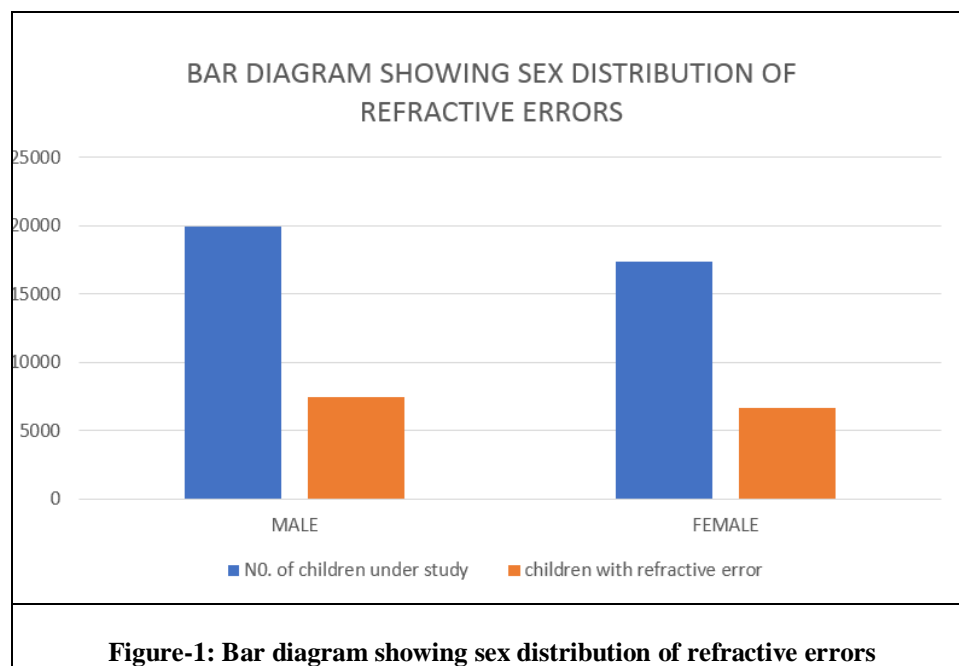
After receiving permission from the school administration, lists of the enrolled, age-eligible students were collected from the institutions. Exams were typically held during and after school hours at times determined by the school administration so as not to interfere with the schedule of the students. A school-wide eye health education session always took place before the screening on the first day. Additionally, kids who already wore glasses were encouraged to do so to school.

A team of three to six ophthalmologists (consultants and residents in training), two experienced optometrists, two trained visual acuity assistants, one trained nurse, and six more field workers typically conducted the clinical assessment. The visual acuity was measured unilaterally using a retroilluminated Snellen chart. The youngsters were instructed to read out the alphabets and those not good with alphabets were asked to point with their hands or call out the direction of the E optotype to the examiner's hearing. Children who wore glasses to school had their visual acuity assessed with and without the glasses.

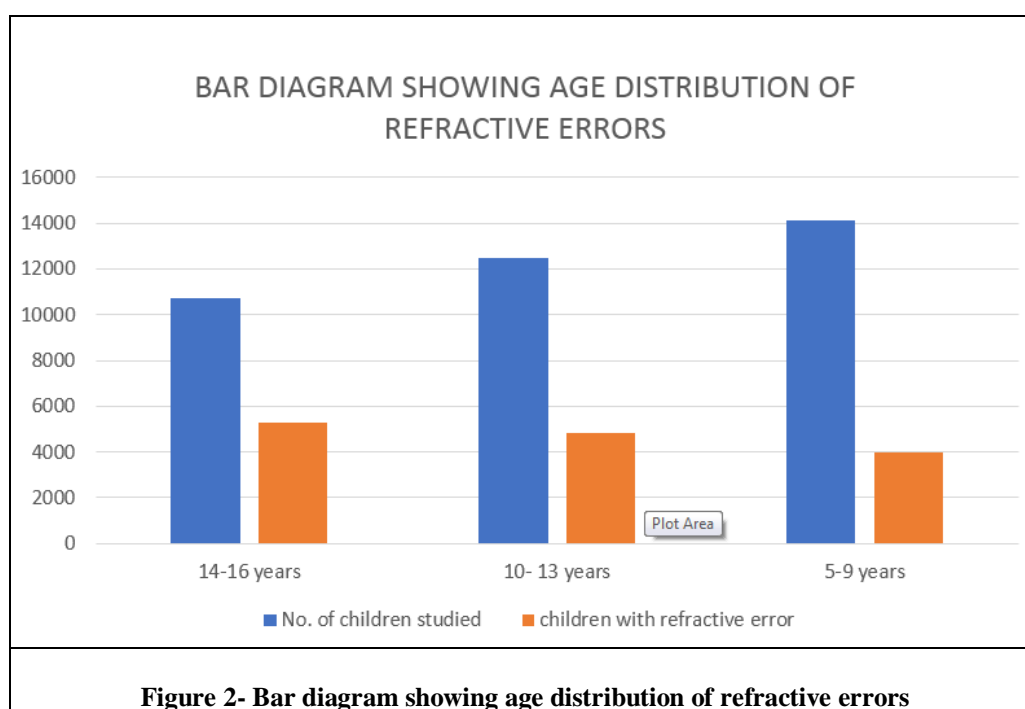
The presence of tropias was detected by using corneal light reflex, while prism cover test was used to measure the deviation in prism dioptres. The external eye, anterior and posterior segments of the eyes of all the children were then examined by ophthalmologists. A pen torchlight, magnifying loupe (x4), direct and indirect (when applicable) ophthalmoscopes were used for this purpose. For kids whose unaided (uncorrected) visual acuity was 6/12 or worse in either eye, the nurse administered two drops of 1% cyclopentolate five minutes apart, followed by a third drop fifteen minutes later to induce cycloplegia. On final examination after an additional 20 to 30 minutes, pupillary dilatation of 6 mm or more in the absence of the light reaction was regarded complete cycloplegia. The optometrist used an autorefractor to do autorefraction. Subjective refraction was performed on all the children with uncorrected refractive error in either eye and spectacles were prescribed. Children who needed minor medical attention received such on-site, and those with more serious eye conditions were referred. The prevalence of visual impairment was calculated based on UCVA, presenting VA and BCVA.

Results:

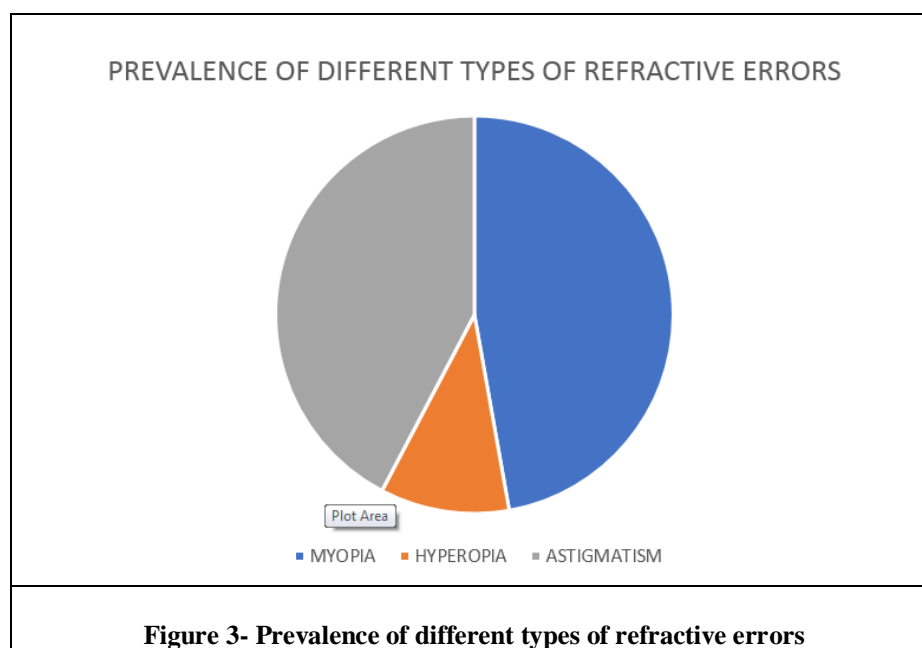
A total of 37329 school children were screened from different schools of kurnool district. Among them, 19934 (53.4%) children were male and 17395 (46.6%) were female. Among the male children, 37.2% (n=7433) had refractive error. Among the female children, 38.1% (n=6642) had refractive error. [figure-1]



We observed that increasing age was associated with an increased risk. Refractive error was highly prevalent in the age group of 14–16 years with 49.21% (n = 5273) among 10714 students followed by 38.4% (n = 4820) in the age group 10–13 years in a total of 12505 children. However, the age group between 5 and 9 years had comparatively less prevalent refractive errors with 28.22% (n = 3982) among 14110 students. [Figure-2]



From a total of 37329 students studying in different schools of kurnool district, the prevalence of refractive errors was 37.7% (n=14075) among which myopia was the most common with 47.2% (n = 6643), followed by 42.3% of astigmatism (n = 5953), and the remaining 10.5% (n = 1479) with hyperopia . Regarding gender, out of 19934 males, 37.2% (n=7433) had refractive errors whereas 38.1% (n=6642) females had refractive errors from a total of 17394 [Figure-3]. Some other ocular cases like squint, vitamin A deficiency, and cataract were also diagnosed.



Discussion:

We found in this study that the majority of the eye issues seen were caused by refractive error. Policymakers and the patients themselves must put in great effort to solve the problem. Refractive errors that are not addressed or are not treated properly have serious ramifications for the person, family, and society. These include missed opportunities for career and education, financial burdens on the family and the government, and cause a general decline in quality of life.

In this study, myopia was the most prevalent eye condition. This made up 47.2% of all cases of refractive error. Astigmatism and hyperopia have also been detected, with myopia being the most common distance refractive abnormality. The most common cause of vision impairment worldwide has been identified as uncorrected distance refractive error, primarily myopia, and this trend is predicted to continue. This result is similar to Adegbehingbe et al. in Ile-Ife (22.7%)¹² and Emerole et al. in Owerri (23.4%) in hospital-based investigations, and as 26.99% in population research in Southern India, as well as Adeoti and Egbewale's findings in Osobgo (39.2%).¹³

Myopia is more common in urban areas than in rural ones, according to a meta-analysis of myopia prevalence in Indian schoolchildren¹⁴, although

rural students have experienced four times greater increases in prevalence over the past ten years than their urban counterparts. According to the authors, the shrinking urban-rural divide is a result of a changing environment in rural areas, where a greater availability of digital devices encourages indoor activities and near work.

Myopia was the most common refractive error (47.2%) followed by astigmatism (42.3%), and hyperopia (10.5%) being the least and many studies have reported similar results.^{15 16 17 18}

A prominent cause of amblyopia in children has been identified as uncorrected high refractive error, despite the fact that the aetio-pathogenesis of amblyopia is known to be multifactorial.¹⁹ Early case detection, eye exams, refractions, the dispensing of glasses, and follow-up to guarantee prescription compliance are baseline preventative measures that need to be implemented by eye-care stakeholders at all strategic levels.²⁰

Vision screening is crucial in preventing visual impairment in children, as mentioned by Dandona et al.¹⁵. However, this needs to be carried out by trained individuals with good refraction skills, a backup plan to provide corrective lenses for those who require them, and inclusion of all school-aged children both inside and outside of school.

The large sample size is the main strength of this study. Because this study was conducted in

schools, it may not accurately represent the clinical conditions in these communities, where a sizable number of kids may not be attending school because of poverty. Selection bias can affect the school-based design. Children who are severely vision handicapped are also unlikely to attend school.

Conclusion:

The main factor contributing to visual impairment is refractive error. However, the majority of children lack the suitable eyewear for the best visual correction and care. The essential to preventing visual impairment from refractive error, especially in settings with limited resources, is an effective school eye health program to detect children with refractive error and provide free or affordable optical services. To prevent lifelong visual impairment, it is crucial to conduct timely screenings for the early detection of eye and vision issues in youngsters. The best chance for successful treatment is early detection.

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