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Original Research Article

DEMOGRAPHIC STUDY OF REFRACTIVE ERRORS IN SCHOOL CHILDREN OF JANGAON DISTRICT, TELANGANA

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Abstract

Background: Refractive errors are a common cause of visual impairment among school children worldwide. This study aimed to assess the prevalence and distribution of refractive errors in school children in Jangaon District, Telangana. **Materials and Methods:** A demographic study was conducted involving 21,774 students from various schools in Jangaon District. The study focused on the prevalence of refractive errors, their distribution across age groups, gender, and the types and grades of refractive errors. **Result:** Out of the total students, 1,456 were diagnosed with refractive errors, yielding a prevalence rate of 6.68%. The highest prevalence was observed in the 13-15 years age group (40.3%), followed by 37.9% in the 10-12 years group. The lowest prevalence was noted in the 16-17 years group (22.1%). Among the types of refractive errors, myopia was the most common (50.9%), followed by astigmatism (19.4%) and hyperopia (0.6%). In myopic students, the majority had simple myopia (87%), with moderate (11.2%) and high myopia (1.8%) being less common. A gender-based analysis revealed a higher prevalence of refractive errors among girls (8.2%) compared to boys (4.8%). **Conclusion:** The study highlights the high prevalence of refractive errors among school children in Jangaon District, with myopia being the most common type. The findings underscore the need for regular eye screening and timely intervention, particularly among school children in the 13-15 years age group and females.

INTRODUCTION

Refractive errors are the most common cause of visual impairment worldwide, significantly impacting the quality of life and academic performance, particularly in children.[1] These errors occur when the eye does not properly focus light, leading to blurred vision. The major types of refractive errors include myopia (nearsightedness), hyperopia (farsightedness), and astigmatism. In children, refractive errors often go undiagnosed, which can affect their learning, behavior, and overall development.[2,3]

In India, the prevalence of refractive errors among school children has been increasing, primarily due to lifestyle changes, limited access to eye care, and a lack of awareness about the importance of regular eye check-ups.[4] Several studies conducted in different regions of India have reported varying rates of refractive errors, but there is limited data available for specific regions such as Jangaon District in Telangana. This gap in knowledge hampers the implementation of targeted interventions to address this public health issue.[5,6]

The aim of this study is to assess the prevalence, distribution, and types of refractive errors among school children in Jangaon District, Telangana. By understanding the extent of refractive errors, particularly in terms of age, gender, and specific types, the study seeks to provide insights that will inform future eye care policies and interventions for school children in the region. Early detection and correction of refractive errors are critical for ensuring that children can achieve their full academic potential and prevent long-term visual impairment. This study will serve as a baseline for the formulation of local strategies to address refractive errors in school-going children.

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MATERIALS AND METHODS

Study Design: A cross-sectional observational study was conducted to assess refractive errors among school children in Jangaon District, Telangana. The study was part of the Rashtriya Bal Swasthya Karyakram (RBSK) under the National Health Mission (NHM) and aimed to screen and correct refractive errors in children aged 10-17 years.

Study Population: A total of 21,774 school children from 409 schools were screened for refractive errors. The schools included in the study were higher, secondary, and residential (Gurukul) schools within Jangaon District. Permission was obtained from the principals of all selected schools, and informed written consent was provided by teachers prior to enrolling the students. Ethical clearance for the study was obtained from the institutional ethical committee.

Eye Examination Process: The eye examination was conducted by a dedicated ocular team consisting of a senior optometrist and an ophthalmic assistant. The following steps were taken to assess the refractive errors:

Training of Teachers: Teachers were selected based on the total number of students in each school. These teachers were trained by the optometrist, under the guidance of an ophthalmologist, to screen the children's vision using the Snellen chart. They were educated about the importance of early detection of vision problems and other eye diseases.

Initial Screening: Vision screening was performed for each student using the Snellen chart at a distance of 6 meters. The children who were detected with any deviation from normal visual acuity were referred for further examination by an optometrist.

Refraction Testing: Objective Refraction: If needed, the children who had visual acuity deviations were first examined by the optometrist using objective refraction with an autorefractometer.

Subjective Refraction: A subjective refraction was then carried out using the Snellen chart and appropriate lenses were placed in a trial frame to correct the refractive error.

Referral for Further Examination: Children who did not show improvement with the pinhole test were referred for a complete ophthalmic examination at Government Medical College, Jangaon.

Anterior Segment Examination: An anterior segment examination using a torch and slit lamp was performed to detect conditions such as vernal keratoconjunctivitis, corneal opacities, pediatric cataracts, iris and lens colobomas, and keratoconus7.

Extraocular Movements: Extraocular movements were assessed to rule out squint and nystagmus.

Posterior Segment Examination: A posterior segment examination was conducted using a direct ophthalmoscope or a 90D lens for children who did not improve with the pinhole test.

Cycloplegic Refraction: Children whose visual acuity remained poor after the above tests underwent cycloplegic refraction by instilling 1% cyclopentolate eye drops to determine the full refractive error.

Refractive Error Classification: The refractive errors were categorized according to the Refractive Error Study in Children (RESC) Survey group. This classification includes myopia, hyperopia, and astigmatism, along with different grades of myopia (simple, moderate, and high).

Statistical Analysis: The data collected from the school children were analyzed to determine the prevalence and distribution of refractive errors based on age, gender, and type of refractive error. The study focused on identifying the common refractive errors, their correlation with demographic factors, and the need for further eye care services.

Ethical Considerations: The study was approved by the Institutional Ethics Committee, and informed consent was obtained from the parents or guardians of all participating children. Confidentiality was maintained throughout the study, and the results were shared with the relevant authorities to support public health initiatives in the region.

RESULTS

A demographic study was conducted to assess the prevalence and distribution of refractive errors among school children in Jangaon District, Telangana. The total number of students included in the study was 21,774, with 1,456 students identified as having refractive errors, giving an overall prevalence rate of 6.68%.

Age Distribution of Refractive Errors: The prevalence of refractive errors varied across different age groups. The highest prevalence was observed in the 13-15 years age group, with 40.3% of students (879 out of 8,786) affected by refractive errors. The age group 10-12 years followed with a prevalence of 37.9% (235 out of 8,165 students). The lowest prevalence was observed in the 16-17 years age group, with 22.1% of students (183 out of 4,823) presenting refractive errors [Table 1].

Distribution of Refractive Errors: Among the different types of refractive errors, myopia was the most common, affecting 742 students, which constitutes 50.9% of all students with refractive errors. This was followed by astigmatism, which was diagnosed in 283 students (19.4%), while hyperopia was observed in only 10 students (0.6%) [Table 2].

Grading of Myopia: Within the myopic population, the majority of the students had simple myopia, accounting for 87% (646 out of 742) of the cases. Moderate myopia was observed in 11.2% of cases (83 out of 742), while only 1.8% of students (13 out of 742) had high myopia [Table 3].

Gender Distribution: The gender distribution of refractive errors revealed that a higher percentage of girls were affected compared to boys. Out of 9,868 boys, 473 (4.8%) had refractive errors, while 983 out of 11,906 girls (8.2%) were diagnosed with refractive

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errors, indicating a higher prevalence in females [Table 4].

Table 1: Age Distribution of Refractive Errors in School Children of Jangaon District.

Age Group (years)	Total Number of Students	Number with Refractive Errors	Percentage (%)
10-12	8165	235	37.9%
13-15	8786	879	40.3%
16-17	4823	183	22.1%
Total	21,774	1,456	6.68%

Table 2: Distribution of Refractive Errors Among School Children in Jangaon District

Refractive Error Type	Number of Students	Percentage (%)
Myopia	742	50.9%
Hyperopia	10	0.6%
Astigmatism	283	19.4%

Table 3: Grading of Myopia Among School Children in Jangaon District

Myopia Subtype	Number of Students	Percentage (%)
Simple Myopia	646	87%
Moderate Myopia	83	11.2%
High Myopia	13	1.8%

Table 4: Gender Distribution of Refractive Errors in School Children of Jangaon District

Gender	Total Number of Students	Number with Refractive Errors	Percentage (%)
Boys	9868	473	4.8%
Girls	11,906	983	8.2%

Figure 1: School Children with Blepharophimosis with Myopia

Figure 2: Duans retraction syndrome

DISCUSSION

The study on the prevalence and distribution of refractive errors among school children in Jangaon District, Telangana, involved 21,774 students and revealed a prevalence rate of 6.68%. This is consistent with rates observed in similar studies conducted in India and globally, but it is somewhat lower than those found in urban settings, where the prevalence often ranges from 10% to 30%. The difference can be attributed to factors such as the rural versus urban settings, socioeconomic status, lifestyle, and access to eye care services.[8,9]

The highest prevalence of refractive errors was found in the 13-15 years age group (40.3%), followed by the 10-12 years age group (37.9%), and the lowest in the 16-17 years age group (22.1%). This trend aligns with other studies that suggest refractive errors are more common during the early to mid-adolescent years, which coincides with the rapid growth and development of the eye.[10]

Myopia was the most common refractive error observed, affecting 50.9% of the children, which is in line with global trends, particularly among children and adolescents. The increasing prevalence of myopia can be attributed to factors such as prolonged near work, reduced outdoor activity, and increased screen time, which have become significant contributors to the rise of myopia in recent years.[11,12]

Interestingly, a significant gender difference was noted in the prevalence of refractive errors, with a higher percentage observed in girls (8.2%) compared to boys (4.8%). This finding may reflect greater care-seeking behavior among girls, as they are more likely to be brought to healthcare facilities by their parents. Hormonal or genetic factors might also contribute to

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this gender disparity, as could cultural factors that promote regular health check-ups for girls.[13]

The distribution of refractive errors revealed that myopia was the most prevalent, followed by astigmatism (19.4%) and hyperopia (0.6%). Within the myopic group, simple myopia was the most common (87%), followed by moderate (11.2%) and high myopia (1.8%). This pattern is consistent with findings in other studies from India, where moderate and high myopia are less common, suggesting that vision correction using spectacles could be an effective intervention for a large proportion of children in this population.[14]

The study's methodology, including the use of Snellen charts for initial screening, autorefractometers for objective refraction, and cycloplegic refraction for accurate diagnosis, ensures a reliable assessment of refractive errors. Additionally, the involvement of teachers in the initial screening process helped identify children who might not have otherwise sought medical attention, which is a notable strength of this study.[8]

While this study provides valuable knowledge into the prevalence of refractive errors in Jangaon District, there are some limitations. Notably, preschool children and those outside the school system were not included, even though they may also experience refractive errors. Furthermore, the study did not assess potential risk factors such as a family history of refractive errors, socioeconomic status, or lifestyle factors, which could influence the prevalence. Future research should consider exploring these factors for a more comprehensive understanding of the causes and risk factors associated with refractive errors in this population.[9]

CONCLUSION

This study highlights the significant prevalence of refractive errors among school children in Jangaon District, Telangana, with myopia being the most common refractive error. The findings underscore the need for regular eye screenings, particularly in the 13-15 years age group and among girls, to ensure timely diagnosis and intervention. The results of this study can inform future eye care policies and interventions for school children in the region, with the aim of reducing the burden of visual impairment and improving the academic performance and quality of life of affected children.

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