

Profile of Paediatric Refractive Errors in a Tertiary Care Hospital of South Western Nigeria

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Received Date: January 02, 2023 **Accepted Date:** January 12, 2023 **Published Date:** January 23, 2023.

Citation: Ajite Adebukola B, Osadare A.S, Ajite K.O, (2023), Profile of Paediatric Refractive Errors in a Tertiary Care Hospital of South Western Nigeria, *J. Clinical Research and Clinical Reports*, 2(1); DOI:10.31579/2835-8325/009

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Abstract

Refractive errors are part of the priority areas for Vision 2020, a global initiative for the elimination of avoidable blindness introduced by W.H.O. (World Health organization). The presence of refractive errors in children is a cause for concern for the overall development and not only the vision of the child. It may also constitute a form of disability if left unattended to. This study therefore aims to determine the pattern of refractive errors and its associations with selected variables among children presenting to a tertiary hospital. This is a cross-sectional retrospective study conducted in the Ophthalmology Department of Ekiti State University teaching hospital which is a tertiary hospital in South-western Nigeria. Children of ages 5years - 16years with diagnosis of refractive error were recruited for the study. The medical records between Jan 2018- December 2020 were reviewed and patients' data including age, gender and type of refractive error were extracted. Data obtained was analysed with SPSS version 20(inc.) and results are shown by frequency, tables and figures. Measure of association of the variables was done using chi square and P value =0.005.

A total of 193 children with various refractive errors were seen during the period of study. There was a slight male preponderance. M: F (1.2:1) and highest frequency of refractive error was seen in children of ages between 5-7years. The most common refractive error seen was astigmatism in 140(36.2%) patients, most of the patients (46.4%) presented with moderate refractive error.

Keywords: refractive error; visual impairment; paediatric

Introduction

Refractive error occurrence in children is a cause for concern for the overall development as well as the vision of the child; it might constitute a form of disability if left unattended to. Hence, refractive errors are one of the priority areas for Vision 2020, a global initiative for the elimination of avoidable blindness introduced by W.H.O. (World Health organization) [1]. Refractive error is defined as a state in which the optical system of a non-accommodating eye fails to bring the parallel rays of light to focus on the retina [2]. Three common types of refractive errors include Hypermetropia, Myopia and Astigmatism. In myopia (nearsightedness), the point of focus is in front of the retina because the cornea is too steeply curved, the axial length of the eye is too long, or both. Distant objects are blurred, but near objects can be seen clearly. To correct myopia, a concave (minus) lens is used. Myopic refractive errors in children frequently increase until the child stops growing [2]. Myopia has been reported as the most common refractive error requiring correction seen in children [2]. In hyperopia (farsightedness), the point of focus is behind the retina because the cornea is too flatly curved, the axial length is too short, or both. In adults, both near and distant objects are blurred. Children and young adults with mild hyperopia may be able to see

clearly because of their ability to accommodate. To correct hyperopia, a convex (plus) lens is used [2]. The term astigmatism is used to describe a condition in which non-spherical (variable) curvature of the cornea or lens causes light rays of different orientations (eg, vertical, oblique, horizontal) to focus at different points. To correct astigmatism, a cylindrical lens (a segment cut from a cylinder) is used.

Children with visual impairment may develop amblyopia, limited or slow academic progress, poor social functioning and impaired quality of life if left unattended to [3-8]. There have been previous studies to show varying prevalence of these common childhood visual impairments [9-11]. For instance, in a study conducted in Southern Nigeria among primary school pupils, refractive error accounted for 33.3% of reduced vision while the overall prevalence of refractive error was 2.1%. Prevalence of myopia was 1.9% and hyperopia, 0.1% [10]. In another study carried out among school children in Bhutan, the prevalence of myopia (≤ -0.5 D) was 6.64% and was associated with female gender ($P = 0.004$), urban schooling ($P = 0.002$), and greater parental education ($P < 0.001$) [11]. The prevalence of hyperopia ($\geq +2.0$ D) was 2.17% and was significantly associated with lower class-level

($P = 0.033$), and female gender ($P = 0.025$). These studies^{10,11} concluded that reduced vision due to uncorrected refractive error is a public health problem among school-age children [10,11]. Effective school eye health strategies are needed to eliminate this easily treatable cause of visual impairment. The impact of refractive errors on the children cannot be over emphasized. It is therefore important that policy makers at state level or national level have access to data of children with refractive error so as to plan future interventional strategies and implement appropriate measures for early diagnosis and treatment.

This study therefore aims to determine the pattern of refractive errors and its associations with selected variables among children presenting to a tertiary hospital. This may provide data for the health administrators in planning for necessary interventional strategies.

Methods

This is a cross-sectional retrospective study of Children of ages 5years - 16years with diagnosis of refractive error at Ekiti State University teaching hospital which is a tertiary hospital of south western Nigeria. The medical records between Jan 2018- December 2020 were reviewed. 386 eyes of 193 children with refractive errors were studied.

Table I: Age group and gender distribution of the subjects

AGE GROUP (YEARS)	FREQUENCY (PERCENT %)		Total (%)
	MALE (%)	FEMALE (%)	
5-7 years	36 (18.7)	42 (21.8)	78(40.5)
8-10 years	24(12.3)	26 (13.5)	50(25.8)
11- 13 years	20 (10.4)	8 (4.1)	28(14.5)
14-16 years	26 (13.5)	11(5.7)	37(19.2)
Total	106(55.0)	87(45.0)	193(100)

Table 1: showed slight male preponderance. $M: F (1.2:1)$ and highest frequency of refractive error presentation was between age 5-7years.

Table 2: Distribution of types of refractive error by the eye involved $n=386$

TYPES OF REFRACTION	RIGHT EYE (%)	LEFT EYE (%)	TOTAL (%)
HYPERMETROPIA	71(52.6)	64(47.4)	135(35.0)
MYOPIA	59(53.2)	52(46.8)	111(28.8)
ASTIGMATISM	75(53.6)	65(46.4)	140(36.2)
TOTAL	205(53.1)	181(46.9)	386(100%)

Table 2: showed majority (36.2%) of the refractive error seen was astigmatism, and right eye was predominantly involved in all types of refractive error.

Table 3: Presenting visual acuity of the subjects

VISUAL ACUITY	RIGHT EYE n(%)	LEFT EYE n(%)	TOTAL
6/6-6/12	88(50.6)	86(49.4)	174(45.1)
6/18-6/36	71(48.9)	74(51.1)	145(37.6)
6/60 - <6/60	37(55.2)	30(44.8)	67(17.4)
TOTAL	196(50.7)	190(49.3)	386(100)

Table 3: showed that most of the children presented with the visual acuity 6/6 - 6/36.

Table 4: Severity of the different type of refractive errors.

TYPES OF REFRACTIVE ERROR	MILD $\leq 1.5D$ n (%)	MODERATE 1.75- 2.75D n (%)	SEVERE 3.0-5.0D n(%)	VERY SEVERE $>5.0D$ n(%)	TOTAL
HYPERMETROPIA	50(37.0)	62(45.9)	19(14.1)	4(3.0)	135(35.0)
MYOPIA	36(32.5)	55(49.5)	11(9.9)	9(8.1)	111(28.8)
ASTIGMATISM	71(50.7)	62(44.3)	3(2.1)	4(2.9)	140(36.2)
TOTAL	157(40.7)	179(46.4)	33(8.5)	17(4.4)	386(100%)

Table 4: showed that most of the patients (46.4%) presented with moderate refractive error and astigmatism has the highest frequency of occurrence.

Children, diagnosed as having refractive error of 0.50 Dioptres or more and whose parents/guardians gave consent for examination were included in the study. Uncooperative children and those with dense media opacities or history of any intraocular surgery were excluded from the study. Patients' data including age, gender and type of refractive error were extracted. Unaided visual acuity of all children as measured with the use of Snellen chart placed at 6metres away from child was extracted from the record. On the basis of unaided visual acuity, visual impairment was graded as mild (VA 6/6 to 6/12), moderate (VA 6/18 to 6/36) and severe (VA 6/60 to less than 6/60). Pinhole vision was also taken in eyes with visual acuity worse than 6/6. All children underwent slit lamp evaluation and fundoscopy. Data of the cycloplegic objective refraction done and post cycloplegic subjective refraction done 1 week after the initial test was extracted. The final result was then recorded.

Data obtained was analysed with SPSS version 20(inc.) and results shown by frequency, tables and figures. Measure of association of the variables was done using chi square and P value $=0.005$. Approval for the study was obtained from research and ethics committee of the institution.

Results

Discussion

The uniqueness of a study that aims to emphasize the pattern of refractive errors and its associations among children with a view of providing data for planning for necessary interventional strategies cannot be overemphasized [12,13]. The intervention in terms of provision of prescribed spectacles for children with visual impairment will go a long way in promotion of healthy, confident and psychological balanced children in school [14].

This study is a cross-sectional hospital-based study which made it economical when compared to most of the studies done to analyze the pattern of refractive errors in children which are either school based screening or population-based screening that may require huge economic resources. There is a slight preponderance of males in this study with a male to female ratio of 1.2:1, moreover the peak age at presentation was 5-7 years this is consistent with findings from other previous studies elsewhere. [15,16] This tally with early school age when active learning process commences. Failure to recognise visual impairment early may lead to poor school performance, low self-esteem and eventual psycho-social depreciation. Some earlier studies [17-19]. noted that refractive error was more around pubertal age (11-15 years), the increase in awareness of the occurrence of visual impairment in children and the gradual disproof of the societal myth that early use of glasses may worsen the sight of a child may account for this disparity in the peak age of presentation in the hospital.

In our study, the most common refractive error seen was astigmatism (36.2%), this is similar to the finding in a study done in India children⁹. Some other studies [20,21]. done in the country also reported astigmatism, especially the myopic form, to be the commonest paediatric refractive error. The reason that could be alluded to this is the predominant symptom of astigmatism; which is blurring of vision, a child with this impairment will not be able to see clearly irrespective of his/her distance from the object. He/she and may likely complain earlier of poor vision unlike short-sightedness or long-sightedness, in which position to the viewed object may improve the vision. It is imperative that complaints of poor vision in a child or perception of impaired vision in a child by the primary caregivers, parents or teachers should not be ignored. Such children should be properly evaluated by the ophthalmologist as such conditions are usually amenable to appropriate intervention.

Most of the patients (46.4%) presented with moderate refractive error and astigmatism has the highest frequency of occurrence. Moderate degree of refractive error was seen in them in all categories. Myopia up to 2.75D and hypermetropia as well as astigmatism up to 1.5 D was present in majority of the eyes. This finding was consistent with studies done in India, Nepal and Iran by Krishnamurthy H et al, Shrestha GS et al and Hashemi H et al [13,15,16]. Furthermore, according to Faderin and Ajayeoba study, it was reported that moderate refractive error contributed significantly to cases of visual impairment noticed among school children [22].

In previous studies on visual impairments, refractive errors have been the major cause of visual morbidity [17-19]. The refractive error when not properly managed affects vision related quality of life of children. The global initiative for the elimination of avoidable blindness which was introduced by WHO (World Health Organization) i.e., Vision 2020 will be more impactful if routine evaluation of the visual health of a child could be effectively inculcated and monitored as part of the school health program.

In our study, majority of the children presented with visual acuity between 6/6 and 6/36 indicating that at presentation, there was some level of visual impairment. This is emphasizing the need for urgent intervention. The children with refractive errors were duly attended to and followed up in the clinic.

Conclusion

In conclusion, Refractive error is an important health challenge seen in school age children with astigmatism having the highest frequency of occurrence.

Recommendation

Eye screening at school entrance should be routinely done for school age children so as to detect refractive errors early and treat promptly Parents and Guidance should be encouraged to procure spectacles for children as soon as they are prescribed by their doctors

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