DISTRIBUTION OF REFRACTIVE ERRORS AMONG SCHOOL CHILDREN IN ABIA STATE OF NIGERIA

BY
***AHUAMA O. C. AND ATOWA U. C.**
DEPARTMENT OF OPTOMETRY, ABIA STATE UNIVERSITY
UTURU, ABIA STATE, NIGERIA
Email:drahuama@yahoo.com
*Corresponding author

ABSTRACT

Visual screening in pre-school and school children has long been a tradition in developed nations of the world. And the significance of this cannot be overemphasized especially with the already established correlation between school performance and visual status. This study, which was carried our in Abia State of Nigeria made use of 2,525 school children aged 7 to 17yrs. One primary and one Secondary school each were chosen from four local councils from which the subjects were randomly selected. Following ocular pathology screening, the subjects declared free of such were subsequently refracted both objectively and subjectively using retinoscope and trial case respectively. The result showed prevalence rate of 31.05% for myopia, 19.13% for hyperopia and 7.80% for astigmatism. Furthermore, the frequency of the distribution of myopia was found to show a linear progression with age while that of hyperopia was found to be on the decrease within the same age range. On further analysis, an average percentage difference of 2.14% was observed in the distribution of refractive errors in urban and rural school children.

KEYWORDS: Refractive errors, Distribution, Urban, Rural, School children.

INTRODUCTION

The ñrefractive statusò of the eye is an expression used to denote the relationship between the refractive mechanism (dioptrics) of the eye and the spatial location of the sensory layer of the eye (retina). This is broadly classified into two groups ï emmertropia and ametropia.

The latter term is employed to describe the clinical condition in which there is a variation from a perfect coincidence of the posterior principal focus of an eye's refractive media and the retina, while the former denotes the clinical condition in which the perfect coincidence exists. A further classification of the latter condition is made based upon the location of this posterior principal focus thus formed relative to the position of the retina.

Myopia is the word used to refer to the condition in which the posterior principal focus thus formed lies in front of the retina, while hyperopia defines a reverse situation in which this focus lies hypothetically behind the retina. However, a third condition exists in which the posterior principal focus fails to form a point focus and this is denoted as astigmatism.

According to Borish[1], most if not all children are born hyperopic and this hyperopia decreases with increase in age, as the eyes turn more myopic.

As a result of this assertion, so many researchers have focused on determining the refractive status of both pre-school and school children. A step has also been taken further in establishing a relationship between a child's school performance and his refractive status.

Making use of 4,890 children in urban South Africa, ages ranging from 5 to 15 yrs, Naidoo et al[2], found that reduced vision in school age African children are mostly because of uncorrected refractive errors. Similarly Horea[3], carried out a study in Sana city with 1,016 children between the ages of 7 -13 years, and concluded that this age group is in an active stressful near work and characterized by a decline in hyperopia with an onset of myopia. In a comparative study however, Grosvenor[4] found that Polynesian children living in New Zealand has a greater frequency of emmetropia than Caucasian children. These developments, therefore, have not only made it imperative for further studies in this field, but also desiring for researchers in different

parts of the globe to establish their own norms. This study, therefore, was geared towards determining the distribution of refractive errors among West African school children.

MATERIALS AND METHODS

The subjects were selected from one primary and one secondary school from four local councils in Abia State, namely-Aba, Umuahia, Isiala Ngwa and Ikwuano. These students who were randomly selected numbered 2,525, had normal ocular health and within the age rnag of 7-17yrs.

For each subject, a comprehensive case history was taken following which the habitual visual acuity was taken for both far and near distances using the Snellen acuity chart. Subsequently, normal ocular health was ascertained using the retinoscope (working distance of +1.50D). Similarly the prescription so obtained was subjectively refined using the trial lenses.

RESULTS

The result showed that out the 2,525 subjects, 1,062 subjects (42.02%) were emmetropic while 1,462 (57.98%) were ametropic. Table 1 below presents a summary of the gross distributions of the refractive errors among the subjects in the urban and rural areas.

Similarly, a concise prevalence of the age distribution of the refractive errors was made in table 2 while table 3 depicts the distribution of the different refractive errors in primary and secondary schools.

On analysis, myopia was found to have the highest prevalence (31.05%) followed by hyperopia (19.13%) while astigmatism was the least prevalent (7.80%).

DISCUSSION

From the result of this study, myopia was the most prevalent refractive error among school children in Abia State. 31.05%, followed by hyperopia 19.13%, with astigmatism being the least prevalent (7.8%)

Notably, the observed increase in both frequency and prevalence of myopia was in line with the observations of African children elsewhere[3]. This frequency affects 65% of children between 12-17 yrs. However, when compared with the reports of recent surveys of other racial groups, Garner, et al[5] reported 0.77% frequency of myopia among Vanuatu school children age 6-7 yrs even as Junghans[6] found an increase in the prevalence of myopia greater than -0.50D from 1% at 4 years to 8.3% at 12 years in Sydney.

Conversely, the observed frequency for hyperopia follows a reverse pattern to that of myopia. This appears relatively high in 7 year old-subjects (26%; although about 60% of these cases were below +1.00D) while in 17-year old subjects; the observed frequency was 5%. When compared to the finding of Duke Elder[7], 50% hyperopia for 16-year old subjects; the current subjects showed low prevalence of hyperopia. Similarly, the earlier study of Nnadozie[8], which reported astigmatism as the most common refractive error in school children in Nigeria was is in sharp contrast of the current observation, which showed astigmatism to be least prevalent, notably, while the former study was based on self ï selected subjects, the latter (current study) was based on a random selection of subjects. In agreement with Arnold[9], astigmatism changed little with age when compared to myopia and hyperopia.

Finally, the difference in the distribution of refractive errors between urban and rural school children was in harmony with earlier observations by Lin et al[10] using school children in Taiwan. He found myopia and astigmatism to be higher in the urban group with percentage differences of 2.46% and 0.75% respectively with hyperopia being higher in the rural group, 3.21% on the average, the current difference in refractive errors between the two groups was 2.14%. And noting that urban children have greater access to computers, television, better libraries and regular electricity supply which could also motivate more night reading may make an acceptable explanation for this.

However, it is the recommendation of the researcher that the effects of environmental factors on the distribution of refractive errors be assessed.

TABLE 1: PREVALENCE OF REFRACTIVE ERRORS

Refractive errors	Total		Urban		Rural	
	No.	%	No.	%	No.	%
Emmetropia	1061	42.02	531	21.03	530	20.99
Myopia	784	31.05	410	8.63	374	14.81
Hyperopia	483	19.13	218	8.63	265	10.50
Astigmatism	197	7.80	104	4.12	93	3.68
Total	2,525	100	1,263	50.02	1,262	49.98

TABLE 2: AGE DISTRIBUTION OF REFEACTIVE ERRORS

Age	Myopia		Astigmatism		Hyperopia	
	No	%	No	%	No	%
7	11	1.40	127	26.29	1	0.51
8	15	1.91	68	14.089	0	0.00
9	14	5.23	79	16.36	2	1.02
10	53	6.76	62	12.84	4	2.83
11	67	8.55	30	6.21	19	9.64
12	83	10.59	27	5.50	20	10.15
13	91	11.61	18	3.73	18	9.13
14	100	12.61	21	4.35	29	14.72
15	91	11.61	9	1.86	29	14.72
16	114	14.54	16	1.31	39	19.78
17	118	15.05	25	5.18	36	18.24
Total	784	100	483	100	197	100

TABLE 3: DISTRIBUTION OF REFRACTIVE ERRORS IN PRIMARY AND SECONDARY SCHOOL

	Hyperopia	Myopia	Astigmatism	Total
Junior Primary (1-3)	195 (87.83%	26 (11.71%)	1 (0.46%)	222 (100%)
Senior Primary (4-6)	171 (47.89)	161 (45.09%)	25 (7.00%)	357 (100%)
Junior Sec. JSS (1-3)	66 (13.66%)	278 (67.32%)	67 (16.46%)	407 (100%)
Senior Sec. SS (1-3)	50 (10.48%)	323 (67.71%)	104 (21.80%)	477 (100%)

REFERENCES

1. Borish, I .M. (1975): Clinical Refraction. 3rd Edn. Chicago Professional press, 1381pp.
2. Naidoo, K. S., Raghunanadan, A., Mashige K. P., Govender, P., Holder, A., Pokharel, G. P. and Ellwein, L. B. (2003): Refractive Error and visual impairment in African children South Afr. Medline. 1293.
4. Horea, A. A. (2000): Prevalence of Refractive-Errors in Yemeri Primary School children with VA less than 6/6. Am. J. Optom. Arch. Am. Acad. Optom, 47:375-41.
5. Grossvenor, T. (1970): Refractive Error Distribution in New Zealand, Polynesia and European children. Am. J. Optom. Arch. Am. Acad. Optom, 47:573-9.
6. Garner, L. F., Kinner, R. F., Linger, J. D. and Mickeller, M. J. (1985): Prevalence of Myopia in school children in Vanuatu. Arch. Ophthalmol, 63:323-6.
7. Junghans, B. M. and Crewther, S. G. (2003): Prevalence of Myopia among Primary School Children in Eastern Sydney. Clin. Exp. Optom, 86 (5):339-45.
8. Duke-Elder (1963): Accommodation and Refraction-Hypermetropia. London Churchill Livingston, pp 39-45.
9. Nnadozie, J. N. B. (1986): Refractive Problems among Nigerians. Optician, 192 (12):50-7.
10. Arnold, M. C. (2001): Epidemiology of Ametropia: Introduction to Refraction. Optom. Vis. Sci, 70:351-63.
11. Lin, L. K., Shih, V. F., Lee, Y. C., Hing, P. T. and Ko, I. S. (1990): Changes in ocular refraction and its components among medical students. Optom. Vis. Sci, 73:495-8.