

ORIGINAL ARTICLE

Pattern of Refractive Errors Among Ophthalmic Outpatients of University of Uyo Teaching Hospital, Uyo, Nigeria

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ABSTRACT

Introduction: Uncorrected refractive error (RE) is the most common cause of visual impairment (VI) in the world. It has significant effects on individuals and community, restricting some educational and occupational employment opportunities of the otherwise healthy individual. A significant percentage of the world population is visually impaired/blind from uncorrected RE. **Aim:** To determine the pattern of REs in ophthalmic outpatients in a teaching hospital. **Materials and Methods:** Records of consecutive patients attending a tertiary eye facility who were diagnosed with RE and/or presbyopia from January 2010 to December 2011 were retrieved. Data were analyzed using Statistical Package for the Social Sciences 20.0. **Result:** Presbyopia coexisting with other forms of RE 273 (40.4%) and presbyopia only was seen in 215 (31.8%). Myopia only was seen in 77 (11.4%), astigmatism only in 18 (2.7%), and hyperopia only in 13 (1.9%). **Conclusion:** In line with the objectives of VISION 2020, the data presented in this study will help in planning result-oriented intervention programs in the state.

Keywords: Presbyopia, refractive error, visual impairment

INTRODUCTION

Refractive error (RE) is a state in which the optical system of a nonaccommodating eye fails to bring parallel rays of light to focus on the fovea. It is caused by an incongruity between the axial length of the eye and the powers of the optical elements of the eye.^[1] Presbyopia is a loss of accommodation or recession of near point with age.^[2] Together with presbyopia, uncorrected RE is the most common cause of visual impairment (VI) in the world.^[3,4] It has significant effects on individuals and community, restricting some educational and occupational employment opportunities of the otherwise healthy individual.^[4]

In 2008, there were 145 million people with VI (visual acuity [VA]) of $<6/18-3/60$ and 8 million with blindness ($VA < 3/60$) from uncorrected RE.^[5] This constitutes 18% of the world population, and thus made, RE, the leading cause of low vision and the second only to cataract as a cause of treatable blindness.^[5] The Nigerian National Blindness and VI Survey recorded a similar trend in which uncorrected RE accounted for 57.1% of moderate VI ($VA < 6/18-6/60$) in individuals 40 years and above.^[6,7]

The etiologic mechanism of RE can be both genetic and environmental.^[8-10] Specific polymorphism or environmental risk factors responsible remain largely unknown, although earlier studies found near work, particularly reading to be a significant environmental factor that may lead to myopia.^[8-10] From the twin and family study, genetics has been established to play

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a role in the growth and structure of the eye.^[11-13] For instance, a susceptibility locus of myopia is linked to the PAX6 region on chromosome 11.^[14]

Because of the increasing realization of the enormous need for correction of RE, it has been considered one of the priorities in the global initiative for the elimination of avoidable blindness: VISION 2020 - The Right to Sight.^[15] This study was conducted to determine the pattern of REs among patients attending out-patient eye clinic of the University of Uyo Teaching Hospital. The information derived from the study would complement existing knowledge toward making appropriate recommendations for institutional and national planning and development.

This study aimed at determining the pattern of REs in ophthalmic outpatients in Uyo, South-South Nigeria, with a view of developing result-oriented intervention programs in the state.

MATERIALS AND METHODS

The eye clinic is the only tertiary eye clinic in the state, located in Uyo, the Akwa Ibom state capital. It is very accessible to other parts of the state. Records of consecutive patients attending a tertiary eye facility that were diagnosed with RE and/or presbyopia from January 2010 to December 2011 were retrieved. Initial distant visual acuity was determined using the standard Snellen chart at 6 m in a well-lit room, and near vision was estimated using the Rayner near reading chart. Same refracting unit was used for all the patients. All objective refraction was carried out by two optometrists with streak retinoscopes (Heine Beta 200) at 1/3 of a meter, followed by subjective refraction and fine-tuned by Jackson Cross Cylinder. The final subjective correction was taken as individual existing RE. Some children (those with excessive accommodation) had cycloplegic and postcycloplegic refraction done using homatropine 1% eye-drops.

Myopia and hyperopia were taken as REs of at least -0.5DS and +0.5DS, respectively. Astigmatism was defined as $\geq \pm 0.25$ DCyl, spherical power > -6.0 DS was defined as high myopia, and $\geq +5.25$ DS as high hyperopia. All the patients who needed plus power reading addition/ of difficulty in reading small letter prints despite best optical correction in place were considered as having presbyopia. The degree of presbyopia was determined as the minimum amount of plus lens needed to achieve the maximum improvement in lines read. Diagnosis of co-existing RE in the same eye was also taken into consideration, e.g., presbyopia co-existing with myopia in the same eye.

Demographic information requested included age, sex, and occupation. Descriptive analysis of data was done using IBM SPSS Statistic for windows version 20.0 (Armonk, NY:IBM Corp). Measure of central tendency used was mean \pm standard deviation. Frequencies were expressed as percentages. The relationships among categorical variables were established with Chi-square test. $P \leq 0.05$ was considered statistically significant.

RESULTS

In the period under review, a total of 676 consecutive patients attended our eye clinic. Two hundred and seventy-two (40.2%) were males and 404 (59.8%) were females with male to female ratio of 1:1.48. The mean age was 38.91 ± 14.50 . Majority 236 (49.7%) were between 36 and 50 years. Public servants (core civil servants, teachers, and other professionals) accounted for 264 (39.1%) and pupils/students (primary/secondary) formed the second largest group 166 (24.6%). Presbyopia only was seen in 215 (31.8%) and presbyopia coexisting with RE in 273 (40.4%). Myopia only was seen in 77 (11.4%), hyperopia only in 13 (1.9%), and astigmatism only in 18 (1.7%), while presbyopia with myopia was seen in 62 (9.2%), presbyopia with hyperopia was seen in 165 (24.4%), and presbyopia with astigmatism was seen in 5 (0.7%). Details are as shown in Tables 1-4.

DISCUSSION

The mean age of our cohort was 38.91 ± 14.10 years. This is the pattern seen in many other studies.^[16-18] The prevalence rate of myopia (myopia alone, myopia with astigmatism, and myopia with presbyopia was 205 [27.9%]). This was higher than the figures from the national survey (16.2%).^[19] This is a hospital-based study, while the former is a population study. This result is similar to the findings by Adegbehingbe *et al.* in Ile-Ife (22.7%)^[18] and Emerole *et al.* (23.4%)^[20] in

Table 1: Age and sex distribution of 676 patients

Age group	Sex		Percentage
	Male	Female	
≤10	16	13	29 (4.2)
11-15	12	25	37 (5.5)
16-20	18	19	37 (5.5)
21-25	14	14	28 (4.1)
26-30	12	10	22 (3.3)
31-35	14	36	50 (7.4)
36-40	62	85	147 (21.7)
41-45	35	58	93 (13.8)
46-50	29	67	96 (14.2)
51-55	25	35	60 (8.9)
56-60	17	24	41 (6.1)
≥61	18	18	36 (5.4)
Total	272	404	676 (100)

Table 2: Age and refractive error distribution in 676 patients

Age	Myopia*	Hypermetropia**	Astigm***	MA	HA	Presbyopia only	PMA	PHA	PA	Total
≤10	12	7	2	6	1	0	0	0	0	28
11-20	37	6	8	17	3	0	0	0	0	71
21-30	27	3	5	9	2	0	0	0	0	46
31-40	13	3	3	3	2	122	25	32	2	205
41-50	2	2	0	0	0	76	28	78	3	189
51-60	4	0	0	0	1	10	20	66	0	101
≥61	3	0	0	0	0	7	9	17	0	36
Total	98	21	18	35	9	215	82	193	5	676

*Myopia: Myopia including pathological myopia and myopia with other ocular pathologies, **Hypermetropia: Hypermetropia including high hypermetropia and hypermetropia with ocular pathologies, ***Astigmatism: Astigmatism including astigmatism with other ocular pathologies. MA: Myopic astigmatism, HA: Hyperopic astigmatism, PMA: Presbyopia coexisting with myopia and myopic astigmatism, PHA: Presbyopia coexisting with hypermetropia and hypermetropic astigmatism, PA: Presbyopia coexisting with astigmatism

Table 3: Distribution of refractive errors among 676 cases by sex

Refractive error	Male	Female	n (%)
Myopia	43	34	77 (11.4)
Hyperopia	5	8	13 (1.9)
Astigmatism	12	6	18 (2.7)
Myopic astigmatism	12	23	35 (5.2)
Hyperopic astigmatism	3	6	9 (1.3)
Presbyopia only	82	133	215 (31.8)
RE with ocular pathologies	6	9	15 (2.2)
Myopia and presbyopia	25	37	62 (9.2)
Hypermetropia and presbyopia	60	105	165 (24.4)
Astigmatism and presbyopia	3	2	5 (0.7)
Myopic astigmatism and presbyopia	6	14	20 (2.9)
Hyperopic astigmatism and presbyopia	11	14	25 (3.7)
Pathological myopia	5	10	15 (2.2)
High hypermetropia	0	2	2 (0.3)
Total	273	403	676 (100)

RE: Refractive error

Table 4: Distribution of 676 patients by occupation

Occupation	Frequency (%)
Public servants	264 (39.1)
Students/pupils	166 (24.6)
Business people	23 (3.4)
Farmers/petty traders/artisans	142 (20.9)
Pensioners	37 (5.5)
Applicants/dependents	26 (3.8)
Clergy	18 (2.7)
Total	676 (100)

Owerri in similar hospital-based studies and 26.99% in a population study in Southern India,^[21] but lower than the findings in Osobgo by Adeoti and Egbewale (39.2%).^[17] More women (116) had myopia in various degrees as compared to men (89). In an epidemiological review of myopia, prevalence of myopia was seen to be higher in women than men.^[22] The prevalence of high myopia (2.7%) is similar to that of the national survey (2.1%)^[19] and close to the findings in India.^[21] Myopia was highest between the age range of 10 and 25 years (71). It has been established that the prevalence of myopia changes with age, occurring

mostly between the age of 6 and 14 years and remaining relatively stable between the age of 12 and 54 years, and then a decreasing prevalence with increasing age.^[23-25] Myopia in this study is less common than hyperopia. This agrees with earlier studies in the different parts of the country.^[26] This is different from the findings of Adegbehingbe *et al.*^[18] in similar hospital-based studies. Of the 112 subjects with myopia/myopic astigmatism, 88 (78.6%) were students/pupils. This high prevalence is consistent with recent thinking that myopia is not only a genetic problem, but has some environmental components. Education has been associated strongly with the risk of myopia in many studies.^[27]

A comparative study of prevalence of myopia in medical and arts stream students in Ahmedabad, showed that students who read for longer hours had a higher prevalence of myopia.^[28,29] The theory that nuclear sclerosis contributes to myopic refractive shift in the elderly is supported by longitudinal data.^[30] However, actual biometric changes with age could also have contributed to a myopic change in age-specific elderly adults.^[31]

The prevalence of hyperopia (hyperopia, hyperopia astigmatism, and hyperopia with presbyopia) was 212 (31.1%). This is lower than that of the national survey (50.7%),^[6,7] which was a population study of those 40 years and above but higher than the findings of Adeoti and Egbewale in Osogbo South-West Nigeria (23.3%)^[17] in a similar hospital-based study. Hyperopia in this study is the most common type of RE (agrees with the findings of the national survey).^[6,7] Hyperopia is seen to increase with age in this study from 31 to 55 years and then starts to decrease again. The explanation for this observed prevalence pattern is not clear but has been hypothesized to be due to a birth cohort effect (differences in the environment experienced during life by persons born during different calendar-year periods) or to actual longitudinal changes in RE with age.^[32] Prevalence of hyperopia was higher

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in women than men. This is similar to the outcome of the national survey^[6,7] and was also seen among black women in a study by Katz *et al.*^[33,34] This may be because females' eyes on average have shorter axial length and shallower anterior chamber depth than those of males'.^[35]

Astigmatism/astigmatism with presbyopia in this study was 112 (16.6%). This is similar to the findings in India by Dandona *et al.* (12.94%)^[4] and is close to the findings of Adeoti and Egbewale in Osogbo (21%)^[17] in a similar hospital-based study, but lower than what was obtained in Ile-Ife by Adegbehingbe *et al.* (55.8%).^[18] It was seen to be largely in the younger age group and peaked at 21–30 age group. It is the least common RE in this study. This is similar to the finding among Ekiti people of Ekiti state of South-West Nigeria by Ayanniyi *et al.*^[16] Astigmatism was the most common RE in Bayelsa-Nigeria in a hospital-based study by Korye-Egbe *et al.*^[36]

Prevalence of presbyopia in this study was 495 (72.8%). Of this, presbyopia only was seen in 215 (31.8%) and presbyopia with REs in 273 (40.4%). This is high as expected as the mean age of our cohort was 38.91 ± 14.10 years. This is higher than the result from similar hospital-based study in Kano (40.7%) (Northern Nigeria)^[37] but similar to the findings in Tanzania, another African country where 61.9% of those with 40 years and above were presbyopic.^[38] The Andhra Pradesh Eye study reported that 63.7% of those with REs had presbyopia.^[39] Of this, only 17% had presbyopia alone and 23.7% had presbyopia with other RE. This difference may be due to the population studied, which had a large percentage of public servants.

CONCLUSION

Presbyopia was seen as the most common error and this correlated positively with the mean age of the cohort (38.91 ± 14.10). Patients with RE and presbyopia were more than those with presbyopia only. In line with VISION 2020, The Right to Sight, the data presented in this study will help in planning results-oriented intervention programs in the state.

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Conflicts of interest

There are no conflicts of interest.

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