PATTERN OF REFRACTIVE ERRORS AND PRESBYOPIA IN A TERTIARY HOSPITAL IN SOUTH EAST, NIGERIA

ABSTRACT

BACKGROUND

Uncorrected refractive errors and presbyopia are a major cause of visual impairment. They affect a large proportion of the population globally, irrespective of race, age and sex. They also have psychological and socio-economic effects on the individual, family and society. Uncorrected refractive error and presbyopia could lead to poor quality of life.

AIM: To determine the pattern and predisposing factors of refractive errors and presbyopia among patients seen in the outpatient clinic.

METHODOLOGY: A prospective, cross-sectional study involving all patients with refractive error and presbyopia that presented to the eye clinic of Abia State University Teaching Hospital, Aba, Abia State from January 2017 to December 2017. Data were obtained from patients' records, entered into and analysed using IBM SPSS version 25. Categorical data were analysed using proportions. Charts and tables were used to present the frequency distributions of the variables while Chi square test was used to determine association between variables. Statistical significance was set at a P-value of < 0.05.

RESULTS: A total of 300 patients with refractive errors and presbyopia were seen in the period of study. This comprised of 93 males and 207 females aged 5 years to 85 years. Their mean age was 40.13±17.6 years.

The commonest presenting complaint was blurring of both far & near vision (24%), other presenting complaints in decreasing order of frequency were blurring of distant vision, itching, blurring of near vision, eye pain, headache and red eyes in 18%,15%, 9.6%, 5.6%,and 3.2% respectively. Presbyopia was noted in 55.3% while myopia, anisometropia, astigmatism and hypermetropia were noted in 20.7%, 19.3%, 7.0% and 1.3% respectively. Nuclear sclerosis was the commonest co-existing ocular pathology or morbidity in this study. Statistically significant association was found between age of the patients and presence of ocular disease existing with RE ($p=0.016$).

CONCLUSION: Refractive errors and presbyopia constitute a common diagnosis among patients seen in our facility. Fifty-one percent of the study population had refractive errors/presbyopia. Presbyopia was very common in the study population. The commonest refractive error was myopia while hypermetropia was the least common refractive error in this environment.

KEYWORDS: Pattern, Predisposing factors, Refractive errors, presbyopia

1. INTRODUCTION

Refractive error is a major cause of visual impairment, accounting for 43% of the 208 million visually impaired people worldwide [1,2] and 11.5% of visually impaired in Nigeria [3] It is a common correctable cause of visual impairment. It is the inability of the eye to focus images properly on the retina.[4] In refractive errors, the rays of light fall either in front of the retina (myopia), behind the retina (hypermetropia) or in different meridia (astigmatism). Presbyopia also known as aging sight is a non-refractive error that affects visual acuity. It

occurs when the lens loses its normal accommodating power and can no longer focus an object viewed at arm's length or closer.[5] This normal aging process of the lens can also occur in combination with myopia, hyperopia or astigmatism.[6]
Refractive error is worldwide in distribution, affecting people of all ages, gender, race and social status.[7] An estimate of 153 million people worldwide live with uncorrected refractive errors,[8] out of this number, about 8 million persons are blind. The prevalence of refractive error varies from place to place. About 80% of population is estimated to have refractive error in Asia,[9] while 33.1% and 25% prevalence has been reported in America and Europe respectively.[10,11]

In Bayelsa, South-South Nigeria and Osogbo South-West Nigeria, 53% of study population had significant refractive error,[12,13] while 44% was found in Kaduna, Northern Nigeria.[14]

Refractive errors may be asymptomatic but commonly may present with blurring of vision for both distant and near objects, eye strain (asthenopia), feeling of heaviness or tiredness in the eyes, pain, conjunctival hyperaemia tearing and headache.[15.16] They may also present with the complaint of holding books very close to the eyes.[17]

In presbyopia, patients present with blurred vision at normal reading distance, eye strain and occasionally headache. There is difficulty in reading small prints, fatigue in doing close works and need for brighter lightening when reading or doing close work. There is preference of holding reading materials at arms-length to make letters clearer.[18,19] Presentation is usually after the age of 40 but a good number of Africans present before 40 years of age.[20] Clinically, esotropia may be elicited while visual acuity evaluation reveals decreased vision. Refractive errors can be corrected with eyeglasses, contact lenses or surgery.[21]

The purpose of this study is to highlight the pattern, predisposing/ associated factors of refractive error and presbyopia in this environment to form a baseline data for further studies and effective planning for eye care service provision.

2. METHODOLOGY

A prospective, cross-sectional, study involving all patients with refractive error and presbyopia that presented to the eye clinic of Abia State University Teaching Hospital, Aba, Abia State from January 2017 to December 2017.

Abia State University Teaching Hospital, Aba is a state-owned tertiary health facility that provides secondary and tertiary medical care, and it is also involved in training of high and middle level manpower for the health industry. The state has a population of about 4 million people and it is surrounded by Imo, Rivers, Akwa-Ibom, Ebonyi and Enugu states. It thus provides secondary and tertiary eye care services to these people.

All patients with refractive errors and presbyopia were included in the study. The biodata such as age, and sex were obtained. The visual acuity of each eye was evaluated using Snellen's, picture or tumbling E chart. The picture chart was used for preschool children while tumbling E-chart was used for illiterate adults. The near vision was evaluated using Jaegers' chart. The visual acuity (VA) was evaluated at a 6-meter distance, unaided and aided with pin hole. The visual acuity was graded using the10th revision of the World Health Organization international statistical classification of diseases, injuries and causes of death into mild or no visual impairment, moderate visual impairment, severe visual impairment and blindness.[22] Any VA improvement by at least one line with pinhole was considered to have a refractive error component. Presenting complaints, its duration, past ocular and medical

history and other ocular diseases co-existing with refractive errors were also recorded. History of use of spectacles was noted. All patients also had autorefraction done. The final subjective refractive correction given to the patient was used to categorize the type of refractive error into myopia, myopic astigmatism, hypermetropia, hypermetropic astigmatism presbyopia, myopic presbyopia, hypermetropic presbyopia and anisometropia.

Continuous variables were presented using mean and standard deviation. Categorical data were analysed using proportions. Charts and tables were used to present the frequency distributions of the variables. Statistical significance was set at a P-value of < 0.05. IBM SPSS version 25.0 was used to analyse all data.

Ethical approval for this study was obtained from the Ethical and review committee of the hospital. Confidentiality of patients' information was ensured. Informed consent to participate in the study was obtained from the patients.

3. RESULTS

A total 588 patients were seen in the study period. Of this number, 300 patients with refractive errors and presbyopia were seen.

This comprised of 93 males and 207 females aged 5 years to 85 years.Their mean age was 40.13±17.6 years. The socio-demographic characteristics and the family ocular history of patients seen is show in table 1 below.

Table 1: Socio-demographic characteristics and family ocular history of patients

Variables	Frequency (N=300)	Percent (%)
Age group (in years)		
≤20	64	21.3
21-40	75	25.0
41-60	132	44.0
>60	29	9.7
Gender		
Male	93	31.0
Female	207	69.0
Occupation		
Student	79	26.3
Civil servant	81	27.1
Self employed	109	36.3
Unemployed	31	10.3
Family ocular history		
None	255	85.0
Glaucoma	13	4.3

Cataract	9	3.0
Refractive errors	17	5.7
Others	6	2.0

Mean age=40.13±17.6 years

Table 1 shows the socio-demographic characteristics of the patients included in this study. Their mean age was 40.13±17.6 years with majority (44%) in the 41-60 years age group. There were more females (69%) while 31% were males. Self-employed respondents were 36% while 27% were civil servants, 26 % were students and 10% unemployed. Majority of the patients (85%) had no family ocular history of the conditions studied while 4.3%, 3.0% and 5.7% respectively had history of glaucoma, cataract and refractive errors.

The recorded visual acuity of both eyes, prior and after correction is as shown in tables 2a and 2b.

Table 2a: Distribution of Visual acuity in right and left eyes, Unaided & with correction

	Unaided		**With Correction**	
Visual acuity	**OD (%)**	**OS (%)**	**OD (%)**	**OS (%)**
Normal (6/6-6/18)	197 (65.0)	202 (67.3)	279 (93.0)	278 (92.7)
Mild/moderate VI(<6/18-6/60)	84 (28.0)	82 (27.3)	18 (6.0)	19(6.3)
Severe VI(<6/60-3/60)	9 (3.0)	9 (3.0)	1 (0.3)	2 (0.7)
Blindness(<3/60-NPL)	10 (3.3)	7 (2.3)	2 (0.7)	1 (0.3)

VI=visual impairment

Table 2b: VA with correction-both eyes

Variable	**Frequency (n=300)**	**Percent**
Normal (6/6-6/18)	289	96.4
Mild/moderate VI	11	3.6

Tables 2 a & b above show the distribution of visual acuity in right and left eyes unaided, with correction and correction in both eyes together.

The commonest presenting complaint was blurring of both far & near vision (24%), other presenting complaints in decreasing order of frequency were blurring of distant vision, itching, blurring of near vision, eye pain, headache and red eyes in 18%,15%, 9.6%, 5.6%,and 3.2% respectively. These as well as the duration are depicted in table 3 below.

Table 3: Common ocular complaints and duration

Ocular complaints with RE	**Frequency (n=570*)**	**Percent (%)**
Blurring of both far & near vision	138	24.2
Blurring of distant vision	104	18.2
Itching	87	15.3

Pain	55	9.6
Blurring of near vision	53	9.3
Tearing	46	8.1
Headache	32	5.6
Others	31	5.4
Redness	18	3.2
Floaters	6	1.1
Duration of symptoms (in years)	**N=300**	
<1	91	30.3
1-2	37	12.3
>2	172	57.3

***Multiple responses**

Table 3 shows the presenting complaints of the patients and their duration.

The past medical history as well as history of ocular morbidity and pathology noted in the patients are as shown in table 4.

Table 4: Past ocular and medical history

Variable	Frequency	Percent (%)
Past ocular history	**n=305***	
Glaucoma	11	3.6
Cataract	7	2.3
Pterygium	10	3.3
Trauma	8	2.6
None	269	88.2
Medical history	**n=305***	
Hypertension	32	10.5
Diabetes mellitus	7	2.3
Peptic ulcer disease	8	2.6
Asthma	2	0.7
Arthritis	1	0.3
None	255	83.6

***Multiple responses**

The past ocular and medical history of the patients is reported in table 4 above.

Following the final subjective refractive correction given to the patients, pressbyopia was noted to affect visual acuity most among the study population while hypermetropia was the least common. These are depicted in figure 1.

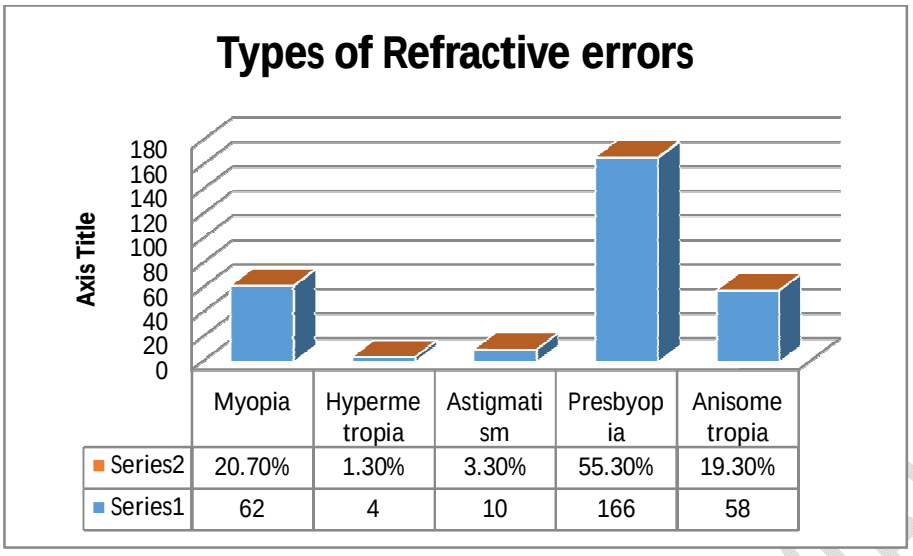

Fig 1: Showing the Refractive error and Presbyopia distribution in the study population

Various forms of Presbyopia had the highest frequency, 166 (55.3%), then Myopia, 62 (20.7%) and Anisometropia, 58 (19.3%)

.Majority of the patients with refractive errors /presbyopia had no co-existing ocular lesion.The common co-existing ocular morbidities in ths study were lenticular opacities, glaucoma and pterygium as shown in table 5.

Table 5: Other ocular diseases coexisting with RE and presbyopia

Variable	Frequency	Percent (%)
Ocular disease coexisting with RE	**n=313***	
Lens opacities (nuclear sclerosis)	25	8.0
Glaucoma	20	6.4
Pterygium	10	3.2
Ocular hypertension	9	2.9
Others	7	2.2
Allergic conjunctivitis	4	1.3
Pinguecula	2	0.6
Chalazion	1	0.3
Albinism	1	0.3
None	234	74.8

***Multiple responses**

The ocular diseases coexisting with RE and presbyopia are shown in Table 5 above. About 75% of the patients had no coexisting ocular disease while 20 (6.4%) had glaucoma and 25 (8.0%) had nuclear sclerosis. Pterygium was present in 3.2% of the patients, Ocular hypertension in 2.9% and less than 1% respectively had pinguecula, chalazion and albinism.

Association between the socio-demographic variables, refractive errors and presbyopia were evaluated. The findings are shown in table 6.

Table 6: Socio-demographic variables and REs / presbyopia in patients

	Errors affecting visual acuity in patients

Variables	Myopia	Hypermetropia	Astigmatism	Presbyopia	Anisometropia
Age group(in years)					
<40	57(44.5)	4(3.1)	10(7.8)	27(21.1)	30(23.4)
40+	5(2.9)	0(0.0)	0(0.0)	139(80.8)	28(16.3)
Sex					
Male	13(14.1)	3(3.3)	3(3.3)	48(52.2)	25(27.2)
Female	49(23.6)	1(0.5)	7(3.4)	118(56.7)	33(15.9)
Occupation					
Employed	12(6.3)	0(0.0)	3(1.6)	140(74.1)	34(18.0)
Unemployed	50(23.6)	4(3.6)	7(6.4)	25(22.7)	24(21.8)
Family ocular history					
Yes	12(26.7)	1(2.2)	0(0.0)	18(40.0)	14(31.1)
No	50(19.6)	3(1.2)	10(3.9)	148(58.0)	44(17.3)

Table 6 shows association between Socio-demographic variables and Res/ presbyopia in patients. Age groups less than 40 years had more myopia than the older patients while presbyopia appeared to occur more in those 40 years and above. Likewise the female sex, the employed and those without family ocular history had more of presbyopia (118, 56.7%; 140, 74.1% & 148, 58.0%).

4. DISCUSSION

In this study, the prevalence of refractive error and presbyopia was 51%. This is comparable to studies by Koroye-Egbe et al in Bayelsa[12],and Adeoti et al in Osogbo[13] in which 54.28% and 53.71% had refractive errors and presbyopia respectively. It however differs from findings by Sharma KD et al [23] in which a prevalence of 23% of refractive error was noted. These variations in prevalence could have been due to difference in demographic factors.

The mean age of the study population was 40.13±17.6 years with majority (44%) in the 41-60 years age group similar to work done in Kaduna Northern Nigeria.[14] There were more females (69%) than males (31%). This differs from findings by Gomez-Salazar et al[7] in which more patients were males and work by Lian-Hong Pi et al[24] and Naidoo K[25] with equal sex distribution. However the gender distribution in this study is relatable to work by Ruiz-Alcocer[26] et al in Mozambique in which 53% of patients seen were females.

Association between glaucoma and myopia has long been speculated and discussed. In a population based study by Grodum et al [27] amongst others, it was established that glaucoma was strikingly dependent on refraction and was markedly over represented in myopic eyes. In this study, 4.3% of patients with refractive errors had a family history of glaucoma.

Family history of myopia is an important risk factor for the development of myopia. The frequency of myopia among offsprings of both myopic parents is more than when a parent is not myopic.[28] Three percent of patients in this study had a positive family history of cataract. Cataract is also associated with refractive error. The risk of myopia is higher in

patients with cataract particularly in patients with nuclear cataract.[29] Nuclear cataract is thought to increase the density of the crystalline lens's nucleus which results in increase in gradient index with consequent increase in refractive index and formation of images in front of the retina.[29] In the same study, there was however decrease frequency of hyperopia in cataractous eyes. The few noted were in patients with cortical cataract.

Significant past ocular history in this study were cataract, glaucoma and pterygium in 2.3%, 3.6% and 3.3% of study population respectively. Studies have shown that there is a strong association between myopia and glaucoma, particularly normal tension glaucoma. The prevalence of glaucoma is known to increase with increasing myopia. [30] Increasing incidence of refractive error was also noted in patients with cataract as in a study by Wong et al.[31] Refractive error can also result from pterygium which is a degenerative disease of the conjunctiva and subconjuctival tissues which may encroach on the cornea and result in astigmatic refractive error.[32]

In this study, presbyopia was the commonest finding. It was noted in 55.3% of study population. This differs from findings in Bayelsa South – South and Osogbo South West Nigeria in which 74% and 46% of study population had presbyopia respectively.[12,13] The difference recorded may be due to the difference in sample size and study population. Myopia was noted in 20.7% and it was the commonest refractive error in this study. This is in keeping with studies by Adeoti [13] in Nigeria, Gomez-Salazar et al [7] in Mexico and Goh et al in China [10] in which the most common refractive error was myopia occurring in 39.2%, 24.8% and 71% of study population respectively. The high prevalence of myopia noted in these studies may be related to the population distribution which is skewed towards the younger age group in the afore mentioned regions. Myopia is noted commonly in the younger age group (10-19 years) because that is the period of rapid growth of the eyeball. [7]

Next to myopia in prevalence in this study is anisometropia occurring in 19% of study population. This differs from figures reported in Portugal, [33] Osogbo Nigeria [13] and Jos Nigeria [34] in which 6.1%, 44.5% and 76% respectively had anisometropia. In anisometropia, the two eyes have unequal refractive powers. Its frequency increases with age and correlates with the difference in the interocular axial length. [35]

In sociodemographic distribution of refractive errors, it was noted in this study that presbyopia was commoner in people aged more than 40 years because it is an accommodation defect that causes near visual impairment with advancing age as a result of physiological change in the crystalline lens of an adult eye with consequent loss of the amplitude of accommodation. [36] Other refractive errors were commoner in the younger age group. The higher prevalence of refractive error in the younger age group may be due to greater awareness in this group and due to the fact that the younger age may be more involved in reading activities for which good vision is needed. Moreover, most people greater than 40 years living with refractive errors have earlier been diagnosed and managed thus they didn't present anew. Anisometropia and presbyopia were noted more in the employed than the unemployed age group while myopia, hypermetropia and astigmatism were noted more commonly in the unemployed. The reason and relevance of this observation is not understood and more studies may need to be carried out in this area.

4.1 LIMITATION OF STUDY: As a hospital based study, this study is limited by selections bias. Only people with perceived refractive error presented to the hospital this may not be representative of the general population.

4.2 CONCLUSION: Refractive errors and presbyopia constitute a common diagnosis among patients seen in our facility. Fifty-one percent of the study population had refractive errors/presbyopia. Presbyopia was very common in the study population. The commonest refractive error was myopia while hypermetropia was the least common refractive error in this environment.

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