Journal of Medicine and Medical Sciences Vol. 1(9) pp. 401-406 October 2010
Available online http://www.interesjournals.org/JMMS

Full Length Research Paper

Common refractive errors among the Ekitis of south-western Nigeria

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Accepted 05 October, 2010

This study was aimed to report the common refractive errors among the Ekitis of south-western Nigeria. A population based survey of refractive errors. The selection criteria for refraction included complaint bordering on asthenopic symptoms and visual acuity worse than 6/9 that improved with pin hole or near vision worse than N8 at 40 cm but improved with test plus lenses. The study population comprised 123 (30.3%) males and 283 (69.7%) females with age range 14-92, mean 48.29. Presbyopia was the commonest refractive error and astigmatism the least. The commonest prescription was Plano add +1.50DS. The least age of presbyopia was 30. The range of hyperopic refractive power is, +0.50 to +12.00DS. The range of near refractive power is, +1.00 to +3.75DS. Most patients (66.5%) had presbyopic refractive power in the range +1.00DS to +3.75DS while 17.8% had combined hyperopia with presbyopia in the range +0.50DS add +1.00DS to +12.00DS add +2.00DS. The range of myopic refractive power is, -0.50DS to -8.00DS. Myopia was commoner than hyperopia but, combined errors of hyperopia with presbyopia were commoner than combined myopia with presbyopia. There was no association between gender and refractive error (*P*=0.894) but there was between age and type of refractive error among the participants (*P*<0.001). Presbyopia was the commonest refractive error and correlated with the mean age of the cohort. The studied cohort was representative of the population. The refractive powers could be useful in making readymade spectacles for the community.

Keywords: Ekitis, normal distribution, readymade spectacles, refractive errors.

INTRODUCTION

Refractive error is a disorder of optical power of the eye resulting in inability to focus light rays on the retina. The main symptom is blurred vision. Refractive errors are thought to be caused by a combination of genetic and environmental factors (Weale, 2003; Hammond et al., 2001). Studies have shown higher prevalence of refractive error among children in urban settings than in rural settings (Dandonal et al., 2002; Lithander, 1999; Murthy et al., 2002). Astigmatism and hypermetropia are inherited disorders, and myopia is caused by a combination of hereditary and environmental factors. Exposure to near work, such as reading has been the most consistent environmental factor that has been linked to the development of myopia (Richler and Bear, 1980). Refractive errors can be corrected with glasses, contact lenses, and refractive surgery (Weale, 2003; Bourne et al., 2004; Ayanniyi et al., 2010).

Uncorrected refractive errors constitute important ocular health problem across the globe (Dandona et al., 1999; Wedner et al., 2002; Kempen et al., 2004; Adeoti, 2006; Adegbehingbe et al., 2005). It has impact on quality of life, and has educational and socioeconomic consequences. This makes refractive errors a top priority in the blindness/visual impairment prevention agenda of Vision 2020 (Pizzarello et al., 2004). Many agencies, including governments across the globe have realised that refractive error can no longer be ignored as a target for urgent action (Holden, 2007).

Despite refractive errors being amenable to simple and cost effective corrective measures (Pizzarello et al., 2004), many people with symptomatic refractive errors

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cannot access these measures. The challenges responsible bordered on availability of resources and affordability of this measures (Bourne et al., 2004; McCarty, 2006; Maini et al., 2001; Naidoo and Ravilla, 2007). This can be tackled through mobilisation of resources by government and non governmental agencies through provision of highly subsidized or free refractive error services.

Since the dawn of democratic governance in Nigeria in 1999, Ekiti State community where this study was conducted has been enjoying periodic State government-sponsored free health care interventions including the free eye care. This, aside being a positive scorecard for the government, is aimed at providing qualitative health care especially, preventing avoidable blindness/visual impairment caused by refractive error, which as a resource limited community most people, could not afford/access.

Ekiti State is located in the south-west geo-political zone of Nigeria. The word *Ekiti* was coined after the numerous mountains that dotted the landscape of the region. The community is inhabited by *Ekitis*, an ethnic group of the Yoruba race. Though the literacy level is high, the community is essentially agrarian with some inhabitants in the civil service, teaching, trading and technical works.

This study was conducted during the ninth free eye care interventions in *Ekiti* State since the inception of the programme in the year 2000. The objective of this study was to report the common refractive errors and refractive powers among *Ekitis* of south-western Nigeria. This report being the first of its kind among *Ekitis* in Nigeria not only provided baseline data but could be used to provide readymade spectacles for the community.

PATIENTS AND METHODS

This study was approved by Ethic and Research Committee, University Teaching Hospital, Ado Ekiti, Nigeria and conducted following the guidelines as contained in the declaration of Helsinki. The study was carried out during the ninth Ekiti State government organised free eye health care intervention programme. The ninth eye health care intervention was subdivided and executed in phases. These included planning and publicity, screening of patients for eye conditions, surgery, and distribution of eye glasses.

There was initial publicity of the programme through the State owned mass media including the radio and television. The screening phase of the programme as well as the distribution of the free eye glasses was conducted at five different hospitals which were evenly distributed across the state. These included the State hospitals at Ikole, Oye, Ijero, Ikere and the base hospital, the University Teaching Hospital, Ado Ekiti, Nigeria.

A complement of ophthalmic team including three ophthalmologists, a senior trainee ophthalmologist, a chief medical officer, four optometrists, four ophthalmic nurses, a medical record officer and three community health extension workers delivered the eye care services during the programme. Some other adhoc personnel including members of the host hospital communities rendered some assistance while the programme lasted. The materials utilised included pen torches, ophthalmoscopes, retinoscopes, batteries, lens boxes including trial frames and the near and Snellen visual acuity charts. A bus was made available by the State Ministry of health for the period of the screening and distribution of free eye glasses.

This study was conducted during the screening phase at the five selected hospitals. The patients that form the subjects of this study were selected based on complaints of asthenopic symptoms (including blurred near, distance or both vision, ocular discomfort/pain, brow ache) and visual acuity worse than 6/9 that improved with pin-hole test or near vision worse than N8 at 40 cm that improved with test plus lenses. These patients were subsequently subjectively refracted at the five selected hospitals. The patients' biodata and refractive powers were entered into proforma. The refractive powers as reported in this study were subjective refractive powers as prescribed in the corrective eye glasses. The corrective eye glasses were distributed free to the patients at the same venue where they had refraction at a later date. The patients whose refractive errors did not improve with correction were excluded from this report.

The data were collated, coded, entered and analysed using Superior Performance Software System (SPSS Inc., Chicago, IL, USA) version 15.0. The test of significance was carried out using Chi square test. The statistical significance was taken at $P < 0.05$.

RESULTS

Four hundred and six patients including 123 (30.3%) males and 283 (69.7%) females with age range 14-92, mean age 48.29 SD 11.45 and modal age 50 were included (Table 1). Almost only females presented with refractive error in the first thirty years of life while there was reversal above the age of 70 with male preponderance (Table 1). The overwhelming majority of the patients were civil servants, teachers and traders (Table 2). There was association between the diagnosis and occupation of the patients ($P<0.001$).

There was normal age distribution of the patients (Figure 1). Most of the patients requiring correction for the refractive errors were in the age range 40-60 (Figure 1). This correlated with the presbyopia as the most common refractive error among the cohort (Table 3).

The astigmatism was the least refractive error. The most common prescription was Plano add +1.50DS. The least age of presbyopic correction among the study population was 30 and the required corrective refractive power was +1.00DS. Most patients (66.5%) had presbyopic refractive power in the range plano add +1.00DS to +3.75DS while 17.8% had combined hyperopia with presbyopic refractive powers in the range +0.50DS add +1.00DS to +12.00DS add +2.00DS (Table 3). The range of near refractive power was +1.00 to +3.75DS.

The range of myopic refractive power was -0.50DS to -8.00DS. The highest hyperopic refractive power was +12.0DS and was found in a patient who had intracapsular cataract extraction in the past while the least was +0.50DS. There were more patients with myopic refractive errors compared to ones with hyperopia. However, patients having combined hyperopia with presbyopia were more than ones with combined

Table 1. Age and sex distribution of the patients

Age	Gender		
	Male (%)	Female (%)	Total (%)
<20	-	7 (1.72)	7 (1.72)
21-25	1 (0.25)	4 (0.99)	5 (1.23)
26-30	1 (0.25)	3 (0.74)	4 (0.99)
31-35	4 (0.99)	21 (5.17)	25 (6.16)
36-40	12 (2.96)	35 (8.62)	47 (11.58)
41-45	18 (4.43)	64 (15.76)	84 (20.69)
46-50	33 (8.13)	70 (17.24)	103 (25.37)
51-55	16 (3.94)	35 (8.62)	51 (12.56)
56-60	14 (3.45)	18 (4.43)	32 (7.88)
61-65	7 (1.72)	10 (2.46)	17 (4.19)
66-70	6 (1.48)	8 (1.97)	14 (3.45)
71-75	6 (1.48)	4 (0.99)	10 (2.46)
76-80	2 (0.49)	2 (0.49)	4 (0.99)
81-85	1 (0.25)	-	1 (0.25)
86-90	1 (0.25)	-	1 (0.25)
>90	1 (0.25)	-	1 (0.25)
Total	123 (30.30)	283 (69.70)	406 (100.00)

Table 2. Occupation distribution of patients

Occupation	Number of patients	%
Civil service	205	50.4
Teaching	60	14.8
Trading	59	14.5
Pensioner	27	6.7
Farming	14	3.4
Artisan	13	3.2
Student	12	3.0
Clergy	10	2.5
Driving	4	1.0
Dependant	2	0.5
Total	**406**	**100.0**

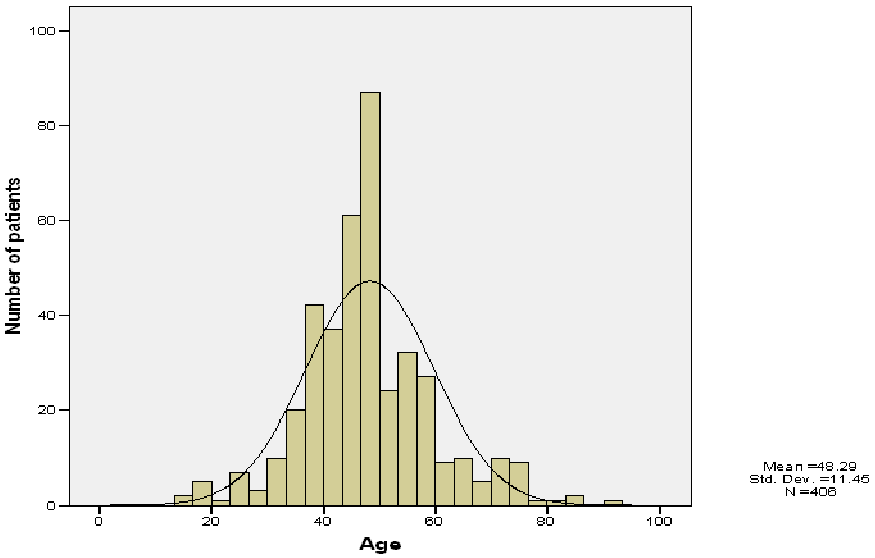

Figure 1. Age distribution of the patients

Table 3. Distribution of refractive errors among the patients

Diagnosis	Refractive power	Number of patient	%
Presbyopia only	Plano add +1.00DS to +1.50DS	99	24.3
	Plano add +1.75DS to +2.25DS	106	26.0
	Plano add +2.50DS to +3.00DS	63	15.5
	Plano add +3.25DS to +3.75DS	3	0.7
Hyperopia with presbyopia	+0.50DS add +1.00DS to +3.50DS	24	5.9
	+0.75DS add +1.25DS to +3.00DS	14	3.4
	+1.00DS add +1.50DS to +3.00DS	21	5.2
	+1.50DS add +1.50DS to +3.00DS	6	1.5
	+1.75DS add +3.75DS	1	0.3
	+2.50DS add +2.50	1	0.3
	+10.00DS add +3.00DS	1	0.3
	+12.00DS add +2.00DS	1	0.3
Myopia	-0.5DS to -8.0DS	31	7.6
Myopia with presbyopia	-0.50DS add +1.00DS to +3.00DS	5	1.2
	-0.75DS add +2.25DS	1	0.3
	-1.00DS add +2.50DS	3	0.7
	-1.25D add +2.50D	2	**0.5**
	-1.50D add +3.00D	2	**0.5**
Hyperopia	+0.50DS to +3.00DS	11	**2.7**
Astigmatism	+0.50x90	4	**1.0**
	+0.50D x180	3	**0.7**
	-0.50D x180	2	**0.5**
Hyperopic astigmatism with presbyopia	+0.50x90 add +2.50D	1	**0.3**
Myopic astigmatism with presbyopia	-0.50D x180 add +2.00D	1	**0.3**
Total		**406**	**1000.0**

myopia with presbyopia. There was no association between gender and refractive error (P=0.894) but there was between age and type of refractive error among the cohort (P<0.001)).

DISCUSSION

The preponderance of the females in this study might be due to the fact that more females tend to attend eye care programme that have support services/free (Courtright and Lewallen, 2006). On the other hand, females tend to seek care for refractive errors than their male counterparts (Adegbehingbe et al., 2006). This should be common among the adolescent girls as in this study where all patients below age 20 were females. However, the reversal above age 70 with males preponderance was remarkable. There was no association between gender and type of refractive errors among the cohort (P=0.894)

There was a normal age distribution of the patients who had refractive error suggesting the study should be representative of the pattern of refractive errors in the study population. However, the absence of children among the study population was of note. The reason for this should be of research interest.

The presbyopia was the most common refractive error among the cohort. This might be due to the fact that the majority of the cohorts were between forty and sixty years of age, an age range where presbyopic correction would be most desired. On the other hand, the cohort was predominantly females, and presbyopia affects women earlier than men (Patel and West, 2007). Most of these patients, aside being in the working class also, were in vocations such as civil service and teaching where they needed to use much, their near vision (Patel et al., 2006). It was remarkable that the least age of presbyopic correction among the study population was 30 and the affected patient was not hyperopic. However, it was reported that Africans had younger onset and more severe presbyopia (Patel and West, 2007). This might be environment related as people living in hot climates such as tropics where this study was conducted were reported to have early age of onset of presbyopia (Patel and West, 2007). Moreover, some individuals, for a number of reasons, might underestimate their real age.

On the other hand, below age 30, patients were found to be myopic, hyperopic or astigmatic. Myopia was found to be more than hyperopia in this study. This might be related to females' preponderance among the cohort. On the other hand the community where this study was conducted was reputed for high literacy level and desire for reading had been implicated in the development of myopia (Hammond et al., 2001). Furthermore, the observed increased number of participants having combined hyperopia with presbyopia as compared to

ones having myopia with presbyopia agreed with the fact that hyperopia increased in populations aged 45 or more, where most people would require presbyopic correction.

The astigmatic refractive errors were the least refractive errors among the cohort. It appeared complex astigmatic refractive errors were rare among the study population. This should be of research interest. On the other hand, the actual magnitude of astigmatic refractive errors at least, the simple astigmatic errors, might have been masked by spherical equivalent subjective refraction.

The refractive errors with power in the range of – /+ 0.5 to 0.75DS/DC might appear insignificant however, the associated asthenopic symptoms vis a vis relief of symptoms justified the corrective prescription among the affected patients. Finally, all the patients were given corrective eye glasses at the expense of the Ekiti State government, Nigeria.

This report addressed refractive errors in adult and older children populations among Ekitis. Determination of refractive errors among young children requires sophistication beyond the methodology in this study. Furthermore, the use of subjective refraction (without initial objective refraction) in this study might overcorrect myopic and undercorrect hyperopic errors in the study population. Initial objective refraction before subjective refraction should have reduced this challenge. However, in a community based free eye care programme, rapid refraction is required in view of high patients load. Hence, manual objective refraction is not advisable. The autorefractor which could be appropriate alternative to manual objective refraction in high patients load was not available during this study. Nevertheless, the temptation of prescribing refractive powers of autorefractor, without 'refinement' (subjective refraction) should be resisted to avoid 'needless' spectacle intolerance among patients. It was of note that this report benefited from practitioners with experiences in population based eye care services. This made aforementioned challenge of subjective refraction negligible making this report valid.

CONCLUSION

In conclusion, presbyopia was the commonest refractive errors and correlated with mean age of the cohort. The studied cohort was representative of the population. The reported refractive powers could be useful in making readymade spectacles for the community. The attractive WHO tall order Vision 2020- The Right to Sight, can largely achieved by commitment of the government of signatory nations especially, in the resource limited community.

ACKNOWLEDGEMENT

The authors acknowledge the contributions of the following people to the screening phase of the ninth Ekiti State free eye care intervention: Drs M Chinweuche and S Onyemelonu (optometrists), Mrs FI Fasakin, and Messers TD Alo and KO Olatunji (ophthalmic nurses), Mrs T Abolarin (adhoc medical record officer), Miss O Aladesanmi, Mrs F Ayodele, and Mrs A Akinola (Community Health Extension Officers), Mrs FM Adeyemi (health assistant) all of University Teaching Hospital, Ado Ekiti, Nigeria and Mr. P Ogunyeye (driver, Ekiti State Ministry of Health).

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