

# Prevalence and Variation of Refractive Anomalies among Patients in the Bingham University Teaching (ECWA Evangel) Hospital, Jos, Nigeria.

Felix B. Masok \*, Stephen D. Songden \*\* Emeka E. Ike \*\*

\* Department Of Physics, Plateau State University, Bokokos.

\*\*Department Of Physics University Of Jos.

Email for correspondence: songdenstephen@gmail.com

## Abstract

This work set out to investigate refractive anomalies among patients in the Bingham University Teaching Hospital, Jos. The results reveal how these refractive errors varied between male and female subjects at different age groups. A total of 950 subjects were examined for refractive errors; 531 males and 419 females. It was observed that 735 (77.37%) had various refractive errors. Myopia was observed in 373 (49.79%) of the subjects with the number of females being 204 (54.69%) making them more myopic than the males 169(45.31%). Hyperopia was observed in 385 (40.52%) of the population with the male being more hyperopic than the females 174 (45.19%). Astigmatism accounted for 359 (37.79%) of the subjects with females being more astigmatic than the males 168 (46.80%). Presbyopia was observed in 404 subjects with males 240 (59.41%) being more presbyopic than females 164 (40.59%). The refractive error had its peak within the 60 – 69 age group. This pattern of refractive errors could be attributed to exposure to various forms of light particularly the ultraviolet rays (e.g rays from television and computer screens). This agrees with the report made by Cogan and Kinsey (1947) and Emina and Kio (1997).

**Keywords:** refractive error, ametropia, myopia, presbyopia, astigmatism, visual acuity

## 1.0 Introduction

Vision is an important process for learning and communication as man depends greatly on vision to sense his environment. For man, the information provided by the eyes play the dominant role in the interpretation of his environment (Mann,1964) and this sense underlines why the study of vision has continued to play an important role in academic pursuit at lower and higher levels.

The normal condition of the eye in which without accommodation, parallel light is focused on the retina is called emmetropia. Any optical departure from this condition is referred to as refractive error or ametropia. Refractive errors are disorders and not diseases and may require corrective lenses for correction or improvement. Research has shown that at least 90% of all problems people have with their eyes result from refractive error, strabismic amblyopia and presbyopia while less than 10% result from diseases (Robert and Edwin, 1990). Steiger (1913) first measured the refractive power of the cornea in 5,000 children. He observed that corneal power and calculated axial length of the eye were independent variables, the interactions of which could cause all refractive errors. The actual cause of refractive error is not known as it may result from development problems, uncoordinated growth of the element of the eye, diseases, processes such as inflammation and other changes in the anatomy and physiology of the eye. This view was supported by Sorsby et al (1957), in measurements of the optical components of the eyes. However, only few people have perfect vision as even Children are usually born hyperopic and later become emmetropic on completion of development as revealed by Randall (1885). Thus, many people compensate for minor defects by adjusting their viewing distance, tilting their head, using high light levels or avoiding situation where a certain type of visual activity is required over a sustained period of time. Straub (1909) postulated the emmetropization theory to account for this large number of people with high refractive errors. Emmetropization is the coordination of mechanisms that fit the optical parts of the eye together. But even when the eye stopped growing, emmetropization may be said to have continued by flattening of the eye lens which account for some reversal of myopia at older age as revealed by David (1975) and Jaeger (1938). A study by Hirsh (1959) revealed an increase in myopia at 12 years which later decreased at 13 to 15 years.

However, not all types of refractive errors increase with age as myopia is seen to increase and later decrease at puberty. Therefore a study of prevalence and variation of various refractive anomalies in Jos is important as it reveals the visual needs of the inhabitants, the pattern of distribution, as well as provide data for planning and possible intervention by relevant agencies.

## 2.0 Method

This study was conducted in Jos the capital of Plateau State Nigeria located at latitude 9° 55'N and longitude 8° 53'E. Archaeological finds in the Jos Plateau indicate that the Nok people lived in the area from 900 BC to AD 200. Iron tools and cast-bronze burial artifacts from the Nok culture provide the earliest evidence of the Iron Age in West Africa (Microsoft Encarta, 2009). The population outlook is cosmopolitan consisting of mostly civil servants, traders and students. A total of 950 subjects were sampled for refractive error, 531 males and 419 females of different age groups. The subjects were patients that came to the Bingham University Teaching

(ECWA Evangel) Hospital, Jos from December 2011 to the end of May 2012. For effective screening, Snellen's chart, Snellen's illiterate 'E', trial lenses, trial frame, trial box containing spherical and cylindrical lenses of various plus and minus powers, a pinhole, an occluder, retinoscope and near point reading card were employed.

## 2.1 Measurement Of Visual Acuity

Visual acuity is concerned with detecting the presence of an object, identifying it, revolving details in its make up and localization of the objects. Acuity is 'normal' if details in an object can be resolved with a visual angle of one minute of arc (Beynon,1985). A 6/6 visual acuity is the standard vision at 6 meters using snellens chart and snellens illiterate 'E' chart. Subjects with less than 6/6 vision had thorough refraction done on them to ascertain their actual refractive error. A near point reading card was used in assessing the subjects' reading at near point.

## 2.2 Measurement Of Eye Refraction

The patients were made to sit at a distance of 6 meters from the snellen's chart, so that the rays of light are practically parallel and the patients exert minimal accommodation. The chart was properly illuminated. The patient read the chart with each eye separately while the other one was closed in each case and the visual acuity recorded as a fraction. The numerator being the distance of the patient from the letters and the denominator being the smallest letter accurately read. The visual acuity is recorded as 6/6 when the patient is able to read up to the 6 metre line similarly, depending upon the smallest line which the patient can read from the 6m distance, his/her visual acuity is recorded as 6/9, 6/12, 6/18, 6/24, 6/36, 6/60 respectively. The procedure of determining and correcting refractive error is termed as refraction. Refraction comprises two complementary methods (objectively, when no response is required from the subject and subjectively, when the subject's help is required) to find the lens which best corrects his/her vision. For the purpose of this study, refraction was done objectively and subjectively.

## 3.0 Results

The results of the refraction done are shown in tables 1, 2, 3, 4 and 5. Nine Hundred and fifty subjects were examined comprising of five hundred and thirty one (531) males and four hundred and nineteen (419) females. 735 (77.37%) as shown on Table 1. 473 (49.79%) were found to be myopic, 169 (35.73%) males and 304 (64.27%) females (Table 2). A total of 385 (40.53%) subjects were found to be hyperopic, 174 (45.19%) females and 211 (54.81%) males (Table 3). Table 4 shows presbyopia was found in 404 (42.53%) of the subjects of which 240 (59.41%) were females while 164(40.59%) were males. Astigmatism accounted for 359 (37.79%) of the population comprising of 168 (46.79%) males and 191 (53.21%) females (Table 5). There was a general increase in myopia between 10 to 29 years age group and sharply declined between 30 to 59 years age group. Presbyopia was observed in the age group between 10 to 69 years and remained relatively progressive in men between the ages of 20 to 69 years. While in females it increased between the ages of 20 to 59 years. Hyperopia was observed in all the age groups.

Table 1: Prevalence And Variation Of Ametropia

Age Group (Years)	Number of eyes sampled.			Number of eyes with Refraction		
	Males	Females	Total	Males	Females	Total
0 - 9	76	60	136	52	38	90
10 - 19	70	66	136	51	52	103
20 - 29	73	64	137	46	48	94
30 - 39	77	60	137	60	39	99
40 - 49	69	66	135	51	57	108
50 - 59	84	53	137	77	43	120
60 - 69	82	50	132	76	45	121
TOTAL	531	419	950	413	322	735

Table 2: Variation of Myopia in Jos.

Age Group (Years)	Number Of Eyes Sampled.			Number Of Eyes With Myopic Errors.		
	Males	Females	Total	Males	Females	Total
0 - 9	76	60	136	19	27	46
10 - 19	70	66	136	25	18	43
20 - 29	73	64	137	34	64	98
30 - 39	77	60	137	26	21	47
40 - 49	69	66	135	23	31	54
50 - 59	84	53	137	16	19	35
60 - 69	82	50	132	26	24	50
TOTAL	531	419	950	169	204	373

Table 3: Variation of Hyperopia in Jos.

Age Group Years	Number Of Eyes Sampled			Number Of Eyes With Hyperopic Errors		
	Males	Females	Total	Males	Females	Total
0 - 9	76	60	136	43	8	51
10 - 19	70	66	136	29	25	54
20 - 29	73	64	137	32	27	59
30 - 39	77	60	137	24	33	57
40 - 49	69	66	135	35	26	61
50 - 59	84	50	137	22	45	67
60 - 69	82	50	132	26	10	36
TOTAL	531	419	950	211	174	385

Table 4: Variation of Presbyopia in Jos.

Age Group. (Years)	Number Of Eyes Sampled.			Number Of Eyes With Presbyopic Error.		
	Males	Females	Total	Males	Females	Total
0 - 9	76	60	136	0	0	0
10 - 19	70	66	136	6	2	8
20 - 29	73	64	137	4	2	6
30 - 39	77	60	137	35	23	58
40 - 49	69	66	135	57	61	118
50 - 59	84	53	137	66	40	106
60 - 69	82	50	132	72	36	108
TOTAL	531	419	950	240	164	404

Table 5: Variation of Astigmatism in Jos.

Age Group (Years).	Number Of Eyes Sampled.			Number Of Eyes With Astigmatic Errors.		
	Males	Females	Total	Males	Females	Total
0 - 9	76	60	136	16	28	44
10 - 19	70	66	136	28	33	61
20 - 29	73	64	137	20	24	44
30 - 39	77	60	137	32	25	57
40 - 49	69	66	135	27	34	61
50 - 59	84	53	137	10	26	36
60 - 69	82	50	132	35	21	56
TOTAL	531	419	950	168	191	359

#### 4.0 Discussion of Results

Out of the 950 subjects that were examined for ametropia, 735 (77.37%) were found with various refractive errors of which 413 were males and 322 were females. The number of subjects eyes with refractive errors was high in the age group 10 to 69 and had its peak within 60-69 year age group. This pattern of refractive errors could be attributed to exposure to various forms of light particularly the ultraviolet rays (e.g rays from television and computer screens). A similar report was made by Cogan and Kinsey (1947) and by Emina and kio (1997). Of the subjects refracted, female eyes of 204 (54.69%) were found to be more myopic than the male eyes of 169 (45.31%). The males eyes had it peak myopic error within the 20-29 years age group which is also the peak myopic error of the females eyes. Myopia decreased with advancing age as observed within 30 to 59 years age groups. This agreed with the observation of Kragha (1987) in University of Benin clinic. Hyperopia was observed in 385 (40.52%) of the sampled population with the male eyes of 211(54.81%) being more hyperopic than the female eyes of 174(45.19%) . Hyperopia decreased with age in males as within the age groups of 40 to 69 years and increased progressively with age in females until 50-59 years age group and began to decrease in later age groups, this again agreed with the observation of Kragha (1987). Presbyopia was was not observed in the age group of 0 to 9, but between the ages of 10 to 69 years, with the males eyes (59.41%) being more presbyopic than the females eyes (40.59%). Male eyes with presbyopic errors increased generally with age. Astigmatism accounted for 359 (38.84%) of the refractive errors with the females 191(53.20%) being more astigmatic than the males 168 (46.80%). This could be attributed to the aging process as most of these anatomic and physiologic processes follow a gradual decline since the light adapted eye of a young person receives six times more light than that of an elderly person . Sometimes, the reduced vision and low vision in the age group could be attributed to accident, protracted illness and in part to pathological ocular and neural defects which could be congenital or development anomalies (Wyber, 1979).

## 5.0 Conclusion

Apparently, myopia was found to be more in Jos, Plateau state as it accounted for 473 (49.79%) of the sampled population with refractive errors, comprising 169(35.73%) male eyes and 304 (64.27%) female eyes making the female eyes more myopic than the male eyes. However, there was an increase in myopia between 10 to 29 years age groups and a sharp declined between 30 to 59 years age groups, thus myopia decreased with advancing age. The female eyes had the highest refractive errors in the age group 20-29 and the least in the age group 30-39 while the males eye had highest number of refractive errors within the age group 20-29 and the least in the age group 50-59 years. The large value of the standard deviation from the mean was a clear indication of the wide spread refraction among the sampled population. Therefore, there is need for periodic eye examination especially for those people involved in visual tasks that may constitute visual hazards in order to prevent progressive refractive anomalies.

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