PREVALENCE OF REFRACTIVE ASTIGMATISM IN MERCYLAND SPECIALIST HOSPITAL, OSOGBO

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SUMMARY

Objective: To determine the prevalence and distribution of astigmatism amongst patients presenting to Mercyland Specialist Hospital, Osogbo, Osun State between November 1999 and October 2002.

Materials and method: A study was carried out on a total of 800 eyes of 462 consecutive patients presenting with blurring of vision and eye strain and who were diagnosed as having astigmatism. Visual acuity was tested with a Snellen distance chart and Snellen near chart. Fundoscopy was done using a Keeler ophthalmoscope and objective refraction was done with a Keeler retinoscope. The verification of power and axis of cylindrical correction was done using a Jackson cross cylinder. On patients less than 20 years of age we used cycloplegic refraction. Information obtained from the patients included age, sex, visual acuity, and type and degree of astigmatism. The data obtained was analyzed using SPSS 11.0 version (Statistical Package for Social Sciences) computer software. Various statistical methods such as analysis of variance (ANOVA), Bonferroni multiple comparison test, T-test and chi-square test were used to investigate association and trends between variables. Level of significance was drawn at $p< 0.05$.

Results: Out of a total of 1846 patients with refractive error, 462 (25.0%) had astigmatism. The male to female ratio was 1:1.4. Their ages ranged between 8 and 74 years, with a mean of 30.7 (standard deviation 15.6). The mean age for males was 32.8 and for females 29.1(standard deviation 17.0 and 14.3 respectively). The degree of refractive astigmatism increases with age and this was found to be highly statistically significant ($P< 0.0001$). There were more females (238) than males (158) in the lower degrees of astigmatism (<2.00 dioptres), unlike in the higher degrees (>2.00 dioptres) where the males dominated. However, this was not statistically significant ($P> 0.05$).

The commonest type of astigmatism was compound myopic astigmatism which accounted for 42.13% of cases, followed by simple myopic (29.63%), mixed (27.75%) and compound hypermetropic (0.5%) astigmatism. Against the rule, with the rule, and oblique astigmatism were found in 235 (50.87%), 223 (48.27%) and 4 (0.87%) of the patients respectively.

Conclusion: Refractive astigmatism was found to be common in patients presenting at Mercyland Specialist Hospital, Osogbo; the most common type being compound myopia. Appropriate provision should therefore be made to correct this visual problem.

Key words: refractive astigmatism, prevalence, types

INTRODUCTION

Refractive error is the most common visual problem among Nigerian adults.[1] It is a common cause of visual impairment and eye ache and may even cause blindness, which however is reversible. The different types of refractive errors include myopia, hyperrmetropia, astigmatism, anisometropia, and presbyopia. The prevalence of each type varies from place to place, even within the same country. Myopia was found to be the commonest type of refractive error in Zaire,[2] Alaska,[3] and Israel.[4] In Hong Kong, however, hypermetropia was the most common refractive error.[5]

In Nigeria, Olurin[6] and Adefule[1] found a predominance of myopia in Ibadan and Lagos, while in the eastern part of Nigeria, hypermetropia predominated.[7,8] Thus the role of genetics and race in the prevalence of refractive errors cannot be over-emphasized.

Astigmatism is a refractive error in which the rays of light entering the eye are not brought to focus at one point but at different spots, thus distant and near objects appear blurred. The cause, in most instances, is irregular corneal shape, but in some cases it may be due to an irregularly curved or positioned lens. It is often associated with large spherical ametropias.[9]

The degree of astigmatism can be determined using refractometry, which measures the 'cylinder prescription' or refractive astigmatism, keratometry, or corneal topography (videokeratoscopy), which measures

corneal curvature, thereby measuring corneal astigmatism.

Most studies in this area usually focus on refractive errors and thus detailed specific data on astigmatism are not readily available. In addition, astigmatism is often presented with spherical errors as spherical equivalents. However, it has been estimated that about 44% of the population have more than 0.50 D of astigmatism, 10% have more than 1.00 D, while 8% have 1.50 D or more.[10]

The prevalence of astigmatism was found to be 20% in African Americans, 26.4% in whites, 33.6% in Asians, and 36.9% in Hispanics.[11] In Nigeria, the prevalence was found to be 32.3% in Onitsha, 38.8% in Lagos and 55.8% in Ile-Ife.[8, 12, 13]

This aim of this study was to determine the prevalence and distribution of the various types of refractive astigmatism in patients presenting at Mercyland Specialist Hospital, Osogbo, in order to create a database that would generate information on the appropriate human and material resources necessary for its management. No such study had previously been conducted in the hospital.

MATERIALS AND METHODS

This was a prospective study, carried out at Mercyland Specialist Hospital, Ladoke Akintola University of Technology Teaching Hospital, Osogbo, Osun State, Nigeria. The hospital is located in the capital of the state and therefore serves most areas within the state, the adjoining states (Oyo, Ogun, Ekiti, Ondo states), and a few people outside these areas. All consecutive new patients that presented at the eye clinic with complaints of blurring of vision and eye strain, and were seen by this researcher, between November 1999 and October 2002, and who were found to have unequal errors in different axis of the eye, were included in the study. Patients with aphakia and those with other ocular pathology that could be responsible for their symptoms were excluded. All refractions were done by the researcher.

Visual acuity was tested with a Snellen distance chart and Snellen near chart. Fundoscopy was done using a Keeler direct ophthalmoscope. Objective refraction was done using a Keeler retinoscope and the verification of power and axis of cylindrical correction was done using a Jackson cross cylinder. Cycloplegic refraction was done for patients less than 20 years of age using 1% atropine (twice a day for 3 days) for those less than 10 years, and 1% mydriacyl (2-3 times at 5 minutes interval for 15-20 minutes) for those greater than 10 years. Information obtained included age, sex, occupation, visual acuity (pre and post refraction), and type and degree of astigmatism. The data obtained was analyzed using SPSS 11.0 version (Statistical Package for Social Sciences) Computer Software, and results were presented in tables. Various statistical methods such as analysis of variance (ANOVA), Bonferroni multiple comparison test, T-test and chi-square test were used to investigate association and trends between variables. Only the right eye was used to investigate associations and trends. Level of significance was drawn at $p< 0.05$.

RESULTS

Out of a total of 1846 patients seen with refractive error, 462 (25.0%) had astigmatism. Table 1 shows the age and sex distribution of the patients. The male to female ratio was 1:1.4. Their ages ranged between 8 and 74 years, with a mean of 30.7 (standard deviation 15.6). The age group which had the highest number of patients with astigmatism was 11-30 years (54.8%), while patients in the first decade and above 60 years of age recorded low figures (3.0% and 3.7%) respectively.

Table 1. Age and sex distribution of 462 patients with astigmatism

Age (years)	Males	Females	Total
	No (%)	No (%)	No (%)
0-10	07 (3.61%)	7 (2.61%)	14 (3.03%)
11-20	41 (21.13%)	104 (38.81%)	145 (31.39%)
21-30	38 (19.58%)	70 (26.12%)	108 (23.38%)
31-40	25 (12.87%)	36 (13.43%)	61 (13.20%)
41-50	40 (20.62%)	29(11.15%)	69(14.94%)
51-60	32 (16.50%)	16(5.97%)	48(10.39%)
61-70	10 (5.16%)	6(2.24%)	16(3.46%)
71-80	01 (0.52%)	-	01(0.22%)
Total	194 (100%)	268(100%)	462(100%)

Out of a total of 462 patients with astigmatism, 414 had it in the right eye and these were used to investigate the association and trend between variables. Their mean ages were: males, 29.6 (standard deviation 15.4) and females 26.3 (standard deviation 11.6). More older men were found to be astigmatic than older women ($P = 0.013$).

The degree of refractive astigmatism increases with age and this was found to be statistically significant ($P< 0.0001$). There were more females (60.0%) than males (158(39.9%) in the lower degrees of astigmatism (< 2.00 dioptres) unlike in the higher degrees (>2.00dioptres). However, this was not statistically significant ($P = 0.101$) table 2.

Of the 924 eyes of the 462 patients that were studied, 800 had astigmatism. The remaining 124 eyes had spherical errors. A total of 218 (27.3%) eyes had more than 0.50 dioptres of astigmatism, while 99 (12.4%) had more than 1.0 dioptre and 77 (9.6%) had more than 1.25 dioptres.

Table 2. Distribution of sex and degree of astigmatism in right eye of 414 patients

Astigmatism	Male		Female		Total	
	No	%	No	%	No	%
0.25	74	38.9	116	61.1	190	100.0
0.50-0.75	52	37.1	88	62.9	140	100.0
1.00-1.75	32	48.5	34	51.5	66	100.0
2.00-2.75	9	69.2	4	30.8	13	100.0
3.00 & over	3	60.0	2	40.0	5	100.0
Total	170	41.1	244	58.9	414	100.0

$x^2 = 7.8$, df= 4, P = 0.101

The most common type of astigmatism found in this study was compound myopic astigmatism, which accounted for 42.1% of cases, followed by simple myopic (29.6%), mixed (27.8%), and compound hypermetropic astigmatism (0.5%) (table 3). Of the 462 patients, 235 (50.9%), 223 (48.3%) and 4 (0.9%) had against the rule, with the rule, and oblique astigmatism respectively. A majority (82.1%) of the patients with against the rule astigmatism were older than 15 years.

Table 3. Types of astigmatism in 800 eyes

Type	No.	%
Compound myopic	337	42.13
Compound hypermetropic	4	0.50
Simple myopic	237	29.63
Simple hypermetropic	-	-
Mixed	222	27.75
Total	800	100

DISCUSSION

Astigmatism is common in Osogbo, as 462 (25.0%) out of 1846 patients that presented at the Mercyland Specialist Hospital were diagnosed. Higher prevalence values, ranging from 28.4% to 82.2%, were found in other studies.[8, 11, 12, 13, 14] However, lower prevalence rates of 20.0% and 15.5% have been found among African Americans[11] and indigenous populations of the northwestern Amazon region of Brazil,[16] respectively. These variations may be due to the differences in methodology and the populations used. While Kleinstein et al.,[11] Faderin and Ajaiyeoba,[12] and Woo et al.[14] used a population of students and children, this study made use of ametropic patients of all ages. Also, while Faderin and Ajaiyeoba,[12] and Thom et al.[16] used only patients who had astigmatic errors of at least 0.5 and 1.0 dioptre respectively, this study included patients with all degrees of astigmatic errors in order to ascertain the exact magnitude of the problem.

More older men were astigmatic than women. This may be due to early presentation by the females. This is consistent with the observations in other studies conducted in Nigeria,[13] which reported that girls complained more and earlier than boys.

Astigmatism increases with age, as shown in table 4. There is also an increasing trend in the mean age of the patients within the degree of astigmatism. There is also a very high statistical significance in the mean difference in age of the patients among the degrees of astigmatism (P=0.0001). This is consistent with the findings of Ray Sahelian,[17] who also found that the prevalence of astigmatism increases and the axis turns to against the rule with age.

Table 4. Mean age distribution of degree of astigmatism in right eye of 414 patients

Astigmatism	No	Mean age	Std. Deviation
25	190	19.6	12.2
050-075	140	30.0	8.7
100-175	66	40.8	7.8
200-275	13	46.9	2.8
300 and above	5	47.4	2.1
Total	414	27.7	13.4

The most common type of astigmatism found in this study was compound myopic astigmatism, which accounted for 42.1% of the cases. This compares with the findings of Adegbehingbe et al.[13] and Tanka et al.,[15] who found that most of their patients had myopic astigmatism. Against-the-rule astigmatism was the most common type found in Brazil[16] and the majority (82.1%) of those affected were older than 15 years. This is similar to the findings in the study by Thorn et al.,[16] in which most of the astigmatism in the indigenous people had an against-the-rule axis.[16]

Mixed astigmatism was found to be relatively more common (27.8%) in patients presenting at Mercyland Specialist Hospital, Osogbo, compared to the 22.4% found in the study by Faderin et al.[12]

CONCLUSION

Refractive astigmatism is common in patients at Mercyland Specialist Hospital, Osogbo, with the most common type being compound myopic astigmatism. Appropriate human and material resources should therefore be provided at the hospital to manage refractive astigmatism.

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