ORIGINAL ARTICLE

Age-related macular degeneration in Onitsha, Nigeria

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Abstract

Objectives: To determine the incidence, pattern and ocular morbidity associated with age-related macular degeneration (AMD) at the Guinness Eye Center Onitsha Nigeria.

Materials and Methods: The case files of all new patients aged 50 years and above seen between January 1997 and December 2004 were reviewed. The files of patients with AMD were further studied. Information on age, gender, occupation, duration of symptoms, type of maculopathy, visual acuity, ocular and systemic co-morbidities were abstracted into a standard proforma and analyzed using the chi-square test, student t-test and confidence interval estimation.

Results: Two hundred and fifty-six of 7966 (3.2%) new patients had AMD; M:F = 2:3; 60 -79 year age group constitute 70% of the cases. Non-neovascular AMD occurred in 210 (82%) patients with 182 (71.1%) having early AMD and 28 (10.9%) geographic atrophy. Neovascular AMD occurred in 46 (18%) patients. AMD was bilateral in 221 (86.3%) patients. Most patients presented late. Systemic co-morbidities were hypertension and diabetes; the main ocular co-morbidities were cataract and glaucoma. Thirty-four (13.3%) patients were bilaterally blind and130 (50.8%) had bilateral visual impairment. Of the blind patients 13(38.3%) had neovascular AMD and 6 (17.7%) had geographic atrophy. This makes AMD the cause of blindness in 7.4% of the patients. An affected eye was more likely to have low vision than an unaffected eye (95%CI: 0.07, 0.21; $P<0.05$); persons aged 70 years and above were more likely to be blind (χ^2 – 7.26, df -1; $P<0.05$); females were also more likely to be blind than males (t – 2.857, df – 8; $P<0.05$) and neovascular AMD significantly causes more blindness than the non-neovascular type (95% CI: 0.11, 0.37; $P<0.05$).

Conclusions: AMD was the main cause of blindness in 7.4% of the patients. Treatment facilities including low vision aids for AMD patients should be provided in eye hospitals in Nigeria. Health education of the public highlighting the risk factors for AMD should be mounted as part of Vision 2020 programme in Nigeria. A community based study is required to fully define the epidemiologic characteristics of AMD in Nigerians.

Key words: Age-related macular degeneration, age-related maculopathy, geographic atrophy, low vision, Nigeria

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Introduction

Age-related macular degeneration (AMD), a progressive degenerative disease of the retina, is a leading cause of blindness in the elderly in industrialized countries.[1-3] It is believed to be rare in blacks.[4] However, community-based studies involving black populations have recently shown that the disease is not as rare in blacks as had been thought.[5,6] Nonetheless, the frequency in blacks compared with the white population is slightly lower.[5]

In the Baltimore Eye Survey, a population-based study involving blacks and whites, Friedman *et al.*[5] reported that drusen was common in both blacks and whites over the age of 40 years, but the more severe forms of AMD was more prevalent in whites. However, the authors admitted that they may have underestimated the true incidence of AMD among blacks. On the other hand, Klein *et al.*,[6] studying a multiracial United States population, reported that the incidence of AMD (including all early and late lesions) was not significantly different among non-Hispanic blacks, Mexican-Americans, and non-Hispanic whites.

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In the Barbados Eye Study, Schachat *et al.*[7] reported an increased prevalence of AMD. Compared with the blacks in the Baltimore Eye Study, blacks in the Barbados Eye Study had higher rates of AMD and pigmentary abnormalities.[5]

In Nigeria, hospital-based studies have documented the contribution of AMD to the burden of blindness and low vision.[8-10] Although Ayanru[8] reported the rarity of the disease in Benin-City, Abiose[9] and later Nwosu[10] separately documented that AMD was the commonest retinal disease in Lagos, south-western Nigeria and Onitsha, south-eastern Nigeria, respectively.

Nevertheless, the detailed information on the pattern and epidemiologic characteristics of AMD in Nigerians is essentially lacking. The aim of the present study is to determine the incidence, pattern, and ocular morbidity associated with AMD over an 8-year period at the Guinness Eye Center, Onitsha, Nigeria.

Materials and Methods

This is a retrospective study. The case files of all new patients aged 50 years and above seen at the Guinness Eye Center Onitsha, Nigeria, between January 1997 and December 2004 were reviewed. The files of patients with AMD were further studied. Information on age, gender, occupation, duration of symptoms, type of maculopathy, visual acuity, ocular, and systemic comorbidities were filled into a standard proforma and analyzed.

AMD was graded according to the international classification and grading system,[11] which defined the disease as a degenerative disorder of persons ≥50 years of age that is characterized by the following abnormalities in the macula: soft large drusen, hyperpigmentation and/or hypopigmentation of the retinal pigment epithelium and associated neurosensory detachment, (peri)retinal hemorrhage, geographic atrophy of the retinal pigment epithelium, or (peri)retinal fibrosis in the absence of other retinal vascular disorders. Specifically, the early AMD, also known as age-related maculopathy (ARM), applies to the presence of drusen and any of the pigment epithelial abnormalities, while late features of the disease include geographic atrophy, pigment epithelial detachment, choroidal neovascularization, and disciform scar. The late AMD with neovascularization and disciform scar is also known as neovascular or wet or exudative AMD, while late manifestation not associated with new vessel formation is known as atrophic or dry or non-neovascular AMD.

Blindness was defined as presenting visual acuity <3/60, while a presenting acuity <6/18 – 3/60 was regarded as visual impairment. In deciding the cause of blindness or visual impairment in an eye with more than one ocular pathology, the more advanced lesion is taken as the cause of the morbidity. For instance, in an eye with neovascular AMD coexisting with immature cataract, neovascular AMD is taken as the cause of blindness, whereas in an eye in which early AMD coexisted with advanced glaucoma, the latter is taken as the cause of the blindness. For the patient, the cause of blindness or visual impairment in the last affected eye is taken. Chi square test, student *t*-test, and 95% confidence interval estimation were used to test the relationship between the different variables with the alpha level at 0.05.

Results

During the study period, 7 966 new patients aged 50 years and above were seen in our hospital. Of this number, 256 patients had AMD. This gives an incidence of 3.2% (95% CI: 2.8, 3.4). However, the annual incidence as shown in Table 1 varied from 1.7% (1997) to 4.1% (2000). There were 102 male and 154 female patients (M : F = 2 : 3). The age range was 50 to 91 years with the 60 to 79 year age group constituting nearly 70% of the cases. Table 2 shows the age and sex distribution of the patients. There was no difference between the ages of the male and female patients (t – 1.537; df – 8; 95%CI: -0.02, 0.22; $P>0.05$).

Non-neovascular (dry) AMD occurred in 210 (82%) patients, with 182 (71.1%) having early AMD and 28 (10.9%) having geographic atrophy. Neovascular (exudative) AMD was found in 46 (18%) patients. In other words, 182 (71.1%) had the early form of the disease, while 74 (28.9%) had the late or advanced disease (neovascular disease and geographic atrophy).

Table 1: Annual hospital incidence of AMD

Year	All patient	AMD patients	Incidence (%)
1997	1 100	19	1.7
1998	990	38	3.8
1999	920	37	4.0
2000	840	34	4.1
2001	1 280	48	3.8
2002	1 040	19	1.8
2003	1 180	38	3.2
2004	616	23	3.7
Total	7 966	256	3.2

AMD = Age-related macular degeneration

Table 2: Age and sex distribution

Age (years)	Male	Female	Total	%
50–59	31	32	63	24.6
60–69	26	63	89	34.8
70–79	33	55	88	34.4
80–89	10	4	14	5.4
90+	2	-	2	0.8
Total	102	154	256	100.0

Although 221 (86.3%) patients had bilateral disease, 35 (13.7%) patients had monocular disease. The duration of symptoms ranged from one month to 14 years with 70% presenting more than one year after the onset of symptoms.

Table 3 shows the systemic and ocular comorbidities. Hypertension and diabetes mellitus were the systemic comorbidity, while cataract and glaucoma were the main coexisting ocular diseases. Table 4 shows the presenting visual acuity in both the affected and the unaffected eyes of the patients. No patient had a visual acuity of 6/6 in the affected eye. Thirty-four patients (13.3%) were bilaterally blind and 130 (50.8%) patients had bilateral visual impairment. AMD was not the sole cause of blindness in all the patients. The causes of blindness were neovascular AMD, 13 (38.3%); cataract, 7 (20.6%); geographic atrophy, 6 (17.7%); glaucoma, 4 (11.8%); myopia, 2 (5.8%); and central leukoma, 2 (5.8%). Thus, AMD caused blindness in 19 (7.4%) of the patients.

An affected eye was more likely to have low vision than an unaffected eye (95%CI: 0.07, 0.21; $P<0.05$). Persons aged 70 years or above were more likely to be blind (χ^2 – 7.26, df -1; 95%CI: 0.06, 0.26; $P<0.05$). Females were also more likely to be blind than men (t – 2.857, df – 8; 95% CI: 0.04, 0.40; $P<0.05$). Neovascular AMD significantly causes more blindness than the non-neovascular type (95% CI: 0.11, 0.37; $P<0.05$).

Table 3: Systemic and ocular comorbidities

Disease	No	%
Systemic comorbidity		
Hypertension	118	46.1
Diabetes	16	6.3
Ocular comorbidity		
Cataract	106	41.4
Glaucoma	16	6.3
Pterygium	13	5.1
Retinal vein occlusion	4	1.6
Refractive error	4	1.6
Others (PVD, leukoma, etc)	15	5.9

PVD = Posterior vitreous detachment

Table 4: Presenting visual acuity of AMD eyes

Acuity (Snellen)	No	%
6/4-6/6	0	0
6/9	30	6.3
6/12	25	5.3
6/18	51	10.7
6/24	50	10.5
6/36	81	17.0
6/60	90	18.7
3/60	27	5.7
CF-LP	117	24.5
NPL	6	1.3
Total	447	100.0

AMD = Age-related macular degeneration

Discussion

The prevalence and incidence of AMD are generally taken to be very low among blacks, especially when compared with Caucasians.[4] The incidence (3.2%) recorded in the present study, though lower than that of cataract,[12] is certainly higher than that of childhood blindness,[13] domestic eye injuries,[14] or diabetic retinopathy,[15] as recorded in the same environment during the same period of time.

In a review of AMD in Benin-City, Omoti[16] reported an incidence of 5% which is higher than that obtained in the present study. The reason for this disparity may be related to the population studied and the study duration. Although the present study was restricted to patients aged 50 years and above, Omoti studied patients aged 1 month to 104 years. Similarly, although the present study analyzed patients seen over an eight-year period, the Benin-City study was restricted to only two years.

In our hospital, AMD is the commonest retinal disease and the third most common eye disease in the elderly after cataract and chronic simple glaucoma.[17] Therefore, AMD as a cause of ocular morbidity should be seriously considered when planning eye care for the elderly in our environment.

Earlier reports had speculated on the possible role of diet and toxins in the etiology of AMD in Nigerians.[8] Further studies are definitely required to explore the possible roles of cassava (a Nigerian dietary staple known to contain cyanide); chronic malarial infection; and locally brewed alcoholic beverages on the development of AMD and other retinal diseases.

Cigarette smoking is a known risk factor for AMD,[18] but its role was not determined in the present study. Some young and middle-aged Nigerians smoke cigarette, although inhalation of tobacco snuff and smoking of dry tobacco leaf are more prevalent among the elderly. The Age-Related Eye Disease Study had reported that among persons with early or intermediate AMD, smoking and body mass index were modifiable risk factors associated with progression to advanced AMD.[18] The inability to determine the proportion of the present cohort of patients who consume cigarette or tobacco is one of the weaknesses of a retrospective study.

Hypertension and diabetes were the two systemic comorbidities in the patients, while cataract and glaucoma were the main ocular diseases coexisting with AMD in the patients studied. These systemic and ocular comorbidities have deleterious effects on the eye. In addition, hypertension is a risk factor for AMD.[19,20] In the Beaver Dam Eye Study,

it was reported that after controlling for other factors, persons with controlled hypertension at baseline were about twice as likely, while persons with uncontrolled hypertension were thrice as likely to develop exudative macular degeneration.[19] Other studies have also linked moderate to severe hypertension to exudative AMD.[20] Neovascular (exudative) AMD is the commonest cause of blindness among patients in the present study. Similar to the experience in developed countries,[21] cataract and glaucoma were also important causes of blindness in these patients. Therefore, the comorbidities need to be treated early and factors predisposing to them modified so as to minimize vision loss in the patients.

This study detected a gender difference in blindness rate with females being more likely to be blind from AMD than their male counterparts. Previous studies on the prevalence of blindness had reported this trend[12] and the low priority given to issues concerning women blamed. Therefore, this finding should further reinforce the need to institute programs aimed at improving the lot of women in Nigeria.

Neovascular AMD was found in 18% of our patients. This is higher than the 10.9% found to have geographic atrophy. In his study, Omoti[16] reported that "pure geographic atrophy" was commoner than "pure neovascular" AMD. Again, this difference may have been influenced by the criteria used in defining AMD. Omoti defined it as "pure" when the lesion is present in both eyes. Omoti's definition differs from the International Classification and Grading System of AMD.[11] On the other hand, the present study strictly adopted the International Classification and Grading System of AMD.[11]

Neovascular disease must have been underdiagnosed in the patients since fluorescein and indocyanine angiographic facilities were not available in our hospital at the time of the study. Nonetheless, it was the most frequent cause of blindness in this cohort. This is in consonance with findings in Caucasians.[21] Recent advances have demonstrated the effectiveness of laser including photodynamic therapy[22] and pharmacotherapy such as antivascular endothelial growth factors (pegaptanib, ranibizumab, etc.)[23,24,25] in the treatment of neovascular AMD. These new treatment modalities need be made available and affordable in government hospitals for the benefit of the patients.

On the other hand, the effectiveness of the prophylactic use of antioxidants in early AMD has been demonstrated.[26] This information should be made known to the public who should also be educated on the risk factors for AMD. Low vision in the patients should be managed with appropriate low vision aids as part of rehabilitation of the visually challenged in the society. Nearly 60% of the patients in this study [Table 2] are within the economically productive age group and therefore, their loss of productivity through severe uncorrected low vision is an avoidable waste.

As health services improve, HIV/AIDS controlled, and the standards of living improve, the population of the aged in Nigeria will expectedly rise. Currently, cataract treatment is justifiably the focus of blindness prevention efforts. However, the results of this study point to the need to also pay attention to AMD in order to minimize the associated ocular morbidity. A community-based study would also be required to fully define the epidemiologic characteristics of AMD in Nigerians.

Conclusions

AMD was the main cause of blindness in 7.4% of the patients. This is comparable with the 8.6% recorded by Omoti[11] in Benin City. Therefore, treatment facilities including low vision aids for AMD patients should be provided in eye hospitals in Nigeria. Health education of the public highlighting the risk factors for this important cause of blindness in the elderly should also be mounted as part of Vision 2020 programme in Nigeria.

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