Original

Pattern and Clinical Features of Age-Related Macular Degeneration in a Tertiary Hospital in Southern Nigeria

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Article history: Received 7 February 2024, Reviewed 8 February 2024, Accepted for publication 15 February 2024

Abstract

Background: Age-related macular degeneration (ARMD) is increasingly being recognized as an important cause of visual impairment and blindness globally. There is however a dearth of information on the prevalence and characteristics of ARMD in our environment. This study aims to determine the clinical features of ARMD in Benin City, Nigeria, and to ascertain if these features differ in blacks as compared to the Caucasian population.

Method: This study is a descriptive hospital-based cross-sectional study and was carried out in the Out-patient clinic of the Department of Ophthalmology, University of Benin Teaching Hospital (UBTH), Nigeria. All consecutive consenting new patients, aged 50 years and above, who met the inclusion criteria presenting at the Ophthalmology Out-patient clinic of the UBTH within the study period were enrolled. Anterior segment and posterior segment examinations were done for all the patients.

Result: Amsler grid was abnormal in 23.3% of the cases with ARMD ($p<0.001$). Of these cases, about 10% of them had unilateral macula abnormalities. Retinal pigment epithelium abnormality was the more common posterior segment finding among cases (94.2%) compared to drusen (≈13%). The predominant form of ARMD seen was the early form (98.3%). The majority of cases with ARMD had RPE hyperpigmentation as against hypopigmentation.

Conclusion: The progression of ARMD and its effect on vision makes the disease an important cause of blindness in the elderly. Thus, early diagnosis and close follow-up is necessary in reducing blindness from the disease.

Keywords: "Age-related macular degeneration", blindness, drusen, pigmentation.

How to cite this article:

Ekechukwu LO, Otabor-Olubor OJ, Uhumwangho OM, Omoti AE. Pattern and Clinical Features of Age-Related Macular Degeneration in a Tertiary Hospital in Southern Nigeria. The Nigerian Health Journal 2024; 24(2):1189 – 1195.
https://doi.org/10.60787/tnhj.v24i2.549

Introduction

Age-related macular degeneration (ARMD) is increasingly being recognized as an important cause of visual impairment and blindness globally.[1] There is however a dearth of information on the prevalence and characteristics of ARMD in our environment. Despite the fact that the prevalence of the disease as a cause of blindness appears low, it is a cause of treatable blindness with severe sequelae, and has been noted to be an important cause of blindness and low vision among Nigerians.[2-5] The prevalence of ARMD and the contribution to blindness has been noted to be significantly higher in Caucasians than in blacks.[6] It is therefore possible that the clinical characteristics of ARMD, the manifestations and the predominant type may show racial, and possibly, environmental differences. The possibility of having a higher yield of individuals with age-related macular degeneration in the hospitals than in the community prompted this study to be hospital-based. This study aims to determine the clinical features of ARMD in Benin City. Also, this study will show if the clinical features of ARMD differ in Benin City where blacks constitute the population, when compared to Caucasians.

Method

This study was carried out in the out-patient clinic of the Department of Ophthalmology, University of Benin Teaching Hospital, Nigeria. It was a descriptive hospital-based study, and was carried out over a period of six months (December 2015 – June 2016) among consecutive consenting new adults aged 50 years and above. Non-consenting adults aged below 50 years, patients with significant media opacities obscuring fundus visualization, prior history of severe trauma to the eyes and those with Retinal lesions/pathology e.g. retinal vascular occlusions, proliferative diabetic retinopathy, diabetic macular oedema were excluded from the study. This study was carried out in accordance with the ethical standards of the Helsinki Declaration of 1975. Ethical clearance to conduct this research was sought and obtained from the Ethics and Research Committee of the University of Benin Teaching Hospital, Nigeria, before commencement of this study. There was no risk of harm or injury to the participants during or after the study was conducted. A structured interviewer-administered questionnaire was used to collect the data. All consecutive consenting new patients, aged 50 years and above, who met the inclusion criteria presenting at the Ophthalmology out-patient clinic of the University of Benin Teaching Hospital within the study period were enrolled.

Convenience sampling was done. Visual acuity was done using an illuminated Snellen's chart or an illiterate E chart depending on the literacy level of the participant. Near vision was tested using a new version near chart held at 33cm from the patient. Visual acuity using a pin hole disc was performed if the visual acuity was less than 6/6. For those with VA < 6/60, the ability to count fingers at 3m to perceive hand movements or light was determined. Refraction was done to obtain the best corrected visual acuity of patients who showed improvement in their visual acuity using a pin hole disc and for aphakic patients. The anterior segment examination was done using a bright pen torch and a Carl Zeiss slit lamp biomicroscope. Direct ophthalmoscopy was done and dilatation was performed to facilitate indirect ophthalmoscopy. Participants with features suggestive of age- related macular degeneration were examined using the slit lamp biomicroscope with a +78D lens. Examination findings were documented.
Respondents with features of age-related macular degeneration proceeded to have fundus photographs taken. Photographs were then compared using standard photographs from the International ARM Epidemiological Study Group to help get an objective assessment of the lesion and classification. Measurements of the size of the lesion were taken using the optic disc as a scale (assuming that a disc diameter is 1500 μm). Further investigation of Fundus Fluorescein Angiography and/or Optical Coherence Tomography were performed when indicated in cases suspected to have neovascular ARMD.

The collected data was entered into a database, cleaned and analysed using the International Business Machine Statistical Product for Scientific Solutions version 20 software (IBM SPSS Inc, Chicago IL., U.S.A.). An initial frequency count of all variables was done and results were presented as tables or figures. Means and standard deviations (SD) were determined.

Tests of statistical significance included Chi-squared test, Student t-test, Independent sample t-test, Fisher's exact test, Mann-Whitney U test and Regression analysis. The analysis was considered to show significant associations when the p value was less than 0.05.

Results

A total of 120 persons participated in the study. There were 97 males (40.4%) and 143 females (59.6%), giving a male to female ratio of 1:1.5. The age range was 50 –

Print ISSN: 0189-9287 Online ISSN: 2992-345X

88 years and the mean age was 66.7 years (SD ± 8.1). Among the cases, 46 (38.3%) were hypertensives, 24 (20.0%) were diabetics, and 1 (0.8%) were on lipid-lowering medications. A majority of the cases (93; 77.5%) were hypermetropic; 25 (20.8%) of them were myopics. The median unaided visual acuity in the right eye of those with ARMD was 6/18 while it was 6/12 in the controls (Table 1). Unaided visual acuity was significantly improved in the right eye using a pin hole in both cases and controls (P=0.004) and the overall best corrected visual acuity in both eyes was significantly improved in both study groups (P=0.001) - Table 1.

Table 1: Visual acuity of both eyes of patients with ARMD

Visual acuity†	Left eye Median (IQR)		
	Cases		Cases
Unaided	6/18 (6/9 – CF at 1.5m)	0.120	6/18 (6/9 – 6/24)
Pinhole	6/12 (6/6 – CF at 1.5m)	0.004	6/9 (6/9 – 6/18)
Best corrected	6/9 (6/6 – CF at 1.5m)	0.001	6/9 (6/6 – 6/12)

* IQR: interquartile range, †values are denominators (while 6 is the numerator)

A greater proportion of the cases with ARMD had lens opacities compared to the controls and this was statistically significant (p<0.001) - Table 2. Amsler grid was abnormal in 23.3% of the cases with ARMD, and this was statistically significant (p<0.001). Of the cases with ARMD, about 10% of them had unilateral macula abnormalities. Retinal pigment epithelium abnormality was the more common posterior segment finding among cases with ARMD (94.2%) compared to drusen (≈13%) – Table 2.

Table 2: Ocular examination of both eyes across study groups of cases with ARMD and controls

	Right eye			Left eye		
	Cases n = 120 (%)	Control n = 120 (%)	p-value*	Cases n = 120 (%)	Control n = 120 (%)	p-value*
Lens						
Transparent	16 (13.3)	50 (41.7)	<0.001*	17 (14.2)	46 (38.3)	<0.001*
Opacities	104 (86.7)	70 (58.3)		103 (85.8)	74 (61.7)	
Amsler grid						
Normal	92 (76.7)	119 (99.2)	<0.001*	93 (77.5)	119 (99.2)	<0.001*
Abnormal	28 (23.3)	1 (0.8)		27 (22.5)	1 (0.8)	
Vitreous						
Clear	114 (95.0)	120 (100.0)	0.013†	113 (94.2)	120 (100.0)	<0.001†
Hazy	6 (5.0)	0 (0.0)		7 (5.8)	0 (0.0)	
Macula						
Normal	12 (10.0)	120 (100.0)	<0.001	11 (9.2)	120 (100.0)	<0.001
Abnormal	108 (90.0)	0 (0.0)		109 (90.8)	0 (0.0)	
Disc (VCDR)‡	0.4 (0.3 – 0.6)	0.4 (0.2 – 0.5)	0.615#	0.4 (0.3 – 0.6)	0.4 (0.2 – 0.5)	0.812#
Drusen (present)						
Yes	16 (13.3)	0 (0.0)	<0.001	15 (12.5)	0 (0.0)	<0.001
No	104 (86.7)	120 (100.0)		105 (87.5)	120 (100.0)	
RPE abnormality(present)						
Yes	113 (94.2)	0 (0.0)	<0.001	113 (94.2)	0 (0.0)	<0.001
No	7 (5.8)	120 (100.0)		7 (5.8)	120 (100.0)	
Geographic atrophy						
Yes	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	-
No	120 (100.0)	120 (100.0)		120 (100.0)	120 (100.0)	
Neovascular ARMD						
Yes	2 (1.7)	0 (0.0)		0 (0.0)	0 (0.0)	-
No	118 (98.3)	120 (100.0)		120 (100.0)	120 (100.0)	

*Chi-square test, †Fisher's exact test, ‡Median (IQR), #Mann-Whitney U test.

Print ISSN: 0189-9287 Online ISSN: 2992-345X

The predominant form of ARMD seen was the early form (98.3%) – Figure 1.

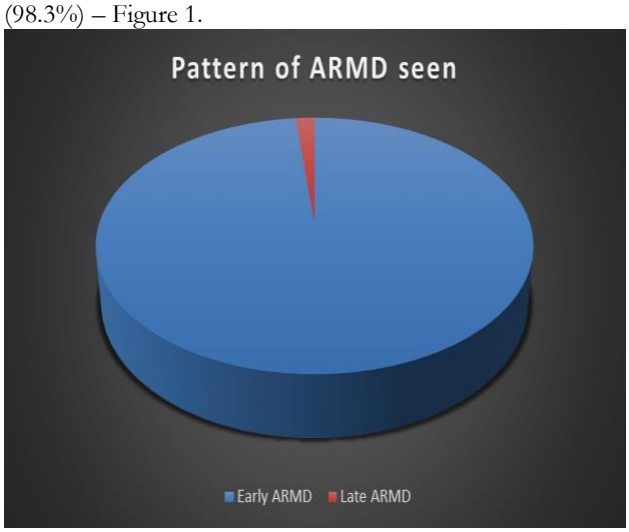
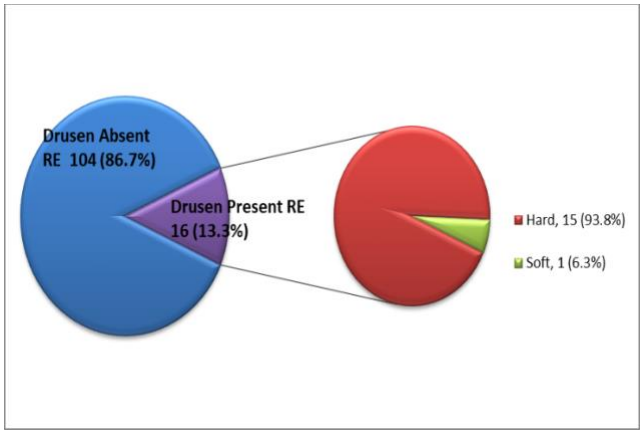


Figure 1: Pattern of ARMD seen among cases.

Sixteen respondents (13.3%) in the case group had drusen in the right eye of which 15 (93.8%) had hard drusen and 1 (6.3%) had soft drusen (Figure 2).



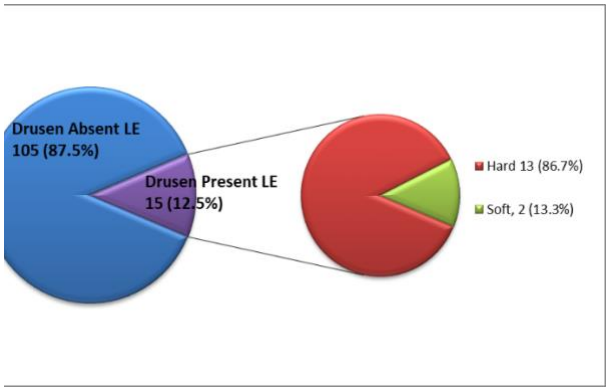


Figure 2a and 2b: Drusen pattern in the right and left eyes respectively of respondents with ARMD

Fifteen (12.5%) of the respondents in the case group had drusen in the left eye of which 13 (86.7%) had hard drusen and 2 (13.3%) had soft drusen. The majority of cases with ARMD had RPE hyperpigmentation as against hypopigmentation (Figure 3). The majority of cases with ARMD had RPE hyperpigmentation as against hypopigmentation.

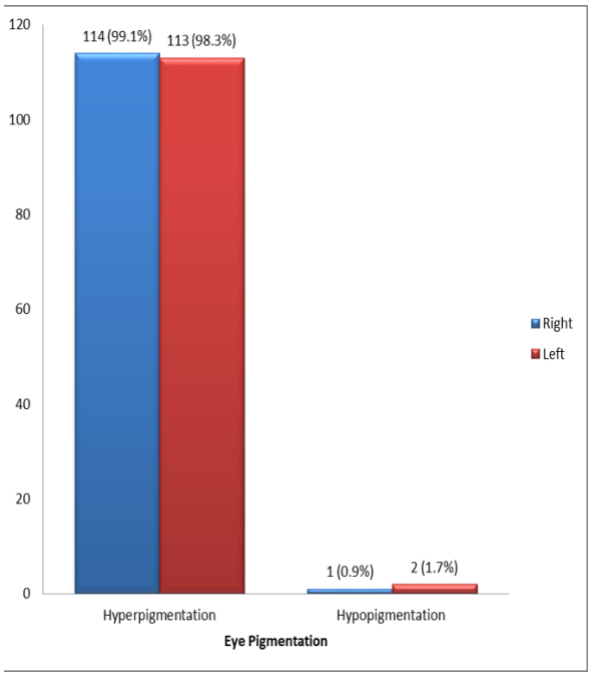


Figure 3: Pattern of retinal pigmentation among the respondents with ARMD

Discussion

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ARMD is a condition of the aged, and it was seen in this study that the mean age of the participants was 66.7 years (SD ± 8.0). Considering that ARMD is a life-long progressive degenerative condition of the eye involving RPE disturbances, drusen formation and Bruch's membrane changes,[7] it is usual to find that most persons with this condition are of advanced age, as seen in our study.

In this study, the greater proportion of individuals with ARMD were females (60.0%). Reasons for this may not be fully ascertained; however, a WHO report of 2004 showed that life-expectancy for women is higher than that for men (50 years and 48 years respectively).[8] This disparity in life-expectancy could reflect in more women reaching advanced age than men, thus having more conditions associated with age, e.g. ARMD. Such was the case in the Nigerian hospital studies by Onakpoya et al,[9] Nwosu[10] and Omoti[11] where there was a female preponderance of cases with ARMD. The similarity in female preponderance between our study and those of Nwosu[10] and Omoti[11] is expected, as all these studies were carried out in the same country where the higher prevalence of ARMD was seen in females compared to males. Yet again, increased longevity in females has been attributed to this finding.[13] Of note however is the fact that while our study was a hospital-based study, the Blue Mountains Eye Study was a population-based study.

Majority of those who used glasses were the control group. The difference in proportion was statistically significant. Of these, 6.8% of them had their glasses tinted or wore photochromic lenses. It has been hypothesized that exposure to sunlight is a plausible risk factor for ARMD.[14-16] Thus, the result here is in keeping with the fact that the use of spectacles (especially tinted) can be protective against the risk factor of exposure to sunlight. The possibility of the tint offering some form of protection from bright sunlight could be attributed to the controls not coming down with ARMD earlier. In this study, myopia was found to be significantly more common among cases with ARMD than in the controls. This is in contrast to findings from North India, Australia and a case-control study done in Baltimore, United States of America where statistically significant associations were demonstrated between ARMD and hypermetropia.[17-20] This finding needs to be evaluated further before valuable conclusions can be drawn, since the number of cases and controls with myopia were small.

In this study, the predominant presenting unaided visual acuity of patients with ARMD ranged from 6/18 to counting fingers (CF) at 2.5m. There was bilateral occurrence of ARMD in approximately 90% of cases. This was similar to findings by Nwosu[10] where 86.3% of the cases of ARMD seen had bilateral involvement of the eyes. About 10% of those with ARMD had significant unilateral involvement. The possibility of the disease occurring bilaterally but in an asymmetrical pattern could be alluded to this finding. The common posterior segment findings seen in this study among cases with ARMD were hyperpigmented retinal pigment epithelial abnormality (94.2%) and drusen (≈ 13%), of which over 90% were hard drusen.

The predominant pattern of Age-related Macular Degeneration seen was early, characterised by reduction in visual acuity and especially for the late type where it is more marked, with the presence of retinal hyperpigmentation and hard drusen. This is not surprising considering the mean age of the participants in the study (66.7 years; SD ± 8.1). This was similar to findings by Oluleye et al,[21] Leske et al[22] and Evans.[23] There were only two cases of late ARMD seen during the study period, and features were suggestive of neovascular ARMD. There was no case of geographic atrophy seen. The reduced proportion of individuals with late ARMD as shown by this study agrees with other studies performed showing that more cases of late ARMD are seen in the Western world.[24-27]

Conclusion

The progression of ARMD and its effect on vision makes the disease an important entity amongst the causes of blindness in the elderly. Thus, early diagnosis and close follow-up would be necessary in reducing blindness from the disease. The following steps are suggested:

- Routine examination of individuals aged 50 years and above to recognise features of early ARMD.
- Lenses of individuals should preferably be tinted/photochromic as this has been shown to offer some form of protection or retard the onset of ARMD.
- More multi-centre hospital-based and population-based studies to be conducted to characterise the pattern and risk factors of ARMD in Sub-Saharan Africa, as the disease is increasingly becoming a major cause of blindness.

Ethical consideration: Ethical clearance was gotten from the Ethics and Research Committee of the University of Benin Teaching Hospital, and the work was carried out in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

Print ISSN: 0189-9287 Online ISSN: 2992-345X

Authors' contribution: The authors are the ophthalmologists who managed the patients; thought about the need to carry out this research; collected data; and discussed the results.

Conflict of interest: The authors declare no conflicting interest

Funding: Nil

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