Section: Ophthalmology

Original Research Article

PREVALENCE AND DETERMINANTS OF AGE-RELATED MACULAR DEGENERATION AMONG PATIENTS AGED 50 AND ABOVE: A CROSS-SECTIONAL STUDY AT A TERTIARY CARE CENTER IN NIZAMABAD

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Abstract

Background: Age-Related Macular Degeneration (AMD) is a leading cause of visual impairment and blindness in elderly individuals, with its prevalence increasing globally. This study aims to determine the prevalence of AMD and identify associated risk factors among patients aged 50 years and above attending a tertiary care center in Nizamabad, Telangana. **Materials and Methods:** A cross-sectional study was conducted with 100 participants aged 50 and older, presenting with visual impairment. Data collection involved demographic profiling, substance use, comorbidities, visual acuity assessment, and ophthalmic examinations, including fundus photography and optical coherence tomography (OCT). The data were analyzed using SPSS version 28.0. **Result:** The mean age of the participants was 63.52 ± 8.74 years. The most common age group was 60-69 years (43%). Males represented 53% of the sample. Substance abuse was reported in 41% of participants. The prevalence of diabetes, hypertension, and hyperlipidemia was 22%, 37%, and 13%, respectively. Drusen, a key indicator of AMD, was present in 68% of participants, with 32% showing soft drusen. Visual acuity varied, with 34% of participants having 6/9 vision, while 1% had only perception of light. Geographic atrophy was observed in 11%. **Conclusion:** The study highlights the significant burden of AMD among older adults in this region, with a strong association between AMD and risk factors such as age, hypertension, diabetes, and substance abuse. Early detection and management of these risk factors can help mitigate the impact of AMD.

INTRODUCTION

Age-Related Macular Degeneration (AMD) is a progressive retinal disease and one of the leading causes of visual impairment and blindness in older adults worldwide.[1] As the population ages, the prevalence of AMD continues to rise, posing significant challenges to public health and healthcare systems.[2] AMD primarily affects the macula, the central part of the retina responsible for sharp and detailed vision, and is characterized by the gradual loss of central vision.[3] It is classified into two main forms: dry (atrophic) and wet (neovascular). While dry AMD is more common, wet AMD leads to more severe vision loss and can progress rapidly due to the growth of abnormal blood vessels beneath the retina.[4]

The global burden of AMD is substantial, contributing to approximately 8.7% of all blindness cases. In India, the prevalence of AMD ranges from 1.8% to 4.7%, with a higher incidence in those aged 50 and above.[5,6] Risk factors for AMD include non-modifiable factors such as age, genetic predisposition, and gender, as well as modifiable factors like smoking, obesity, hypertension, and diabetes.[7] Despite its widespread impact, there is a

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scarcity of region-specific data on the prevalence and risk factors associated with AMD, particularly in Telangana, India.

This study aims to determine the prevalence of AMD and identify the associated risk factors among patients aged 50 and above attending a tertiary care center in Nizamabad. By exploring the demographic, lifestyle, and clinical characteristics of AMD patients in this region, the study seeks to contribute valuable insights to the epidemiology of AMD and inform strategies for prevention and management.

MATERIALS AND METHODS

Study Design: This study was a cross-sectional, observational study aimed at determining the prevalence and risk factors of Age-Related Macular Degeneration (AMD) among patients aged 50 years and above, presenting with visual impairment at the Ophthalmology Department, Government Medical College, Nizamabad, Telangana, India.

Study Setting: The study was conducted at the Government Medical College, Nizamabad, a tertiary care center in Telangana, India. The study period was from September 2022 to March 2024, spanning 18 months.

Study Population: The study included 100 participants aged 50 years and above, who presented with visual impairment, ranging from a visual acuity of 6/9 to perception of light (PL). The inclusion criteria included patients who provided informed consent, had visual impairment associated with risk factors like obesity, diabetes mellitus, hyperlipidemia, smoking, hypertension, and a family history of AMD.

Exclusion Criteria

Participants were excluded if they had congenital eye diseases, dense cataracts, corneal opacities, history of ocular trauma, refractive errors, or if they did not provide consent for the study.

Sampling Technique: A convenient sampling method was used to recruit participants who met the inclusion criteria during the study period. This sampling approach was selected based on ease of access to the study population.

Data Collection: Demographic and clinical data were collected through patient interviews and medical record reviews. A detailed history of the participants, including age, gender, substance abuse (alcohol and smoking), and medical conditions such as diabetes, hypertension, and hyperlipidemia, was documented.

Ophthalmic examinations included: Visual Acuity: Baseline visual acuity was measured for both distant and near vision using Snellen's chart and near vision chart.

Anterior Segment Examination: Performed using slit-lamp biomicroscopy.

Fundus Examination: Direct ophthalmoscopy, 90 D lens, and indirect ophthalmoscopy were used to assess the retina and detect signs of AMD.

Optical Coherence Tomography (OCT): Used to identify the type of drusen and other retinal changes associated with AMD.

Intraocular Pressure (IOP): Measured using a non-contact tonometer.

Laboratory Investigations:

Blood samples were drawn for random blood sugar (RBS) testing and lipid profile assessments, including:

- HDL (High-Density Lipoprotein)
- LDL (Low-Density Lipoprotein)
- Triglycerides (TG)
- Total Cholesterol (TC)

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using the Statistical Package for Social Sciences (SPSS) version 28.0. Descriptive statistics were used to summarize continuous variables as means and standard deviations, and categorical variables were presented as frequencies and percentages. Pearson's correlation coefficient was used to analyze the relationships between various measurements. A p-value of < 0.05 was considered statistically significant.

Ethical Considerations: The study adhered to the principles outlined in the Declaration of Helsinki. Ethical clearance was obtained from the Institutional Ethics Committee of Government Medical College, Nizamabad, and informed consent was obtained from all participants prior to inclusion in the study.

RESULTS

The demographic characteristics of the study population are summarized in [Table 1]. The majority of participants were aged between 60–69 years (43%), followed by those in the 50–59 age group (34%). A smaller proportion of participants were in the 70–79 (19%) and >80 (4%) age groups.

[Table 2] shows the gender distribution of the participants. There was an almost equal distribution between males (53%) and females (47%).

Substance use and comorbidities among the participants are presented in [Table 3]. Alcohol use was reported by 20% of participants, while 21% were smokers. The prevalence of comorbidities was notable, with 37% of participants suffering from hypertension, 22% having diabetes, and 13% having hyperlipidemia.

The lipid profile of the participants is described in [Table 4]. The mean values for HDL, LDL, triglycerides, and total cholesterol were 48.49 mg/dL, 92.94 mg/dL, 181.19 mg/dL, and 148.86 mg/dL, respectively. The standard deviations for these lipid parameters were 8.50, 36.07, 52.68, and 44.05, respectively.

Visual acuity findings are summarized in [Table 5]. A majority of participants had a visual acuity of 6/9 (34%), followed by 6/12 (16%) and 6/18 (18%). The least common visual acuity levels were 6/60 (2%) and PL+ (1%).

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[Table 6] presents the clinical ophthalmic findings. The most common findings were hard drusen (68%) and soft drusen (32%). Other findings included pigmentary abnormalities (21%) and geographic atrophy (11%).

The intraocular pressure (IOP) measurements are shown in [Table 7]. The mean IOP was 14.77 mmHg, with a standard deviation of 2.45 mmHg.

Finally, the body mass index (BMI) distribution of the participants is shown in [Table 8]. The majority of participants were either in the normal weight (43%) or overweight (42%) categories. Only 1% of participants were classified as underweight, while 14% were obese.

Table 1: Demographic Characteristics.

Age Group	Frequency	Percentage (%)
50–59	34	34
60–69	43	43
70–79	19	19
>80	4	4

Table 2: Gender Distribution

Gender	Frequency	Percentage (%)
Male	53	53
Female	47	47

Table 3: Substance Use and Comorbidities

Parameter	Frequency	Percentage (%)
Alcohol Use	20	20
Smoking	21	21
Diabetes	22	22
Hypertension	37	37
Hyperlipidemia	13	13

Table 4: Lipid Profile

Lipid Parameter	Mean (mg/dL)	Standard Deviation
HDL	48.49	8.50
LDL	92.94	36.07
Triglycerides	181.19	52.68
Total Cholesterol	148.86	44.05

Table 5: Visual Acuity

Visual Acuity	Frequency	Percentage (%)
6/9	34	34
6/12	16	16
6/18	18	18
6/24	20	20
6/30	9	9
6/60	2	2
PL+	1	1

Table 6: Clinical Ophthalmic Findings

Finding	Frequency	Percentage (%)
Hard Drusen	68	68
Soft Drusen	32	32
Pigmentary Abnormalities	21	21
Geographic Atrophy	11	11

Table 7: Intraocular Pressure (IOP)

Parameter	Value	Standard Deviation
Mean IOP (mmHg)	14.77	2.45

Table 8: Body Mass Index (BMI)

BMI Category	Frequency	Percentage (%)
Underweight (<18.5)	1	1
Normal (18.5–24.9)	43	43
Overweight (25–29.9)	42	42
Obese (≥30)	14	14

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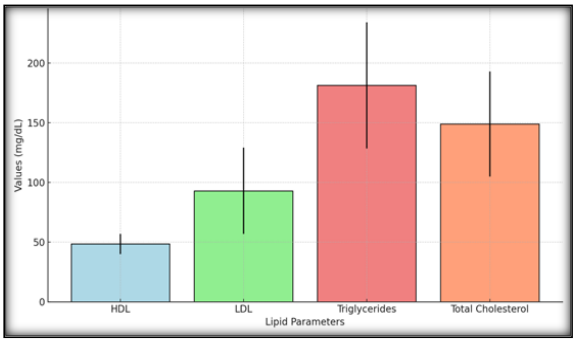

Figure 1: Lipid Profile with Standard Deviation

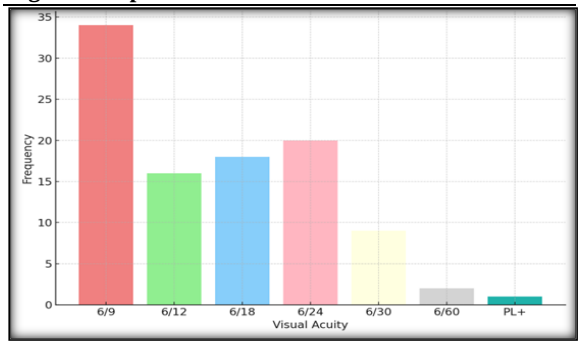

Figure 2: Visual Acuity Distribution

Figure 3: Fundus photo of left eye showing hard drusen

DISCUSSION

This study aimed to assess the prevalence and associated risk factors of Age-Related Macular Degeneration (AMD) among patients aged 50 years and above attending the Ophthalmology Department at Government Medical College, Nizamabad. The findings of this study contribute to the limited regional data available on AMD and its associated factors, especially in Telangana, India.

Prevalence and Demographic Characteristics: The mean age of the study participants was 63.52 ± 8.74 years, with the majority (43%) falling within the 60-69 age group. This aligns with previous studies, which demonstrate that the prevalence of AMD increases significantly with age (Beatty et al., 2000; Zhang et al., 2024).[7,8] In this study, the gender distribution was relatively balanced, with 53% males and 47% females, reflecting findings from other studies (Dharshini et al., 2021; Sucheta et al., 2013). However, some studies have shown a slightly higher prevalence of AMD in females (Heesterbeek et al., 2020),[9] highlighting the need for further research to explore gender-based differences in AMD prevalence.

Substance Abuse and Comorbidities: Substance abuse, including smoking (21%) and alcohol use (20%), was reported by 41% of participants, which is consistent with the findings of Man RE et al. (2020).[10] Smoking, a well-established modifiable risk factor for AMD, increases the risk by two to three times compared to non-smokers due to its harmful effects on retinal blood flow and oxidative stress (Ambati & Fowler, 2012).[11] Similarly, alcohol consumption has been linked to increased oxidative damage, which can contribute to retinal degeneration in AMD patients (Somasundaran et al., 2020).[12] The prevalence of diabetes (22%) and hypertension (37%) observed in the study aligns with global research, where these comorbidities are associated with an increased risk of AMD (Heesterbeek et al., 2020).[9] These conditions may exacerbate AMD by contributing to retinal ischemia, oxidative stress, and vascular dysfunction, underscoring the need for managing these risk factors.

Lipid Profile and Cardiovascular Risk Factors: Lipid profiles in the study revealed that 13% of participants had hyperlipidemia, with elevated triglycerides and LDL cholesterol levels. Dyslipidemia is a known risk factor for AMD, as lipid deposition in the retina can lead to the formation of drusen, a hallmark feature of early AMD (Ung et al., 2021).[13] The association between elevated cholesterol levels and AMD risk has been highlighted in several studies, including the Age-Related Eye Disease Study (AREDS), which supports the role of lipid abnormalities in the progression of AMD (Ambati & Fowler, 2012).[11] These findings suggest that cardiovascular risk factors such as high triglycerides and LDL cholesterol may play a role in the development and progression of AMD.

Visual Acuity and AMD Staging: The study found significant variation in visual acuity, with 34% of participants having 6/9 vision and 1% experiencing only light perception. This variability in visual acuity reflects the differing stages of AMD, with a substantial proportion of participants experiencing moderate to severe visual impairment. These findings align with the work of Srinivasan et al. (2017), who reported similar distributions of visual impairment in AMD populations. Notably, although early signs of AMD like drusen were common, many participants still retained relatively good visual acuity. This suggests that while drusen are an early indicator of AMD, they do not always correlate with significant visual impairment in the short term.

Drusen Type and Clinical Findings: In the present study, 68% of participants had drusen, with 32% exhibiting soft drusen, which are more likely to progress to advanced stages of AMD such as

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geographic atrophy and neovascularization. This is consistent with previous studies, which have indicated that large, confluent, and soft drusen are significant risk factors for the progression to wet AMD (Somasundaran et al., 2020).[12] Additionally, 21% of participants exhibited pigmentary abnormalities, further increasing their risk of AMD progression. Geographic atrophy, observed in 11% of participants, indicates advanced dry AMD, emphasizing the severity of the condition in this population (Heesterbeek et al., 2020).[9]

Body Mass Index (BMI): The study found that 56% of participants were either overweight or obese, with a mean BMI of 26.96 ± 4.31. This high prevalence of overweight and obesity is concerning, as BMI has been identified as a modifiable risk factor for AMD. Obesity is linked to systemic inflammation, insulin resistance, and increased oxidative stress, all of which may contribute to retinal degeneration (Ambati & Fowler, 2012).[11] These findings are in line with research indicating that maintaining a healthy weight may reduce the risk of developing advanced AMD (Ung et al., 2021).[13]

Intraocular Pressure (IOP): The mean intraocular pressure (IOP) in the study participants was 14.77 ± 2.45 mmHg, which falls within the normal range. Elevated IOP is a well-known risk factor for glaucoma, which often coexists with AMD in older adults. However, the IOP data in this study suggest that glaucoma may not be a prominent issue in this population. Nonetheless, regular monitoring for both AMD and glaucoma is recommended, especially for those with risk factors such as age, hypertension, and a family history of these conditions (Joyal et al., 2018).[14]

CONCLUSION

This study provides valuable insights into the prevalence and risk factors of AMD among older adults in Telangana, India. The findings underscore the significance of age, smoking, hypertension, diabetes, obesity, and hyperlipidemia as key contributors to AMD. Early detection, lifestyle modification, and effective management of these risk factors can significantly reduce the burden of AMD and prevent severe vision loss in affected individuals. Further longitudinal studies are needed to confirm causal relationships and assess the long-term outcomes of AMD in this population.

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