

Dyslipidemia among patients with Age-Related Macular Degeneration in the Department of Ophthalmology in a Tertiary Care Centre

Roshni Agrawal,¹ Sagun Narayan Joshi,² Pratap Karki²

¹Department of Ophthalmology, National Academy of Medical Sciences, Bir Hospital, Kathmandu, Nepal, ²Department of Ophthalmology, B.P. Koirala Lions Centre for Ophthalmic Studies, Institute of Medicine, Tribhuvan University, Maharajgunj, Kathmandu, Nepal

Correspondence:

Dr Roshni Agrawal
Department of Ophthalmology, National Academy of Medical Sciences, Bir Hospital, Mahaboudhha, Kathmandu, Nepal
Email: dr.roshni.aga@gmail.com
Phone: +9779841442190



doi.org/10.56974/pmjn.304
www.pmjn.org.np

Submission Date:

21 May 2025

Acceptance Date:

20 September 2025

Published Date:

30 September 2025

ABSTRACT

Introduction: Dyslipidemia refers to abnormal levels of lipids in the bloodstream (total cholesterol ≥ 5.17 mmol/L, HDL < 1.03 mmol/L, LDL ≥ 3.36 mmol/L and Triglyceride ≥ 1.69 mmol/L). Age-related macular degeneration is the leading cause of central vision loss in the elderly. The etiology of this disease is multifactorial and one of them is disturbance in lipid metabolism. The study aimed to determine the prevalence of dyslipidemia among patients with age-related macular degeneration.

Methods: A descriptive cross-sectional study was conducted in the Department of Ophthalmology in a tertiary care center from 12 February 2019 to 31 January 2020 after obtaining ethical approval from the Institutional Review Committee (Reference number: 35U (6-11) E2/075/16). Patients aged ≥ 50 years with a clinical diagnosis of age-related macular degeneration were included in this study. Patients < 50 years, undergoing treatment with lipid-lowering agents and with diabetic and hypertensive retinopathy were excluded. A convenience sampling method was used. Data was entered and analyzed using IBM SPSS Statistics version 26. Point estimate and 90% Confidence Interval were calculated.

Results: Among 65 cases of age-related macular degeneration, the prevalence of dyslipidemia was found to be 54 (83.10%) (76-90, at 90% Confidence Interval).

Conclusions: The prevalence of dyslipidemia among the patient with age related macular degeneration was higher compared to study done in similar settings. So this study highlights the importance of routine serum lipid examination in all patients diagnosed with age-related macular degeneration.

Keywords: age-related macular degeneration; dyslipidemia; prevalence.

INTRODUCTION

Dyslipidemia refers to abnormal levels of lipids in the bloodstream. The deranged blood lipid level leads to various systemic disorders. Dyslipidemia is considered when total cholesterol ≥ 5.17 mmol/L, HDL < 1.03 mmol/L, LDL ≥ 3.36 mmol/L and Triglyceride ≥ 1.69 mmol/L.¹ The pathological mechanism of age-related macular degeneration (ARMD) is not completely clear; however, the deposition of lipoproteins has been implicated in the pathogenesis of ARMD.² A study found a significant increase in total cholesterol (TCH), low-density lipoprotein

(LDL), triglycerides (TG) and significant decrease in High density lipoprotein (HDL) in ARMD patients compared with control group.³ Another study showed significantly elevated values of total (p = 0.0002), LDL (p = 0.023), non-HDL cholesterol (p = 0.0014) compared to control group.⁴ TCH, LDL and TG serum concentrations was significantly higher in ARMD compared to control group in previous study.⁵ However, there was no statistically significant difference in HDL concentration between the two groups (P=0.781).

The main aim of the study was to determine the

prevalence of serum lipids among ARMD patients in the Department of Ophthalmology in a Tertiary Care Centre.

METHODS

A descriptive cross-sectional study was conducted in the Department of Ophthalmology, B.P. Koirala Lions Centre for Ophthalmic Studies, Institute of Medicine, Tribhuvan University, Maharajgunj, Kathmandu, Nepal, from 12 February 2019 to 31 January 2020 after obtaining the ethical approval from Institutional Review Committee (Reference number: 35U (6-11) E2/075/16). All patients aged ≥ 50 years of both genders with a clinical diagnosis of ARMD were enrolled as cases. Patients below 50 years with media opacity dense enough to preclude adequate visualization of the fundus, failing to give consent, undergoing treatment with lipid-lowering agents and with diabetic and hypertensive retinopathy changes were excluded. A convenience sampling method was used. A predesigned proforma was used to collect samples. Informed verbal and written consent were taken from all participants.

The sample size was calculated using the following formula:

$$n = Z^2 \times p \times q / e^2$$

$$= 1.64^2 \times 0.5 \times 0.5 / 0.11^2$$

$$= 56$$

Where,

n= minimum required sample size

Z= 1.64 at 90% Confidence Interval (CI)

p= prevalence taken as 50% for maximum sample size calculation

q=1-p

e= margin of error, 11%

The sample size calculated was 56. However, 65 patients were taken for the study.

Demographic profile, presence of known risk factors such as Hypertension, Diabetes, Cardiovascular diseases were recorded. Each patient had a complete ophthalmoscopic examination, including Visual acuity (unaided and aided) using internally illuminated Snellen multiple optotypes, anterior segment with Haag-Streit 900 Slit lamp biomicroscope and dilated fundus examination. Each participant had a fundus photograph obtained by a trained ophthalmic assistant, and ARMD was categorised by a retina specialist based on phenotype characteristics as early (Medium-sized drusen with no pigmentary abnormalities), intermediate (Large drusen and/or pigmentary abnormalities) and late (Neovascular

ARMD and/or geographic atrophy).⁶ The size of drusen compared with the retinal vessel diameter. Patients diagnosed with ARMD were then investigated for serum Fasting Lipid Profile. Cut-off levels for dyslipidemia were total cholesterol ≥ 5.17 mmol/L, HDL < 1.03 mmol/L, LDL ≥ 3.36 mmol/L and Triglyceride ≥ 1.69 mmol/L.¹ Data were entered into Microsoft Excel and statistically analysed using IBM SPSS Statistics version 26.0. The point estimate was calculated at 90% confidence interval.

RESULTS

Among 65 cases of age-related macular degeneration, dyslipidemia was found in 54 (83.10%) (76-90, 90% CI). Dyslipidemia was more prevalent in the age group 70-79 years, followed by 60-69 years (Table 1).

Table 1. Age and gender distribution of ARMD patients with dyslipidemia (n=54).

Variables	n (%)
Age Group (years)	
50-59	4 (7.40)
60-69	13 (24.10)
70-79	24 (44.40)
80-89	11 (20.40)
90-99	2 (3.70)
Gender	
Male	22 (40.70)
Female	32 (59.30)

The majority of ARMD patients with dyslipidemia were female 32 (59.30%). Out of 54 patients, 42 (77.80%) had early, 6 (11.10%) had intermediate and 6 (11.10%) had late ARMD (Table 2).

Table 2. Types of ARMD (n=54).

Age (years)	n (%)
Early	42 (77.80)
Intermediate	6 (11.10)
Late	6 (11.10)

Among 54 patients, 32 (59.30%) patients had abnormal cholesterol, 54 (100.00%) patients had abnormal HDL, 6 (11.10%) patients had abnormal LDL and 41 (75.90%) had abnormal triglycerides (Table 3).

Table 3. Distribution of Serum Lipids level of ARMD (n=54).

Serum lipid levels	n (%)
--------------------	-------

Serum Cholesterol	32 (59.25)
HDL	54 (100)
LDL	6 (11.11)
Triglycerides	41 (75.92)

DISCUSSION

The prevalence of dyslipidemia among ARMD was found to be 54 (83.10%). The prevalence of dyslipidemia was 18.5% among 78 ARMD patients as shown in previous study. This result shows higher prevalence in our study compared to them.⁷ Dyslipidemia was more prevalent in the age group 70-79 years, followed by 60-69 years. The majority of ARMD patients with dyslipidemia were female 32 (59.30%). A study included ARMD patients with mean age of 80.2 years with female preponderance (61.9%).⁸ About 42 (77.80%) patients had early, 6 (11.10%) had intermediate and 6 (11.10%) had late ARMD.

Among 54 patients, 32 (59.30%) patients had abnormal cholesterol, 54 (100.00%) patients had abnormal HDL, 6 (11.10%) patients had abnormal LDL and 41 (75.90%) had abnormal triglycerides. A previous study showed significantly higher levels of total cholesterol, triglycerides and LDL levels in cases and a significant decrease in HDL levels in ARMD patients.³ In our study, HDL levels were also lower in ARMD patients along with an increase in total cholesterol, triglycerides and LDL levels. A previous study also concluded patients with ARMD had higher total cholesterol ($p = 0.0002$) and LDL value ($p = 0.023$), similar to our study.⁴ Another study found a significant increase in total cholesterol ($p = 0.001$), LDL ($p = 0.001$) and TG ($p = 0.017$) concentration among cases compared to controls.⁵ However, no significant difference in HDL ($p = 0.781$) was found between the two groups. Elevated HDL levels was found to be significantly associated with ARMD, while no statistically significant association of ARMD was seen with total cholesterol, LDL or Triglycerides.⁸ This result is the reverse

of our result in which ARMD patients had a lower level of HDL with high total cholesterol, LDL or Triglycerides. A previous study also found significantly higher levels of LDL ($p = 0.03$) in cases compared to controls, and HDL level ($p = 0.05$) was lower in cases than in controls, similar to our study. But no significant difference was seen in total cholesterol and HDL levels between the two groups.⁹

In our study, HDL level contributed to the highest percentage of dyslipidemia (100.00%). Serum Triglycerides and Serum cholesterol are listed second (75.90%) and third (59.30%), respectively, and the lowest contribution is of serum LDL (11.10%). A study from Dhulikhel Hospital in 2010 showed lower levels of HDL (<1.17 mmol/L) in 76% of the total cases who were recruited from the OPD irrespective of their co-morbid conditions.¹⁰ This shows that the average Nepalese may have a lower level of desired HDL level. Elevated levels of LDL or decreased levels of HDL, with or without other risk factors, have been reported to increase the risk of cardiovascular disease.¹¹ An Ophthalmologist, through the detection of ARMD, may identify patients with dyslipidemia and also help in the identification and prevention of well-known risk factors for cardiovascular disease by referring the patient to a concerned facility.

The sample size in this study was small and was carried out in one center only. Therefore, large multicentric and community-based studies are required to further strengthen the study.

CONCLUSIONS

Our study showed patients with ARMD had greater prevalence of dyslipidemia in terms of total cholesterol, serum LDL, triglycerides compare to the study done in similar settings. Therefore, all patients with dyslipidemia and age ≥ 50 years should be screened for ARMD.

Conflict of Interest: None.

REFERENCES

1. World Health Organisation. Guidelines for the management of dyslipidaemia in patients with diabetes mellitus [Internet]. Geneva, Switzerland; 2006 [cited 2025 July 11]. Available from: <https://iris.who.int/handle/10665/119809>.
2. Hogg RE, Woodside JV, Gilchrist SE, Graydon R, Fletcher AE, Chan W, et al. Cardiovascular Disease and Hypertension Are Strong Risk Factors for Choroidal Neovascularisation. 2008 Jun;115(6):1046-1052.e2. [[PubMed](#) | [Full Text](#) | [DOI](#)]
3. Nowak M, Swietochowska E, Marek B, Szapska B, Wielkoszynski T, Kos-Kudla B, et al. Changes in lipid metabolism in women with age-related macular degeneration. Clin Exp Med. 2005 Mar;4(4):183-7. [[PubMed](#) | [Full Text](#) | [DOI](#)]
4. Colak E, Kosanovic-Jakovic N, Zoric L, Radosavljevic A,

- Stankovic S, Majkic-Singh N. The association of lipoprotein parameters and C-reactive protein in patients with age-related macular degeneration. *Ophthalmic Res.* 2011;46(3):125–32. [[PubMed](#) | [Full Text](#) | [DOI](#)]
5. Davari MH, Gheitasi H, Yaghobi G, Heydari B. Correlation between serum lipids and age-related macular degeneration: a case-control study. *J Res Health Sci.* 2013 May;13(1):98–101. [[PubMed](#)]
 6. Ferris FL, Wilkinson CP, Bird A, Chakravarthy U, Chew E, Csaky K, et al. Clinical classification of age-related macular degeneration. *Ophthalmology.* 2013 Apr;120(4):844–51. [[PubMed](#) | [Full Text](#) | [DOI](#)]
 7. Abusharkh FH, Kurdi L, Shigdar RW, Mandura RA, Alattas K. Prevalence and Associated Risk Factors of Age-Related Macular Degeneration in the Retina Clinic at a Tertiary Center in Makkah Province, Saudi Arabia: A Retrospective Record Review. *Cureus.* 2023 Mar 12;15(3):e36048. [[PubMed](#) | [Full Text](#) | [DOI](#)]
 8. Cougnard-Gregoire A, Delyfer MN, Korobelnik JF, Rougier MB, Le Goff M, Dartigues JF, et al. Elevated high-density lipoprotein cholesterol and age-related macular degeneration: the Alienor study. *PLoS One.* 2014 Mar;9(3):e90973. [[PubMed](#) | [Full Text](#) | [DOI](#)]
 9. Reynolds R, Rosner B, Seddon JM. Serum lipid biomarkers and hepatic lipase gene associations with age-related macular degeneration. *Ophthalmology.* 2010 Oct;117(10):1989–95. [[PubMed](#) | [Full Text](#) | [DOI](#)]
 10. Pant P, Hamal PK, Gurung D, Upreti K, Subedi K. Lipid profile in a tertiary care center. *J Nepal Med Assoc.* 2010 Apr-Jun;49(178):147–50. [[PubMed](#)]
 11. Executive summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). *JAMA.* 2001 May;285(19):2486–97. [[PubMed](#) | [Full Text](#) | [DOI](#)]

© The Author(s) 2025.

This is an open access article published in the Postgraduate Medical Journal of Nepal (PMJN) under the Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) license, which permits non-commercial use, distribution, and reproduction (remix, transform, and build upon the material) in any medium or format, provided the original work is properly cited, a link to the license is provided, and any changes are indicated. Commercial use of the content is not permitted. This license ensures that the content remains freely accessible for educational and research purposes. For details, visit: <https://creativecommons.org/licenses/by-nc/4.0/>.