

# Age-Related Macular Degeneration in Nepal

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## ABSTRACT

### Background

The Age-related Macular Degeneration (AMD) is a common cause of visual impairment and blindness worldwide in elderly.

### Objective

This study aimed to explore the demographic characteristics, pattern and risk factors for AMD at a tertiary referral eye centre in Nepal.

### Methods

This is a hospital-based prospective study, conducted at Tilganga Institute of Ophthalmology, Nepal from September 2008 to May 2009. All the consecutive cases of AMD diagnosed at the institute were included.

### Results

A total of 141 patients (266 eyes) with AMD recruited for the study. The mean age was 69.5 years (9.1SD) with three fifth males (58.9%). Housewives and occupations like agriculture comprised of 38.3% and 42.5% respectively. Three fourth (75.6%) of the patients were illiterate. The proportion of dry and wet AMD were found in 62.4% and 37.6% respectively. Bilateral involvement was seen in 88.7% of the subjects. Three fourth (71.4%) of the AMD eyes had presenting visual acuity less than 6/18. History of smoking was found in 69.9% of patients. Hypertension was the predominant systemic problem (45.4%) followed by diabetes mellitus (12.8%).

### Conclusion

AMD is correlated with ageing in our study as well. Dry AMD is more in age groups 45-64 years and wet AMD at 65 years and older. Bilateral involvement with one eye dry and fellow eye wet AMD is more predominant (44%). Smoking and occupations like agriculture and housewife are significant risk factors for AMD. Likewise male sex, illiteracy and hypertension are other risk factors for AMD in hospital settings.

## KEYWORDS

*agriculture, dry macular degeneration, hypertension, illiterate, smoking, wet macular degeneration*

## INTRODUCTION

Age-related Macular Degeneration (AMD) is the commonest cause of irreversible blindness and visual impairment in elderly with significant public health problem in the developed and developing countries contributing 8.7% of global blindness.<sup>1</sup> The various population based studies have shown that the prevalence of AMD was 9.1% -20.9% among the whites and 3.1%-10.6% in Asian peoples.<sup>2-6</sup> In a previous population based study in Nepal, AMD was found to contribute 8.7% of total blindness.<sup>7</sup>

The wet type of macular degeneration although constitutes only 10% of the AMD burden, is a main cause of irreversible

vision loss.<sup>8</sup>

Although a third commonest cause of blindness in worldwide, AMD is not a priority eye disease in the poorest and most populous regions of Asia and Africa. This is compounded by the fact that the available treatment for wet macular degeneration is out of reach to the average people of the developing country.

The aim of study was to explore the demographic characteristics, pattern and risk factors for AMD at a tertiary eye care centre in Nepal.

**Table 1. Demographic information.**

Description	Eyes (AMD)			Patients (n=141)	
	Dry (%) (n=166)	Wet (%) (n=100)	Total (%) (n=266)		
Age (Years)	45-54	8(4.8)	5(5.0)	13(4.9)	7(5.0)
	55-64	47(28.3)	15(15.0)	62(23.3)	34(24.0)
	65-74	59(35.5)	41(41.0)	100(37.6)	52(36.9)
	75-84	44(26.5)	34(34.0)	78(29.3)	41(29.1)
	85-94	8(4.8)	5(5.0)	13(4.9)	7(5.0)
Sex	Female	81(48.8)	32(32.0)	113(42.5)	58(41.1)
	Male	85(51.2)	68(68.0)	153(57.5)	83(58.9)
Ethnicity	Newar	48(18.1)	25(9.4)	73(27.5)	39(27.7)
	Chhetri	37(13.9)	16(6.0)	53(19.9)	28(19.9)
	Mongolian	17(6.4)	20(7.5)	37(13.9)	20(14.2)
	Other	12(4.5)	9(3.4)	21(7.9)	12(8.5)
Occupation	Agriculture	61(36.7)	51(51.0)	112(42.1)	60(42.6)
	Housewife	76(45.8)	28(28)	104(39.1)	54(38.3)
	Service	10(6)	9(9)	19(7.1)	10(7.1)
	Business	11(6.6)	4(4)	15(5.6)	8(5.7)
	Others	8(4.8)	8(8)	16(6)	9(6.3)
Literacy	Literate	37(22.3)	24(24)	61(22.9)	33(23.4)
	Illiterate	129(77.7)	76(76)	205(77.1)	108(76.6)

## METHODS

This was a hospital-based prospective study conducted at Tilganga Institute of Ophthalmology, a tertiary eye care centre of Nepal. All the consecutive cases of AMD presented to the institute from September 2008 to May 2009 were included in the study. Patients with concurrent macular problems due to other inflammatory, retinal vascular problems and traumatic causes leading to confusions in diagnosis and grading of AMD were excluded.

History was taken in detail regarding demographic information, family history, dietary habits, details of smoking and systemic problems, focused mainly on hypertension, hyperlipidaemia and other cardiac problems. Presenting and best corrected distance visual acuity with Snellen chart was recorded. Anterior and posterior segment findings were recorded in detail under mydriasis. Findings on macula were recorded in detail like size and characters of drusens, Retinal Pigment Epithelium (RPE) pigmentary abnormalities, RPE atrophy, geographic atrophy, subretinal hemorrhage, subretinal fluids, pigment epithelial detachment and disciform fibrotic scars. Classification of AMD was done according to the international classification and grading system for age related maculopathy.<sup>9</sup> Fundus photography, optical coherence tomography (OCT) and fundus fluorescein angiography (FFA) were done as needed. Patients were referred to physicians and cardiologist for needful treatment of the systemic problems.

Patients were recorded as hypertensive if they are taking antihypertensive medications or systolic blood pressure more than 160 and or diastolic blood pressure more than 90 mmHg at least three times in two different recordings.

Patients were regarded diabetics if they are taking hypoglycaemic agents or fasting plasma glucose (FPG)  $\geq$  126 mg/dl ( 7.0 mmol) or 2 hour post prandial blood glucose  $\geq$  200 mg/dl ( 11.1 mmol/l). Likewise Hyperlipidaemia was recorded if raised serum levels of one or more of the total cholesterol (TGs), low-density lipoprotein cholesterol (LDL-C), triglycerides (TGs), or both T Choland TG (combined hyperlipidaemia) or if history of taking medication for hyperlipidaemia. The data was analyzed in SPSS 11.0 version. P value of less than 0.05 was taken as significant in this study. Ethical approval was obtained from the institutional review board of the Tilganga Institute of Ophthalmology, and the study was conducted according to the principles of the Declaration of Helsinki. Informed consent was obtained from the patients before enrollment in the study.

## RESULTS

A total of 141 patients (266 eyes) were included in the study. The average age of the patients was 69.5 years with a range from 46 years to 94 years of age (9.1 SD). Maximum numbers of patients were between 65-84 years of age comprising of 66.9% of the affected eyes.

Both the dry and wet AMD cases were more with advancing age of the patient. Males were more than females comprising of 58.9% and 41.1% respectively. Brahmins (29.8%) and Newars (27.7%) were the predominant ethnic groups for this problem.

Patients from all the occupational groups presented with

this problem but people who worked as farmers (42.6%) and housewives (38.3%) were mostly affected. 76.6% of cases were illiterate with involvement of more than three fourth (77.1%) affected eyes (Table 1).

History of smoking was found in 70.2% of the cases. Among them, past smoking was found in 51.5% and smoking at the time of presentation was in 18.4%. About one third of patients used to smoke more than 10 cigarettes/ day. (Table 2)

Ninety five percent of the subjects were of non-vegetarian and 94.6% of the patients were presented with the chief complaints of decrease in vision. The mean duration of decreased vision was 12.09 months.

More than two-third affected eyes (71.4%) had presenting visual acuity of less than 6/18. (Table 3) Astigmatism which includes both myopia and hypermetropia was the commonest refractive error among the affected eyes (54.1%), followed by simple hypermetropia (16.5%) and simple myopia (10.5%). (Table 5) Cataract was the most common anterior segment finding (70.2%) and 12.8% of the cases had already done bilateral cataract surgery.

Dry macular degeneration was more common than wet macular degeneration comprising of 62.4% and 37.6% of the eyes respectively. Bilateral involvement was found in 88.7% of the cases. Among the bilateral cases, one eye affected with dry and other eye wet macular degeneration was found in majority (44.0%) of the cases where as bilateral dry macular degeneration was found in (40.8%) and wet macular degeneration in (15.2%). Among the dry AMD cases, Intermediate type was found in highest number of eyes (50.0%). (Table 4)

Hypertension only was found in 45.4% of the cases. It was followed by diabetes mellitus (12.8%), mixed diabetes and hypertension (7.8%) and hyperlipidaemia (1.4%).

Wet AMD was significantly higher among the occupations with agriculture, housewives ( $p=0.077$ ) and those with smokers ( $p=0.005$ ). (Table 5)

## DISCUSSION

Age- related Macular degeneration is a multi factorial disease with increasing public health problem due to its irreversible vision loss in elderly not only in the developed countries but also in developing countries like Nepal.

In our study, 71% of the AMD patients were of age 65 years and older and AMD was significantly associated with increasing age ( $P=0.026$ ). Dry AMD was found more in younger age groups (45-64 years) where as wet AMD in older age groups (65-94 years). Almost one third (33%) of the dry AMD and one fifth (20%) of the wet AMD were found in age groups 45-64 years where as two thirds (67%) of dry AMD and four fifths (80%) of wet AMD were found in age groups 65-94 years. This finding was consistent with other studies done in other countries.<sup>2,10,11</sup> Unlike mentioned in the literatures where female sex is found as a risk factor

**Table 2. Pattern of smoking.**

		Eyes (AMD)		
		Dry (n=166)	Wet (n=100)	Total (n=266)
		Frequency (%)	Frequency (%)	Frequency (%)
Smoking	Never	60(36.1)	20(20)	80(30.1)
	Past	84(50.6)	53(53)	137(51.5)
	Present	22(13.3)	27(27)	49(18.4)
	Total	166(100)	100(100)	266(100)
No of cigarettes/ Day	<10	115(69.3)	62(62)	177(66.5)
	>10	51(30.7)	38(38)	89(33.5)
	Total	166(100)	100(100)	266(100)

**Table 3. Presenting and best corrected visual acuity.**

Description		Eyes (AMD)		
		Dry (n=166)	Wet(n=100)	Total(n=266)
Presenting visual acuity	6/6-6/18	72(43.4)	4(4.0)	76(28.6)
	<6/18-6/60	63(38.0)	22(22.0)	85(32)
	<6/60-3/60	14(8.4)	23(23.0)	37(13.9)
	<3/60	17(10.2)	51(51.0)	68(25.6)
Best corrected visual acuity	6/6 - 6/18	113(68.0)	9(9.0)	122(45.9)
	<6/18-6/60	32(19.3)	28(28.0)	60(22.5)
	<6/60-3/60	6(3.6)	16(16.0)	22(8.3)
	<3/60	15(9.1)	47(47.0)	62(23.3)

**Table 4. Laterality and severity of AMD.**

Description		Eyes (AMD)			
		Dry	Wet	Mixed (dry + wet)	Total
		Freq (%)	Freq (%)	Freq (%)	Freq (%)
Laterality (n=141)	Bilateral	51 (40.8)	19(15.2)	55 (44.0)	125 (88.7)
	Unilateral	9 (56.3)	7 (43.7)	0 (0)	16 (11.3)
	Total	61 (43.3)	25 (17.7)	55 (39.0)	141 (100.0)
Severity of Dry AMD (n=100)	Mild	79 (47.6)	83 (50.0)	4 (2.4)	
	Inter-mediate				
	Severe				
	Total				

for AMD we found males more with the problems although women were more likely to develop dry than wet AMD ( $P=0.042$ , odds ratio =1.983, CI 1.019-3.876).<sup>2,10,12</sup> This may be due to privilege of males for health facilities. We found the AMD higher among peoples with occupations of agriculture and housewives who used to spend their time longer in the fields. This may be due to higher sunlight exposure as compared to other occupational groups.<sup>11-14</sup> More than three fourth of our study cases were illiterate who don't have knowledge about the disease, relative lack of good nutrition and also work more in the field with

**Table 5. Risk factors analysis for AMD.**

Description		Dry	Wet	Total	P-value
Age	45-54	3	4	7	0.169
	55-64	27	7	34	
	65-74	29	23	52	
	75-84	26	15	41	
	85-94	4	3	7	
Sex	Female	42	16	58	0.056
	Male	47	36	83	
Ethnicity	Brahmin	27	15	42	0.47
	Newar	27	12	39	
	Chhetri	18	10	28	
	Mongolian	9	11	20	
	Others	8	4	12	
Literacy	Literate	19	14	33	0.514
	Illiterate	69	39	108	
Occupation	Agriculture	33	27	60	0.077
	Housewife	40	14	54	
	Service	5	5	10	
	Business	7	1	8	
	Others	4	5	9	
Smoking	Never	31	11	42	0.005
	Present/Past	58	41	99	
HTN	No	52	25	77	0.234
	Yes	37	27	64	
DM	No	76	47	123	0.391
	Yes	13	5	18	
HTN/ DM Mixed	No	82	48	130	0.971
	Yes	7	4	11	
Pattern of refractive error	Astigmatism	103	41	144	0.860
	Hypermetropia	27	17	44	
	Myopia	17	11	28	
	No error	19	31	50	

longer UV exposure without protection. But there was no significant difference with the types of AMD ( $P=0.077$ ) among different occupational groups.

Newar and Brahmin were the predominant ethnic groups for the problem although it was not statistically significant with the type of AMD ( $p=0.470$ ). This might be due to the catchment areas of the eye institute where more people are from Newar and Brahmin ethnic groups. Population based study will be needed for further analysis.

Smoking history was found in more than two-third of our cases out of which one third were present smokers. We found the significant association between past and current smoking with wet AMD ( $P=0.005$ , Odds Ratio=0.442, 95% CI 0.246-0.792) as in other studies.<sup>15-20</sup> There was no significant association between the number of sticks smoked and wet or dry AMD ( $P=0.097$ ).

The poor visual acuity at the time of presentation may be due to late presentation and co-existing cataract. The delayed presentation may be due to the lack of awareness of the seriousness of the problem and poor transportation facilities from the remote areas as almost half of the cases were from out of the Kathmandu valley and painless nature of the problem.

We found no significant association of myopia or hypermetropia with either types of AMD ( $P=0.860$ ) unlike in other literatures where hypermetropia was a risk factor.<sup>10, 12</sup>

Unlike described in the literatures the higher number of wet AMD cases in this study may be due to the lack of knowledge on regular eye check-up among patients where most of the people presented late once they had marked diminution of vision, the main feature of wet AMD.<sup>8,12</sup>

Hypertension was found in nearly half of our study subjects. Although not statistically significant ( $P= 0.234$ ) with either types of AMD it could be one of the risk factors for the causation of AMD in our patients as in other studies.<sup>10, 21-23</sup> The other systemic conditions in our patients were diabetes mellitus, mixed diabetes and hypertension, hyperlipidaemia and other cardiovascular problems, although the association was not statistically significant with the types of AMD (DM  $P= 0.391$ , HTN+ DM  $P= 0.971$ ).

For the analysis of risk factors of all types of AMD, we need the control group who do not have any changes of AMD. This was not done in our study and is the limitation of this study.

## CONCLUSION

AMD is a common retinal problem with emerging public health challenge in elderly of the developing countries like Nepal. Dry AMD is more common in age groups 45-64 years and wet AMD at 65 years and older. Bilateral involvement with one eye dry and fellow eye wet AMD is more predominant than bilateral involvement with single type. Smoking and occupations like agriculture and housewife were risk factors for AMD. Likewise, male sex, illiteracy and hypertension were other risk factors for dry and wet AMD in hospital patients. Public awareness on these modifiable risk factors and regular eye check up after 50 years of age could help to limit the disease and its burden of blindness. We recommend further community based studies for the additional risk factors.

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