

# Epidemiological factors associated with exudative age-related macular degeneration in Spain

Javier A Montero<sup>1, 2, 3</sup>, Hortensia Sánchez-Tocino<sup>1</sup>, Maria Josefa Martí Maldonado<sup>1</sup>, Concepción Arnaiz Niño<sup>1</sup>, Rosa Maria Pérez Bartolom<sup>1</sup>, Antonio Valera Coomonte<sup>1</sup>

<sup>1</sup>Pio del Rio Hortega University Hospital, Ophthalmology Unit, Valladolid, Spain

<sup>2</sup>Alicante Institute of Ophthalmology, VISSUM, Retina Unit, Alicante, Spain

<sup>3</sup>Albacete Medical School, Castilla La Mancha University, Spain

**Correspondence to:** Javier A Montero, MD, PhD. Pio del Rio Hortega University Hospital, Ophthalmology Unit, Avda. Cardenal Torquemada, s/n. 47010 Valladolid, Spain. javmonmor@hotmail.com

Received:2008-12-16 Accepted:2009-01-10

## Abstract

• **AIM:** To report the demographic characteristics of a sample of population affected by exudative age-related macular degeneration (AMD) in the region of Castilla-Leon (North-Central Spain), and to compare them with a group of population of the same age and from the same geographic area.

• **METHODS:** In this observational, prospective study, AMD patients attending a regional reference clinic for photodynamic therapy were interviewed. The patients reported their medical history for high blood pressure, hyperlipemia and smoking habit. Iris color was examined and classified as light (green, blue and grey) or dark (hazel, brown, black).

• **RESULTS:** A total of 343 patients were interviewed. Mean age at onset was 74.9 years (range 55 to 93), among whom 64.5% were female and 35.5% male. Iris color was rated as light in 45.1% of the patients. Arterial hypertension (AH) was present in 50% of the cases and 15.3% were on treatment for hypercholesterolemia, and 30.2% of the patients were smokers or had quit smoking (80.9% of males).

• **CONCLUSION:** The frequency of light colored iris is higher among patients with exudative AMD. In our series, other risk factors for exudative AMD were smoking habit in males, not being on treatment for hypercholesterolemia and being female.

• **KEYWORDS:** exudative age-related macular degeneration; iris color; smoking; blood pressure; hyperlipemia; smoking habit

Montero JA, Sánchez-Tocino H, Maldonado MJM, Niño CA, Bartolom RMP, Coomonte AV. Epidemiological factors associated with exudative age-related macular degeneration in Spain. *Int J Ophthalmol* 2009; 2(1):74-76

## INTRODUCTION

Age-related macular degeneration (AMD) is a common cause of decreased visual acuity (VA) in developed countries [1]. Evidence from epidemiologic data regarding the natural history of AMD suggests that smoking, arterial hypertension and cataract surgery may be related to AMD though it is not known what effect reduction of blood pressure and the cessation of smoking might affect the incidence and progression of AMD [2]. Other factors that may be related are coronary disease, female gender and hyperopia [3]. The association of AMD with light colored irises is controversial [4, 5]. The aim of this study is to evaluate the demographic characteristics and risk factors to develop wet AMD among the population of Castilla-Leon in North-Central Spain.

## MATERIALS AND METHODS

Patients were studied who were recently diagnosed wet AMD and had been referred from the different public hospitals in Castilla-Leon to the regional reference centre for photodynamic therapy at the Pio del Rio Hortega University Hospital in Valladolid, Spain.

The patients and their relatives were informed about the intended use of the information. A complete ocular examination was performed and the color of the iris was recorded. The irises were classified as light (green, blue and grey) or dark (hazel, brown, black). Information regarding age, sex, treatment for arterial hypertension (AH) and hypercholesterolemia (HC), smoking habits and ophthalmic history was also recorded.

The patients were distributed in three age groups, considering the age when AMD was first diagnosed: Group 1

comprised patients aged 55 to 65 years; Group 2 patients aged 66 to 75; Group 3 patients older than 76.

The frequency of age, sex, AH, HC and smoking habit was compared with that of a general population-based enquiry for the same age-group in Castilla-Leon<sup>[6]</sup>.

The distribution of irises color was compared with a control group with patients and relatives who attended the ophthalmology clinic with conditions not related to AMD within the same age group and geographic origin, during the same period.

## RESULTS

Three hundred and forty-three patients were examined (221 female, 122 male), with the mean ages of 76.1 years (SD 7.2, range 60 to 95) for the whole group, 75.9 (SD 7.3, range 60 to 95) for females, 76.2 (SD 7.0, range 61 to 91) for males. Table 1 describes the demographics of this group of patients compared with the general population of the same region.

The prevalence of smoking habit, AH and HC for the AMD population and the control population is described in Table 2.

The frequency of light colored irises was 50.4% (171 patients) among the patients with AMD and 10.6% among the control population ( $P < 0.001$ , Chi-square test).

## DISCUSSION

Much is still discussed regarding risk factors for exudative AMD. Among the reported risk factors are age, hyperopia, lower level of education<sup>[7]</sup>, female gender, cataract surgery<sup>[3]</sup>, smoking, non-drinking<sup>[8]</sup>, genetics<sup>[2]</sup>, arterial hypertension, coronary disease and light colored irises<sup>[4]</sup>. Roca-Santiago *et al*<sup>[9]</sup> reported an increased risk among patients with hypercholesterolemia. Other series considered that intake of fatty acids and hyperlipemia may contribute to the appearance and progression of AMD<sup>[10]</sup>.

Our series suggests that iris color, being female, and smoking habit in males are strongly associated with exudative AMD. We have been unable to detect a statistically significant association with AH. According to our findings, HC may be a protective factor against exudative AMD.

The most remarkable risk factor in our series is the presence of light colored irises (OR 8.19). This finding agrees with other authors<sup>[4]</sup> and is in disagreement with the results reported by Klein *et al*<sup>[5]</sup>. The differences among

**Table 1 Demographics of the studied population (age-related macular degeneration,AMD)compared with the distribution of the general population in Castilla-Leon (control)<sup>[6]</sup>** %

	Age (years)	Females	Males
Control	55-65	50.3	49.7
	66-75	53	47
	≥75	60	40
	TOTAL	55.5	44.5
AMD(324)	55-65	64.3	35.7
	66-75	64.2	35.8
	≥75	64.7	35.3
	TOTAL	64.5	35.5

$P=0.001$ , Chi-square test

**Table 2 Frequency of high blood pressure (HBP), hypercholesterolemia (HCh) and smoking habit (SmH) in the studied population with AMD and the general population in Castilla-Leon (control)<sup>[6]</sup>** %

		HBP	HCh	SmH (M)	SmH (F)
Control	55-65	39.5	35.8	71.2	9.5
	66-75	45.6	36.2	67.4	3.8
	≥75	56.0	30.8	67.5	1.7
	55-65	44.4	5.9	33.3	9.1
AMD	66-75	55.7	25.7	76.0	4.4
	≥75	58.1	12.4	71.4	0.0
		$P=0.5$	$P<0.001$	$P= 0.01$	$P=0.6$

M: Males; F: Females; Chi-square test

these series may be related to different criteria for considering light/dark irises and to different ethnic components among the populations studied. Longer series are required to ascertain the influence of iris color.

The influence of the smoking habit has been reported in previous series<sup>[2, 8]</sup>. This influence was only statistically significant in the male population due to the low prevalence of smoking habit among the elderly female population in our area. The changing habits in smoking will soon reveal the real influence of this risk factor on the appearance of exudative AMD.

The role of AH and serum levels of cholesterol has been previously reported. The influence of AH on retinal blood flow and its effect on AMD was reported by Metelitsina *et al*<sup>[11]</sup>, and there is a general agreement on its pro-AMD effect. However, the role of hyperlipemia may not be so clear. High cholesterol has been associated with AMD<sup>[12]</sup>. In our series, we are not able to affirm whether the lower frequency of AMD in patients taking hypolipemiant is related to the previous hypercholesterolemia or to the effect of the hypolipemiant drugs.

Our results suggest that AMD may appear more frequently among patients with light colored iris, smoking males, and those who are not on treatment for hypercholesterolemia. Further prospective studies with longer series of patients in different geographic settings are required to clarify the predisposing factors for AMD.

**REFERENCES**

- 1 Vingerling JR, Dielemans I, Hofman A, Grobbee DE, Hijmering M, Kramer CF, de Jong PT. The prevalence of age-related maculopathy in the Rotterdam Study. *Ophthalmology* 1995;102(2):205–210
- 2 Klein R, Peto T, Bird A, Vannewkirk MR. The epidemiology of age-related macular degeneration. *Am J Ophthalmol* 2004;137(3):486–495
- 3 Santos LP, Diniz JR, Leao AC, Sena MF. Age-related macular degeneration: analysis in two ophthalmological centers in Pernambuco–Brazil. *Arq Bras Oftalmol* 2005;68(2):229–233
- 4 Chaine G, Hullo A, Sahel J, Soubrane G, Espinasse–Berrod MA, Schutz D, Bourguignon C, Harpey C, Brault Y, Coste M, Moccatti D, Bourgeois H. Case-control study of the risk factors for age related macular degeneration. France–DMLA Study Group. *Br J Ophthalmol* 1998;82(9):996–1002
- 5 Klein R, Klein BE, Jensen SC, Cruickshanks KJ. The relationship of ocular factors to the incidence and progression of age-related maculopathy. *Arch Ophthalmol* 1998;116:506–513
- 6 Junta de Castilla y Leon. Consejeria de Sanidad. Riesgo de Enfermedad Cardiovascular en Castilla y Leon. [http://www.sanidad.jcy.es/sanidad/cm/profesionales/tkContent?pgseed=1205257773021&idContent=20202&locale=es\\_ES&textOnly=false](http://www.sanidad.jcy.es/sanidad/cm/profesionales/tkContent?pgseed=1205257773021&idContent=20202&locale=es_ES&textOnly=false) 2005
- 7 Xu L, Li Y, Zheng Y, Jonas JB. Associated factors for age related maculopathy in the adult population in China: the Beijing eye study. *Br J Ophthalmol* 2006;90(9):1087–1090
- 8 Krishnaiah S, Das T, Nirmalan PK, Nutheti R, Shamanna BR, Rao GN, Thomas R. Risk factors for age-related macular degeneration: findings from the Andhra Pradesh eye disease study in South India. *Invest Ophthalmol Vis Sci* 2005;46(12):4442–4449
- 9 Roca–Santiago HM, Lago–Bouza JR, Millan–Calenti JC, Gomez–Ulla–Irazazabal F. Alzheimer’s disease and age-related macular degeneration. *Arch Soc Esp Ophthalmol* 2006;81(2):73–78
- 10 Mares–Perlman JA, Brady WE, Klein R, VandenLangenberg GM, Klein BE, Palta M. Dietary fat and age-related maculopathy. *Arch Ophthalmol* 1995;113(6):743–748
- 11 Metelitsina TI, Grunwald JE, DuPont JC, Ying GS. Effect of systemic hypertension on foveolar choroidal blood flow in age related macular degeneration. *Br J Ophthalmol* 2006;90(3):342–346
- 12 Donaldson MJ, Pulido JS. Treatment of nonexudative (dry) age-related macular degeneration. *Curr Opin Ophthalmol* 2006;17(3):267–274

## Editorial Board of IJO

**General Academic Advisors**

Bruce E Spivey      G O H Nanumann

R Pararajasegaram      Gullapallin N Rao

**Honorary Editor-in-Chief**

Jean-Jacques Delaey      Dennis S C Lam

H Dunbar Hoskins Jr      Xiao-Xin Li

**President and Co-Editor-in-Chief**

Xiu-Wen Hu

**Editor-in-Chief**

Yan-Nian Hui

George C Y Chiou

**Associate Chief Editors**

Ning-Li Wang

Jole S Schuman

Li-Xin Xie

Shou-Zhi He

**Members of the Editorial Board**

Jia-Qi Chen	Zu-Guo Liu	Ke Yao	Ting-Jun Fan	Pei-Zeng Yang
Shi-Bo Jiang	Alvin Kwan-Ho Kwok	Wai-Man Chan	Hong Yan	Xiao-Ming Chen
Xiao-Guang Dong	Yan-Jing He	You-Qin Jiang	Xiao-Rong Li	Lin Liu
Wu Liu	Zhi-Zhong Ma	Bo-Rong Pan	Jia Qu	Guo-Xiang Song
Xing-Huai Sun	Luo-Sheng Tang	Shi-Bo Tang	You-Zhi Tang	Yu-Sheng Wang
Xiao-Bo Xia	Guo-Xing Xu	Jian Ye	Zheng-Qin Yin	Jin-Song Zhang
Mao-Nian Zhang				