

Incidence of Age Related Macular Degeneration in Correlation with Age, Sex and Occupation

Sanja Njirić, Tamara Mišljenović, Maša Mikuličić and Luciana Pavičević

Eye Polyclinic »Dr. L. Pavičević«, Rijeka, Croatia

ABSTRACT

This study assesses the relation between age related macular degeneration (ARMD) and age, sex and occupation. It is designed as a retrospective study conducted on patients presenting to the Eye Polyclinic »Dr. L. Pavičević«, Rijeka, Croatia, during the years 1995, 2000 and 2005. and included total of 6617 patients. The number of patients diagnosed with ARMD, their age and sex distribution, as well as the correlation between occupation type (indoor/outdoor) and the incidence of ARMD were analyzed. The results of our study show that the incidence of ARMD is slightly increased in female vs. male, strongly age related, as expected, and significantly increased in patients with outdoor type of occupation. Besides, an increasing trend of incidence is noted.

Keywords: ARMD, UV radiation, UV exposure

Introduction

Age-Related Macular Degeneration (ARMD) is the leading cause of visual impairment in people 50 years or over in developed countries and yet researchers are still in the dark about many of the factors that cause this disease¹.

Current treatments are limited. Age related macular degeneration is typically divided into two categories: atrophic or »dry« AMD and exudative or »wet« AMD. In dry AMD, one observes whitish-yellow, discrete subretinal lesions known as »drusen« and alteration of the retinal pigment epithelium. Over time, drusen may coalesce and eventually lead to geographic atrophy. This is characterized by extensive atrophy of the retinal pigment epithelium (RPE) and the overlying photoreceptor cells. This may lead to substantial loss of central vision. Choroidal neovascularization (CNV), which extends into the subRPE and the subretinal space, is the hallmark of wet AMD. Although the wet form of AMD is only seen in ten to twenty percent of patients, it is responsible for eighty to ninety percent of patients with severe visual loss.

The prevalence of ARMD is strongly age related. The prevalence increases from 1.6% in 52–64 years to 11% in 65–74 years and 27.9% in more than 74 years². The findings are applicable to all races and geographical areas and are confirmed in a recent study of pooled in data

from 3 continents. The prevalence varied from 0.2% of the combined population aged 55–64 years, rising to 13% in the population older than 85 years³. The prevalence of neovascular ARMD increased from 0.17% amongst subjects aged 55–64 years to 5.8% for those older than 85 years³.

The present and past history of systemic diseases like cardiovascular disease, hypertension, arteriosclerosis and smoking was also associated with higher degree of ARMD^{4,5}.

Amongst the environmental factors sunlight exposure is the single important risk factor for ARMD. The deleterious effects of sunlight on the eye have been recorded since antiquity. The spectrum of light comprises visible light, necessary for sight, as well as UV and infrared lights⁶. UVR (UV radiation) encompasses wavelengths between 100 nm and 400 nm and includes UVA (315 nm to 400 nm), UVB (280 nm to 315 nm), UVC (200 nm to 280 nm), and UV vacuum (100 nm to 200 nm). UVC and UV vacuum are blocked from reaching the earth by the ozone in the stratosphere⁶.

The evidence that UVR may cause ocular pathology shares many similarities with the evidence associating UV exposure to skin disease⁷. In both cases, years will have lapsed between exposure and clinical effects⁶. Nev-

ertheless, the concept that UVR causes skin cancer is much more widely accepted than the notion that UVR is associated with eye disease⁶. UV light is one of the best-characterized environmental carcinogens, acting both as a tumor initiator and a tumor promoter⁷. UV light acts also as a potent modulator of cell growth and differentiation and some of its actions are important in normal physiological activity, such as in melanogenesis. In excessive amounts, ultraviolet light can be toxic⁸. Indeed, UV light phototoxicity has been implicated in causing or accelerating the progression of several diseases of the eyes and its supporting structures with the three critical structures affected by UV exposure being the cornea, the lens, and the retina⁹. Short-term effects of exposure to UV-A and UV-B rays include photokeratitis, eye sensitivity, and irritation. Long-term effects include pterygia, pingueculae, cataracts, and retinal damage. Light-induced ocular damage occurs either through an inflammatory response or a photo-oxidation reaction¹⁰. Exposure to sunlight has long been suggested to play a role in the etiology of ARMD, but epidemiological studies have yielded inconsistent results¹¹. The results of a recent study support the concept of solar radiation having an effect on the development of ARMD¹². The Beaver Dam Eye Study found significant associations between extended exposure to the summer sun and the 10-year incidence of early Age-Related Maculopathy¹³. More than 2 hours of sunlight exposure are found to be associated with increased risk of ARMD¹². Short wavelengths are more damaging than the long ones as higher energy photons are more damaging to retina¹⁴. High energy visible and ultraviolet photons produce damage by photochemical mechanism. The lesion is exacerbated by oxygen, which initiates free-radical chain reaction. Melanin and cataractous lens have protective influence on retina^{14,15}.

Materials and Methods

The study is designed as a retrospective one and included all the patients visiting the Eye Polyclinic »Dr. L. Pavicevic«, Rijeka, Croatia during the years 1995, 2000, and 2005.

The data used in the present analysis included personal characteristics (sex, age), and occupation type. The data was analyzed from medical records and interviews with patients.

All the patients diagnosed with ARMD were analyzed, without considering the type or the stage of the disease. Minimal criteria for the diagnosis were small drusen or pigment abnormalities in at least one eye. The diagnosis was based on direct ophthalmoscopic and stereo biomi-

croscopic examination with non contact Volk Super Field lens (Volk Optical Inc., Mentor,OH,USA) on dilated eye.

The data analysis was performed with Statistica for Windows with the level of statistical significance set at 0.05.

Results

The study included the total of 6617 patients visited during the above mentioned years in five-year interval. Among 1586 patients visited in 1995, 12 of them (0.75%) were diagnosed with ARMD. Among the total of 2138 patients visited in 2000, 20 of them (0.93%) were diagnosed with ARMD, and finally among 2893 of the patients visited during the year 2005, 31 patients (1.07%) was affected with the disease (Table 1). Of the total number of 63 patients diagnosed with ARMD, 34 subjects were female (54%) and 29 (46%) were male (Figure 1).

TABLE 1
NUMBER AND PERCENTAGE OF NEWLY REGISTERED PATIENTS WITH ARMD IN EYE POLYCLINICS »DR. LUCIANA PAVIĆEVIĆ«

Year	Total number of visits	ARMD	%
1995.	1586	12	0.75
2000.	2138	20	0.93
2005.	2893	31	1.07

ARMD – Age related macular degeneration

In the age group under the 40 years, there was found no case of ARMD. In the age group of 41–50 years, there was 1 case (0.1%), in the age group of 51–60 years there were 5 cases (0.36%), in the group of 61–70 there were 12 patients (1.0%), in the group of 71–80 years 31 patient (5.8%) and in the eldest, 81–90 age group, there were 14 patients (7.0%) with ARMD (Table 2).

As regarding to the occupation type, the patients were divided in two major groups: the first working predominantly (more than 5 hours) indoors, and the second working predominantly (more than 5 hours) outdoors. The first group comprised 6153 (93%) patients and the second only 464 (7%) since most of our patients belong to urban population working in offices. Most of the outdoor working patients were seamen, fishermen, agricultural workers and construction workers. Among the patients in the first group, there were found 54 patients (0.8%) with ARMD, while in the second group there were found 9 patients (1.9%) with ARMD (Table 3),

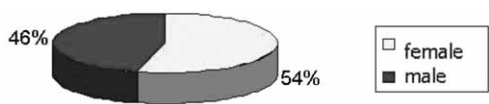


Fig. 1. Distribution of patients with Age-Related Macular Degeneration (ARMD) according to sex.

Discussion

In our group of patients, ARMD distribution according to sex is slightly more frequent in female than in male (54% vs. 46%), while the incidence is strongly age related and, as expected, significantly increased (p<0.05)

TABLE 2
NUMBER AND PERCENTAGE OF PATIENTS DIAGNOSED WITH ARMD ACCORDING TO AGE GROUPS

Age group	Total number of patients	%	ARMD	%
Less than 40	2448	37	/	/
41–50	861	13	1	0.1
51–60	1389	21	5	0.36
61–70	1192	18	12	1.0
71–80	529	8	31	5.8
Over 80	198	3	14	7.0

ARMD – Age related macular degeneration

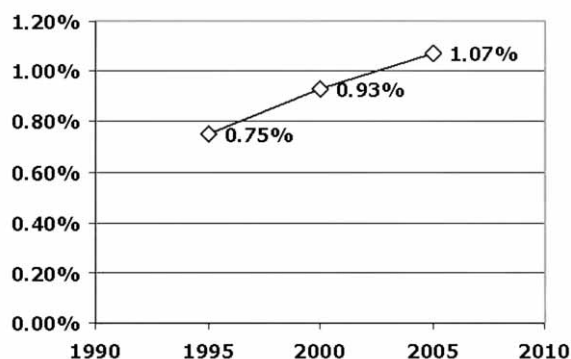


Fig. 2. Increasing trend of Age-Related Macular Degeneration (ARMD) incidence.

in each subsequent age group as compared to the previous one, with high statistical significance over the age of 80 years ($p < 0.001$)

The number of new registrations attributed to ARMD is increasing when comparing the three studied years and these findings are compatible with the hypothesis that the incidence of ARMD is increasing (Figure 2).

While some studies have found no associations between sunlight exposure and ARMD¹³, recent evidence strongly suggests such an association⁵. In our patients, the incidence of ARMD is statistically increased ($p <$

TABLE 3
NUMBER AND PERCENTAGE OF PATIENTS WITH ARMD ACCORDING TO OCCUPATION TYPE

Occupation type	Number of patients	ARMD	%
Indoor	6154	49	0.8
Outdoor	463	9	1.9

ARMD – Age related macular degeneration

0.001) among those who work or have worked predominantly outdoors, meaning that eye symptoms are prevalent in this population since they spend considerable time outdoors during daylight hours when UV rays are strongest.

Interestingly, the less education, the type of work and the lower socio economic status are associated with increased risk of ARMD¹⁶. White-collar jobs are at a lower risk of developing ARMD.

The effects of UV radiation are cumulative, and research has shown that even low amounts of sunlight can increase the risk of having eye disorders¹⁷. For the people who cannot avoid UV exposure, the simplest method of protection against UV rays is the use of sunglasses and a wide-brimmed hat.

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S. Njirić

*Eye Polyclinic »Dr. L. Pavičević«, Trg Republike Hrvatske 2, 51000 Rijeka, Croatia
e-mail: snjiric2@net.hr*

INCIDENCIJA SENILNE MAKULARNE DEGENERACIJE U ODNOSU NA DOB, SPOL I ZANIMANJE

S A Ž E T A K

Cilj ove studije je ispitati zastupljenost senilne makularne degeneracije u ovisnosti o dobi, spolu i vrsti zanimanja na uzorku pacijenata pregledanih u Poliklinici za oftalmologiju »Dr. Luciana Pavičević« u Rijeci. Provedena je retrospektivna analiza kartona svih pacijenata pregledanih u godinama 1995., 2000. te 2005., što je iznosilo ukupno 6617 pacijenata. Nešto veća učestalost pojave bolesti uočena je kod žena, što je u skladu s podacima iz literature. Što se tiče dobne distribucije, daleko je najveća učestalost, očekivano, u najstarijoj dobnoj skupini. Pri analizi povezanosti bolesti i tipa zanimanja, također je statistički značajno veća učestalost kod rada na otvorenom što se dovodi u vezu s izloženosti UV zračenju. Nadalje, uočen je i trend porasta incidencije senilne makularne degeneracije.