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# Distribution of Age-Related Macular Degeneration in Primorsko-Goranska County

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**A B S T R A C T**

*The aim of this study is to show what part of our County has the most population with age-related macular degeneration (ARMD) and how some types frequently appear in same parts. The County includes 3 different geographic areas: Gorski Kotar, Coast and Islands. ARMD is the leading cause of visual impairment and blindness in developed countries. There are two categories of ARMD: atrophic or »dry« ARMD and exudative or »wet« ARMD. Our epidemiological study group includes 60 patients (33 females, 27 males) with both types of ARMD and they mostly spent their life times in our County. Patients were examined and treated in our Clinic during 2008 and 2009. We also examined which contribution factor (age, genetics, UV-exposure, diet, iris and macular pigment) is more common and found a links with occupation, residence and habits. Our study shows that ARMD in our County is most frequent in interval of 61–80 years. Incidence of ARMD is mild increased in female (55%). Significant incidence of ARMD is connected with patients who work outdoor more than 5 hours daily (70 %). There were no significant difference between patients in different areas-Gorski Kotar andCoast ($p=0.9260$), Gorski Kotar and Islands ($p=0.8382$) and Coast and Islands ($p=0.8546$) connected with occupations. Regions Coast and Islands had more cases of ARMD than Gorski Kotar, but in Gorski Kotar patients had greater percent of »wet« type. Difference is statistically significant between areas Gorski Kotar and Islands ($\chi^2=4.675$, $p=0.0306$). Also, there were statistically significant difference in nutrition between Gorski Kotar and Islands ($\chi^2=4.17$, $p=0.0411$). Incidence of ARMD is related with less iris and macular pigment-47 patients (77%). There was an increased risk for exudative type in Tršće and Čabar in Gorski Kotar.*

***Key words:*** *age-related macular degeneration, distribution, Croatia*

## Introduction

Age-related macular degeneration (ARMD) is responsible for great deal of visual impairments in elderly (over 50 years) in developed countries[1,2]. Degenerative changes of macular area results in damage of central vision[1]. There are two categories of ARMD: »dry« or atrophic and »wet« or exudative form with chorioidal neovascularisation (CNV).In the »wet« type, bleeding and scaring destroy overlying retina. There is no way to tell if or when the atrophic type will turn into the exudative type. The LAST (Lutein Antioxidant Supplementation Trial) implicates efficacy of nutritional supplementation in the prevention of amelioration of ARMD and importance of Omega 3 to Omega 6 (animal fats) ratio. Omega 3 derived from fish protects against exudative ARMD. It is believed that ARMD, like other biological processes can be influenced by number of complex biochemical, genetic and environmental mechanisms[3]. It is estimated that environment is very significant risk factor in development of ARMD[4]. Numerous animal experiments have demonstrated that UV-radiation can cause retinal damage that closely resembles those seen of ARMD in humans[5,6,7]. Primorsko-Goranska County includes 3 geographically different areas: Gorski Kotar-mountain part, Coast and Islands.

## Matherials and Methods

Our epidemiological study group includes 60 patients (33 females, 27 males) with both types of ARMD and they mostly spent their life times in our County. Patients which had been born or mostly spent great part of life out

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of our County were excluded. Patients were examined and treated in our Clinic during 2008 and 2009.

Examination included stereobiomicroscopic examination on wided eye and fluorescein angiography. The data collected in form of an interview included: sex, age, occupation (indoor/outdoor), residence and nutritional habits (Omega 3 to Omega 6 ratio).

*Statistics*

The data analysis was performed with MedCalc for Windows v 9.3 9.0 with level of statistical significance set of 0.05.

## Results

Sixty patients from our County were included, 33 females (55%) and 27 males (45%). Median age was 70.23 (range 52–86). We found none of the patients under the age of 50 years. In the group of 51–60 years there were 7 patients (12%), in the group of 61–70 years 20 patients (33%), in the group of 71–80 years there were 29 patients (48%) and 4 patients over 80 (7%) years were noticed (Table 1).

**TABLE 1**
NUMBER AND PERCENTAGE OF PATIENTS DIAGNOSED WITH ARMD ACCORDING TO AGE GROUPS

| Age group | Number of ARMD patients | % |
|---|---|---|
| Less than 40 | 0 | 0 |
| 41–50 | 0 | 0 |
| 51–60 | **7** | 12 |
| 61–70 | 20 | 33 |
| 71–80 | 29 | 48 |
| Over 80 | 4 | 7 |

ARMD – age-related macular degeneration

Both types of ARMD were included: 45 atrophic (75%) and 15 exudative (25%) were noticed in the total number of patients. We noticed 14 patients with ARMD (23%) in Gorski Kotar, 27 patients (45%) in Coast region and 19 (32%) in Islands. There were 7 patients of 14 with exudative form (50 %) in Gorski Kotar, 6 patients of 27 (22%) in Coast region and 2 patients of 19 (10%) in Islands. There was a statistically significant difference between Gorski Kotar and Islands ($\chi^2$=4.675, df=1, p=0.0306). There was no statistically significant difference between Gorski Kotar and Coast region (p>0.05)) and between Coast and Islands (p>0.05).

We noticed 42 cases of 60 in patients working outdoor (70%) and 18 patients working indoor (30%) and that is statistically significant ($\chi^2$=17,633, p<0.0001). There was the same situation in all three regions (71% in Gorski Kotar, 67% in Coast region and 74% in Islands). Forty--seven patients had less iris and macular pigment (77%). We noticed Omega 3 to Omega 6 ratio <0 in Gorski Kotar and Omega 3 to Omega 6 ratio >0 in Coast and Islands ($\chi^2$=4.17, p=0.0411). Exudative type of ARMD was presented in 5 patients from Tršće and Čabar in Gorski Kotar.

## Discussion and Conclusion

ARMD in Primorsko-Goranska County is most frequent in the interval of 61–80 years (81%), so ARMD is strongly age related. Incidence of ARMD is mild increased in female (55%). Coast and Islands had more cases of ARMD than Gorski Kotar, but in Gorski Kotar patients had greater percent of exudative form. There was a statistically significant difference between incidence of exudative form in Gorski Kotar and Islands (p=0.0306). The question is, which factor is responsible for large percent of exudative form in Gorski Kotar: genes, nutrition (Omega 3 to Omega 6 ratio) or something else. ARMD is related to less iris and macular pigment, which is related to less UV-protection.

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## DISTRIBUCIJA SENILNE MAKULARNE DEGENERACIJE U PRIMORSKO-GORANSKOJ ŽUPANIJI


### S A Ž E T A K

Svrha studije bila je prikazati koji dijelovi Primorsko-goranske županije imaju najviše populacije sa senilnom makularnom degeneracijom (SMD), te koji se oblik u pojedinim dijelovima češće pojavljuje. Županija uključuje 3 zemljopisno različita područja: Gorski Kotar, Primorje i otoke. SMD je vodeći uzrok poremećaja vida i sljepoće u razvijenim zemljama. Dvije su vrste SMD: atrofična i eksudativna. Naša je epidemiološka studija uključila 60 pacijenata (33 žene i 27 muškaraca) s oba tipa SMD koji su većinu života proveli u našoj Županiji. Kontrolirani su na našoj Klinici za oftalmologiju tijekom 2008. i 2009. godine. Također smo ispitali koji faktori rizika (godine, genetika, izloženost UV-zračenju, prehrana, količina pigmenta šarenice i mrežnice) su najučestaliji, te tražili vezu s prebivalištem, zanimanjem i životnim navikama. Studija pokazuje da je SMD najučestalija u dobnoj skupini od 61–80 godina, te je jako vezana za dob. Mali porast incidencije primijećen je kod žena (55%). Značajno je češća kod ljudi koji više od 5 sati dnevno rade na otvorenom (70%) pri čemu nema značajne razlike između različitih dijelova Županije. U Primorju i na otocima je veći broj pacijenata sa SMD, ali je u Gorskom Kotaru veći postotak eksudativnog tipa (50%). Razlika je statistički značajna između Gorskog Kotara i otoka ($p=0,0306$). Također je prisutna razlika prehrambenih navika između Gorskog Kotara i otoka ($p=0,0411$). Veća je učestalost SMD kod osoba sa manje šareničnog i mrežničnog pigmenta (77%). U području Tršća i Čabra u Gorskom Kotaru zabilježen je relativno veći broj pacijenata (5) sa eksudativnim oblikom SMD.