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Epidemiology and Quality of Life of Patients with Age-Related Macular Degeneration

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A B S T R A C T

It is well known that age-related macular degeneration (AMD), besides glaucoma and diabetic retinopathy, represents a major cause of low vision and blindness throughout the world. In this study, specific causal factors of AMD are analyzed, emphasizing the causal role and effects of sunlight, no matter which part of its spectrum, in a longer exposition through life. The accent is also put on the influence of lifestyle as well as vitamin and antioxidants supplementation in development or prevention of AMD.

Key words: *age-related macular degeneration, dry form, wet form, epidemiology, quality of life, Croatia*

Introduction

Age-related macular degeneration (AMD) is a major public health issue. Prevalence of AMD among persons older than 65 years is 8% and increases with age. In this condition, the central portion of the retina (the macula) deteriorates, and central vision can be lost. Central vision is the »high-definition« vision that is required for reading, driving, watching television, recognizing people and performing many other activities of daily of living. Peripheral vision generally remains intact, although recent references concluded that is peripheral retina attacked too[1,2] and elderly persons with age-related macular degeneration rarely require white canes or guide dogs. However, they have been found to have lower quality-of life scores than persons for example with chronic obstructive pulmonary disease or chronic cardiovascular diseases. With the continued growth of the elderly population in Europe, family physicians are frequently asked about vision and macular degeneration. As life expectancy continues to increase, age-related macular degeneration will become an increasingly important problem. There are two forms of the disease: atrophic, which is more prevalent (80-90% of AMD cases) and exudative, which is characterized by choroidal neovascularization (CNV; 10-20% of AMD cases). Elderly persons are concerned about losing independence and mobility. Studies have shown that loss of central visual acuity leads to a reduction of daily activities and mobility in the elderly. Loss of central visual acuity also increases the risks of falls, fractures and depression in this population.

Epidemiology

Age-related macular degeneration has been examined in many population-based epidemiologic studies (Table 1). Few studies have evaluated the incidence of age-related macular degeneration. In the Beaver Dam Eye Study[3] pure geographic atrophy (late age-related macular degeneration) was 16.6 times more likely to develop in persons 75 years of age than in persons who were younger at baseline. The incidence of exudative changes increased from zero percent in persons less than 55 years of age to 1.8 % in persons 75 years or older at baseline.

Pathophysiology

The pathophysiology of age-related macular degeneration is still under investigation[4]. The location of the disease also remains a subject of debate. Some investigators believe that the disease resides in the neural retina (rods and cones), whereas others are studying the retinal pigment epithelium (the layer of cells that provide nutrition to the rods and cones).

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TABLE 1
EPIDEMIOLOGICAL STUDIES OF AGE-RELATED MACULAR DEGENERATION (DRY AND EXUDATIVE FORM) – DISTRIBUTION BY AGE GROUPS (%)

Study/age	55–64	65–74	75–84	85+
Beaver Dam (USA) 4756 patients	16.7 (0.5)*	25.3 (1.4)*	41.7 (6.9)*	48.7 (13,5)*
Rotterdam (Netherlands) 6411 patients	2.5 (0.1)*	9.9 (0.7)*	16.7 (3.2)*	29.8 (11.6)*
Blue Mountains (Australia) 3585 patients	2.8 (0.2)*	9.2 (0.7)*	20.9 (5.4)*	46.6 (18.5)*

* percentages for exudative form are given in parentheses.

Materials and Methods

To study the natural history of dry type of age-related macular degeneration (AMD) and search for a sensitive method for detecting the development of the disease, the fundus fluorescein angiography, visual acuity, OCT, electroretinogram and FM 100-hue test were used to examine 75 eyes. These examinations were taken at least twice during the follow-up periods. The average age was 63.2 years (50-80 years). The average follow-up was 29.8 months with a range of 3-74 months.

Results

It was shown that there were no statistically significant differences in the macular lesions, OCT and electroretinogram between the initial examinations and after follow-up ($p>0.05$). 91.14% of the eyes maintained good visual acuity during the follow-up. Subretinal neovascularization developed only in one of the eyes. The total error score of FM 100-hue test had a statistically significant difference between the initial test and the test taken two years afterwards ($p<0.01$). It was suggested that most of the dry type of AMD had a favorable prognosis and that color visual test was a sensitive method for monitoring the development of dry type of AMD.

Discussion and Conclusion

Risk factors

Contributing factors for development of macular degeneration include:

- Age. In Europe, macular degeneration is the leading cause of severe vision loss in people age 60 and older,but is possible in younger[1,2].
- Family history of macular degeneration. If someone in your family had macular degeneration, your odds of developing macular degeneration are higher. In recent years, researchers have identified some of the genes associated with macular degeneration. In the future, genetic screening tests may be helpful for assessing early risk of the disease.
- Race. Macular degeneration is more common in whites than it is in other groups, especially after the age of 75.
- Sex. Women are more likely than men to develop macular degeneration, and because they tend to live longer, women are more likely to experience the effects of severe vision loss from the disease.
- Cigarette smoking. Exposure to cigarette smoke doubles your risk of macular degeneration. Cigarette smoking is the single most preventable cause of macular degeneration.
- Obesity. Being severely overweight increases the chance that early or intermediate macular degeneration will progress to the more severe form of the disease.
- Light-colored eyes. People with light-colored eyes appear to be at greater risk than do those with darker eyes.
- Exposure to sunlight. Although the retina is more sensitive to shorter wavelengths of light, including ultraviolet (UV) light, only a small percentage of ultraviolet light actually reaches the retina. Most ultraviolet light is filtered by the transparent outer surface of your eye (cornea) and the natural crystalline lens in your eye. Some experts believe that long-term exposure to ultraviolet light may increase your risk of developing macular degeneration, which was especially proved by Vojniković B. in recent clinical examination[1,2].
- Low levels of nutrients. This includes low blood levels of minerals, such as zinc, and of antioxidant vitamins, such as A, C and E. Antioxidants may protect your cells from oxygen damage (oxidation), which may partially be responsible for the effects of aging and for the development of certain diseases such as macular degeneration.
- Cardiovascular diseases. These include high blood pressure, stroke, heart attack and coronary artery disease with chest pain (angina).

Signs and Sympthoms

AMD leads to a blind spot in the center of your visual field[5-8]. Other signs and symptoms include:

- The need for increasingly bright light when reading or doing close work,
- Printed words that appear distorted or increasingly blurred,
- Colors that seem washed out and dull,
- A gradual haziness of your overall vision,
- Difficulty seeing when moving from a bright room to a dimly lit room.

If AMD develops in one eye and not the other, it may not be as noticeable, as your good eye compensates for the weak one. It's when AMD develops in both eyes that your vision is dramatically affected.

Diagnostic tests

Diagnostic tests for macular degeneration may include:

- Eye examination. The presence of drusen and mottled pigmentation in the macula as a sign of incipient AMD. The eye examination includes a simple test of your central vision and may include testing with an Amsler grid. Regular screening examinations can detect early signs of macular degeneration before the disease leads to vision loss.
- Angiography and fundus photography. Fluorescein angiography can be used to confirm the diagnosis and to help determine whether a patient has the atrophic or exudative form of the disease. In most instances, this modality is employed to determine whether an eye with exudative disease is eligible for laser treatment. Instead of fluorescein, a dye called indocyanine green is, used. This test provides information that complements the findings obtained through fluorescein angiography.
- Optical coherence tomography. This noninvasive imaging test helps identify and display areas of retinal thickening or thinning. Such changes are associated with macular degeneration. This test can also reveal the presence of abnormal fluid in and under the retina or the RPE. It's often used to help monitor the response of the retina to macular degeneration treatments.
- Visual field analyses: peripheral and meridian thresholds examination is obligatory in diagnostic and developing of AMD.

Hallucinations

Additionally, some people with macular degeneration may experience visual hallucinations as their vision loss becomes more severe. These hallucinations may include unusual patterns, geometric figures, animals or even faces. In fact, they're so common that there's a name for this phenomenon — Charles Bonnet syndrome.

Age-related macular degeneration is a clinical diagnosis that is usually based on the presence of visual disturbances and characteristic findings on dilated examination of the macula. The disease is usually classified as early or late. Late disease can be divided into atrophic (dry) and exudative (wet) forms. In early disease, the macula shows yellowish colored subretinal deposits called »drusen« and/or increased pigment. Drusen are thought to be byproducts of retinal pigment epithelium dysfunction[9]. In most eyes with early disease, visual acuity remains stable for many years, and loss of vision is usually gradual. Late disease (atrophic and exudative) can lead to significant loss of vision. In atrophic disease, the macula usually shows areas of depigmentation. In the exudative form, fluid can accumulate underneath the retina, as pigment epithelial detachments or subretinal neovascularization, and loss of vision is usually sudden.

The Amsler's grid is an effective tool for detecting the progression of age-related macular degeneration. The patient is given a copy of the grid and is instructed to focus one eye on the center dot in the grid from a distance of 35 cm (12 in) with the other eye covered; the procedure is then repeated for evaluation of the other eye. The patient performs this test daily at home and is instructed to call the physician if line distortions or scotomas are detected and persist for one or two days.

There's no treatment available to reverse dry macular degeneration. Dry macular degeneration usually progresses slowly, and many people with the condition are able to live relatively normal, productive lives, especially if only one eye is affected. Dry macular degeneration can, however, develop into the more rapidly progressive wet type of macular degeneration at any time.

Laser photocoagulation is the mainstay of treatment for CNV, although less than 30% of persons with CNV can benefit from it[3]. Photodynamic therapy (PDT)[10], a new treatment for CNV, reduces the risk of vision loss in forms with predominantly visible lesions. Several other new procedures (antiVGF drugs) are also under development. Rehabilitation and low-vision aids are useful palliative interventions when there is a residual visual acuity.

Nutrition

Numerous observational studies have suggested that nutrition plays an important role in age-related macular degeneration[11-14]. In one observational study, 30 patients who ate a diet high in fruits and vegetables, especially green leafy vegetables such as spinach and kale, were shown to have a lower risk of exudative disease. Although observational studies have supported the value of eating foods that are high in antioxidants, clinical trials have provided no evidence for antioxidant supplementation in pill form. Furthermore, results from clinical trials of beta-carotene prophylaxis in Finnish smokers asbestos workers suggested that caution should be exercised in taking pharmacologic dosages of any antioxidant. In these trials, the risks of lung cancer and death were greater in patients taking betacarotene than in those who received placebo. Researchers now believe that supplementing carotenoids in pill form maybe potentially harmful. Increasing evidence indicates that supplementation with one carotenoid may lead to reduced serum levels of other carotenoids. Because there are more than 50 naturally occurring carotenoids, family physicians need to be confident about choosing the »right« nutrient for supplementation: supplementing with the »wrong« carotenoid may lead to lower levels of a needed nutrient. Taking a high-dose formulation of antioxidants and zinc may reduce progression of dry macular degeneration to advanced macular degeneration. The National Eye Institute-sponsored Age-Related Eye Disease Study (AREDS) showed that a daily supplement of 500 milligrams (mg) of

vitamin C, 400 international units (IU) of vitamin E, 15 mg of beta carotene (often as vitamin A — up to 25,000 IU), 80 mg of zinc (as zinc oxide) and 2 mg of copper (as cupric oxide) reduced the risk of progressing to moderate or severe vision loss by up to 25%.

Psychosocial Impact of Age-Related Macular Degeneration

With increasing loss of central vision, patients lose their ability to read and to conduct certain activities of daily living. Working elderly patients may worry about losing their income or their ability to achieve life goals[15–17]. Patients may also find that their self-image changes from that of a responsible, active person to that of a person who must depend on others for help. With changes in their ability to function independently, elderly patients may have additional expenses for help with daily activities and travel. Along with the ophthalmologist, the family physician will need to monitor the mental health of the patient with age-related macular degeneration. Partially sighted persons may have difficulty adjusting to their decreased vision and may experience higher levels of anxiety and loneliness than those who are totally blind.

Elderly persons with macular degeneration will require help with simple tasks such as cooking (e.g. reading recipes and finding ingredients), paying bills and taking medications. As they become unable to drive, they will need help to make to medical appointments and visits with friends and family, contacts that are crucial in preventing isolation and subsequent depression.

Vision Rehabilitation

Patients should be encouraged to consider ways to maximize their remaining vision so that they can master some daily activities. Low-vision professionals can be of great service in assessing residual vision, recommending optical aids and devices, and providing training in the optimal use of these aids. Social workers should be contacted to help patients and families find and use community, state and federal resources for the partially sighted. Support groups can provide ongoing help and a forum for sharing feelings, frustrations and solutions.

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EPIDEMIOLOGIJA I KVALITETA ŽIVOTA PACIJENATA S MAKULARNOM DEGENERACIJOM

SAŽETAK

Poznato je da makularna degeneracija, pored glaukoma i dijabetičke retinopatije, danas predstavlja vodeći uzrok slabog vida i „sljepoće« u čitavom svijetu. Analiziraju se pojedini uzročni faktori makularne degeneracije, ali se pored uobičajeno navedenih faktora također daje naglasak i na utjecaj sunčeva svijetla, bez obzira na područje spektra, kada je u pitanju duže vrijeme eksponiranja kroz život. Naglašava se utjecaj stila, načina života, kao i važnost suplementacije s vitaminima i antioksidansima u razvoju makularne degeneracije.