Epidemiological Study of Sun Exposure and Visual Field Damage in Children in Primorsko-Goranska County – the Risk Factors of Earlier Development of Macular Degeneration

Vojniković, Božo; Synek, Svatopluk; Mićović, Vladimir; Težar, Mirna; Linšak, Željko

Coll. Antropol. **34** (2010) Suppl. 2: 57–59
Original scientific paper

Epidemiological Study of Sun Exposure and Visual Field Damage in Children in Primorsko-Goranska County – the Risk Factors of Earlier Development of Macular Degeneration

Božo Vojniković[1], Svatopluk Synek[2], Vladimir Mićović[3], Mirna Težar[3] and Željko Linšak[3]

[1] Daily Eye Clinic »Dr. Božo Vojniković«, Rijeka, Croatia
[2] Department of Ophthalmology and Optometry, Saint Anne Hospital, Medical Faculty Masaryk University, Brno, Czech Republic
[3] Teaching Institute of Public Health of Primorsko-Goranska County, Rijeka, Croatia

A B S T R A C T

The aim of this study was to examine the possible harmful effects of solar exposure on visual field damage in children living in Primorko-Goranska Country. Our previous work has shown noxious influence on visual field in children with anamnesis long term exposure to sunlight. This is an extended study, including children in Novi Vinodolski and Gorski kotar. We measured possible defect in isopteric visual field and macular-meridian thresholds. In the area of island of Rab these changes were the biggest, subsequently is Novi Vinodolski and at least Gorski kotar with the smallest range of eye complicates according to exposure to sunlight. These damages correlate with the areas of great solar emission. Damages in periphery isopters of visual field have shown the characteristics of periphery defect invagination, while increased macular thresholds in complete visual field was from 5 to 15 Asb. We can conclude that there is direct connection between increased sunlight and long-term exposure to sunlight on one side, and on the other side, damages of retinal perception. Increased sun exposure may represent very important factors in early occurrence and develop of Age-Related Macular Degeneration (AMD). It is recommended the children protection in summer months, as well as taking derivates of vitamin A and antioxidants. Nowadays, AMD is one of the most important causes of damaged visual field, pretend to be national problem if we don't use the adequate prevention. World Health Organization has to begin with prevention of AMD, including these risk factors.

***Key words**: sunlight exposure, children, visual field damage*

Introduction

In recent epidemiological clinical study, Vojniković et al.[1,2] have shown the influence of sun exposure on periphery isopters of visual field in children between 8 and 15 years old, emphasize that 15% of them has damaged visual field and fundus, accompanying with increased macular thresholds. These findings were noticed in children who stay a long time on sunlight, without any protection (eye glasses or cap). Many different causes and risk factors include: smoking, obesity, and race (whites are much more likely to lose vision from AMD than African Americans), family history, gender (women appear to be at greater risk than man). Sunlight and specially UV A and B, than blue light, are present as one of significant risk factors in developing of Age-related Macular degeneration (AMD). Long-term examination on the Adriatic Sea in Croatia has shown that the influence of sunlight represents one of the most important risk factors in early development of AMD.

Patients and Methods

Our earlier examination about influences of sunlight on visual field and macular tresholds on the island of Rab

Received for publication January 10, 2010

(North Adriatic Sea) has shown increased macular thresholds in complete visual field in those children who had been for a long time on sunlight without any protection. The aim of our new investigation was to include the children from the areas of Novi Vinodolski and Gorski kotar in this study. The age of the children was the same, as well as the criteria of the examination, including eye ultrasound, visual field analyses-periphery isopteric and macular tresholds, OCT, and anamnesis.

Results and Discussion

The percentages of visual field defects by region are presented in Table 1. Characteristic defect in isopteric visual field, with invagination of peripheral and central field, is shown in Figure 1. Meridian thresholds, of the same patient, in macular region are higher approximately for 5 to 15 asb (Figure 2).

TABLE 1
THE PERCENTAGES OF VISUAL FIELD DEFECTS BY REGION

Region	Visual field defect	
	Isopteric	Macular Thresholds
Island Rab	7%	15%
Novi Vinodolski	3%	11%
Gorski Kotar	2%	9%

We have shown that the higher percentages of damaged visual field and fundus are present mostly on the island of Rab, a little bit less in the area of Novi Vinodolski and least of the visual field damage findings have been noticed in Gorski kotar. Simultaneously, we measured sun irradiation and the number of sun days in these areas and the same distribution is found in this area of our interest: most summer days and sunlight was in the island of Rab and minimum was in Gorski kotar. All children with damaged visual field were without any protection on sunlight during summertime. According to these findings, UV-A irradiation was also increased and it is well known that it has harmful effects in the situation with subliminal dose of UV-B. There are also phototoxic effects of visible solar spectrum[3] when exceeding in high

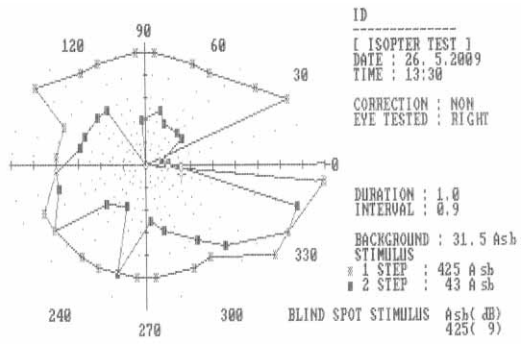

Fig. 1. Characteristic defect in isopteric visual field, with invagination of peripheral and central field.

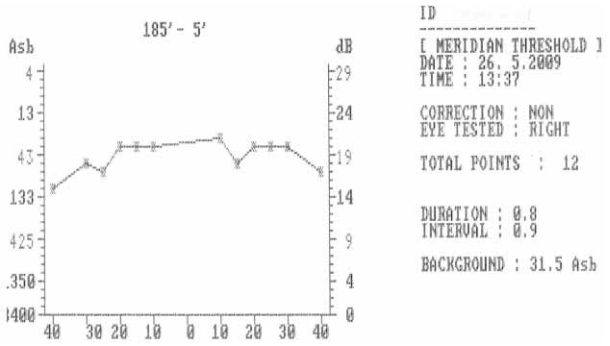

Fig. 2. Meridian thresholds in macular region are higher approximately for 5 to 15 asb.

doses. In July and August we have measured even 100–150 Klux, between 11 and 15 o'clock. In our previous work[1–4] we found that the adult population in the island of Rab has a decreased visual field in the area of macula and also in peripheral field, including the initial optic nerve atrophy. According to these findings, we can conclude that an increased solar exposure, with genetic predisposition, represents the most frequent risk factors in early occurrence and developing of AMD. The children should be protected in the areas with greater insolation, using protection clothes and medical filters for eyes. The authors also recommend the supplementation with vitamin A precursors and antioxidants.

REFERENCES

1. VOJNIKOVIĆ B, MIĆOVIĆ V, ČOKLO M, VOJNIKOVIĆ D, Coll Antropoll, 33 (2009) 747. — 2. VOJNIKOVIĆ B, NJIRIĆ S, ČOKLO M, ŠPANJOL J, Coll Antropoll, 31 (2007) 43. — 3. VOJNIKOVIĆ B, Einsteinov zakon elementarne fotokemijske reakcije (Veleučilište Velika Gorica, Zagreb, 2005). — 4. KOVAČEVIĆ D, MIŠLJENOVIĆ T, NJIRIĆ S, MIKULIČIĆ M, VOJNIKOVIĆ B, Coll Antropol, 32 (2008) 9.

B. Vojniković

Daily Eye Clinic »Dr. Božo Vojniković«, A. Barca 3b, 51000 Rijeka, Croatia
e-mail: decv@decv.com

EPIDEMIOLOŠKA STUDIJA O UTJECAJU SUNČEVA SVIJETLA U DJEČJOJ POPULACIJI NA PODRUČJU PRIMORSKO-GORANSKE REGIJE, KAO MOGUĆI RIZIČNI ČIMBENIK U RANIJEM NASTAJANJU I RAZVOJU MAKULARNE DEGENERACIJE

S A Ž E T A K

Autori su ispitivali moguće štetan utjecaj pojačanog sunčeva zračenja na oštećenje vida u djece na području Primorsko-Goranske regije. U ranijoj studiji ustanovio se bitan štetan utjecaj sunčeva zračebja kod djece od 8–15 godina na otoku Rabu, kada duže borave na suncu i bez zaštite (šilt kapa i sunčane naočale). Ovo je proširena epidemiološka studija, tako da su obuhvaćena i djeca u Novom Vinodolskom i Gorskom Kotaru. Pored uobičajenog rutinskog pregleda, učinjeno je vidno polje i to izopteričko i meridian tresholds, tj prag podražaja u određenom meridijanu, uglavnom makularnog i perimakularnog područja. Na otoku Rabu su defekti u vidnom polju najizraženiji, nešto manje u Novom Vinodolskom i najmanje u Gorskom Kotaru. Ranije izvršena mjerenja jačine i spektra sunčeva zračenja, pokazuju da su učestalost promjena u vidnom polju u korelaciji sa mjestom gdje je jača insolacija. Defekti u izopteričkom vidnom polju pokazuju karakteristike invaginacije periferije, dok je makularno područje sa povišenim pragom podražaja, od 5 do 15 Asb. Zaključuje se da postoji direktna korelacija između pojačanog sunčeva svjetla i dužine boravka na suncu, sa oštećenjima retinalne percepcije. S obzirom na ranije opsežne studije, zaključuje se da je moguće da pojačana sunčeva svijetlost igra važnu ulogu u ranijem nastanku i razvoju makularne degeneracije (AMD). Stoga se preporuča zaštiti djecu u vrijeme mjeseca sa pojačanom insolacijom, a po potrebi i suplementacija s derivatima A vitamina i antioksidansima. Danas je pojava AMD u svijetu vodeći uzrok slabog vida, a kroz samo jedno stoljeće postati će nacionalni problem defekta vida, ukoliko se na vrijeme ne poduzmu preventibne mjere. Danas je to nacionalni problem svake države, dok Svjetska zdravstvena organizacija mora započeti svoju misiju sa svjetskom zaštitom vida u prevenciji razvoja AMD.