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ORIGINAL ARTICLE

Plasma malondialdehyde levels in age related macular degeneration

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ABSTRACT

Age-related macular degeneration (AMD) is the leading cause of blindness in older adults. Oxidative damage is likely to occur in an environment of extremely high oxygen tension, such as centre of macula, which has continuous and lifelong exposure to radiation. The evaluation of alteration in plasma malondialdehyde (MDA) levels in AMD has been made. Significantly higher MDA levels were detected in patients with AMD when compared with controls ($p<0.001$).The result supports the role of oxidative damage in the pathogenesis of age related macular degeneration.

Key Words: Oxidative stress,Age related macular degeneration,MDA

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Age –related macular degeneration (AMD) is the leading cause of blindness among older adults [1] .The pathogenesis of AMD is still unclear [2],[3] .The retina ,which is exposed to both sunlight and very high levels of oxygen ,is exceptionally rich in polyunsaturated fatty acids, which makes it a favorable environment for generation of reactive oxygen species and is particularly susceptible to oxidative damage [4].During ageing, the balance between the generation of reactive oxygen species(ROS) and ROS clearance can be disturbed resulting in damage to outer segments of photoreceptors and lead to progressive deterioration of the retinal pigment epithelium [5].Within the eye these damaging reactions have been proposed to be involved in the pathogenesis of AMD [6] . Lipid peroxidation(LP) induced by ROS is a parameter of cell membrane damage [7]. Malondialdehyde(MDA) is a marker of lipid peroxidation, that can be readily detected by thiobarbituric acid color reaction, quantified by colorimetry [8]. We, therefore, attempted to determine alteration in the levels of malondialdehyde (MDA) as an index of lipid peroxidation in patients with AMD.

Material and method

Fifty patients with AMD, atleast in one eye, were selected for the study. The same number of age and sex matched individuals without AMD served as controls. After obtaining detailed ophthalmological examination including slit lamp bi-microscopy of anterior segment, applanation-tonometry,funduscopic examination and fluorescence angiography were performed in all the subjects. Exclusion criteria included presence of visually compromising eye disease such as significant cataract, glaucoma, and any other retinal disease. About 5 ml of venous blood was collected from the anti-cubital vein under aseptic conditions in a disposable syringe containing 0.1 ml of 5000 units/ml heparin. Samples were processed and analyzed for MDA levels [8] and expressed in nmol/ml. Results were presented as mean ± SD. Student's t-test was used to define statistical significance.

Results

The mean age was 68 years in AMD group and 65.9 years in control group. Table 1 shows the MDA levels in cases and control group. The mean plasma MDA levels in cases of AMD were 6.31 nmol/ml. Standard deviation was 1.02 nmol/ml. Control group mean plasma MDA level was 3.30 nmol/ml with SD 0.51 nmol/ml. Significantly increased level of MDA was observed in AMD group compared to the control group.

Discussion

A series of special conditions imposed upon photoreceptors puts them in high risk pro-oxidant environment. Oxidative damage in the retina has been hypothesized as a key process involved in the development of early age related macular degeneration [9].The result of the present study showing increased lipid peroxidation, are consistent with those of previous studies [10],[11]. High polyunsaturated fatty acid content of photoreceptor membrane expose the retina to increased risk of lipid peroxidation by unopposed action of free radicals [9]. The plasma level of MDA, a secondary product of lipid peroxidation, is a reliable and commonly used bio-marker of the overall lipid peroxidation .Regarding the increased MDA level in AMD patients, one possible explanation might be, increased free radical production with defective anti-oxidant defence mechanisms in AMD, resulting in retinal pigment epithelium degeneration in this disease. The present study has highlighted the role of oxidative stress in the pathogenesis of AMD.

(Table/Fig 1) Plasma MDA activity in age related macular degeneration.

Group	Number of patients	MDA nmol/ml (mean±SD)
AMD cases	50	6.31±1.02*
Control	50	3.30±0.51

Significance in comparison to control, p<0.001*

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