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Serum vitamin A, E & C in cortical & nuclear cataract patients.

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ABSTRACT… Objective: To assess the status of antioxidant vitamins (A, E & C) in cortical and nuclear cataracts patients. **Study Design:** Prospective Comparative study. **Setting:** Al-Ibrahim Eye Hospital and Biochemistry Department of Al-Tibri Medical College, Karachi. **Period:** Sept 2016 to Aug 2017. **Material & Methods:** A non-probability random sampling technique was used on 80 pre-diagnosed cataracts (cortical and nuclear) patients, and 40 control subjects were selected for the study. The demographic data were collected, and the blood sample of control and cataract patients were analyzed for random blood sugar and antioxidant vitamins (A, E, and C) by Elisa Method. **Results:** The Blood level of vitamins E was low in cataract patients as compared to control subjects. **Conclusions:** The blood level of vitamin E is less in cortical and nuclear cataract patients as compared to control but had shown no significant difference between cortical and nuclear cataract patients.

Key word: Cataract Patients, Vitamin A, Vitamin E, Vitamin C.

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INTRODUCTION

Cataract is a complete or partial pacification of eye lens, which impairs vision. The age related cataract is the main cause of blindness.[1] The incidence of cataract is higher in developing countries including India and china.[2,3] A national survey on blindness showed, the prevalence of blindness in Pakistan was 2.7 percent, and about 66 percent were due to cataract.[4] Most common causes of cataract include ageing, diabetes, genetic factors, ultra violet radiation, oxidative stress and trauma.[5] In many cases the mediators underlying the pathogenesis are free radicals. Reactive oxygen species (ROS), which basically include molecules like superoxide anion ($\bar{O}_2$), hydrogen peroxide (H_2O_2) and hydroxyl radicals (OH^-). The free radicals damage the lens by causing membrane lipid per oxidation, protein inactivation, protein aggregation and subsequent lens opacification.[6]

In biological systems, cells endogenously possess both enzymatic and non-enzymatic antioxidant, whose balance with free radical production, determines the status of oxidative stress of a cell.[7] The non-enzymatic antioxidants include ascorbate (Vitamin C), carotene (Vitamin A), α-tocopherol (Vitamin E), glutathione and pyruvate.[8] Vitamin C and vitamin E provides protection against oxidative stress.[9] Vitamin E prevents lipid peroxidation by transferring its own hydrogen producing α-tocopherol radical which can be reduced by ascorbic acid to regenerate vitamins E.[10] Vitamin A and E, help protection of ocular tissue damage caused by free radicals and unstable oxygen. In literature many observational studies or randomized controlled trials have been performed to investigate the role of antioxidant supplement or dietary intake of vitamins in the prevention of age – related cataract.[11-13]

In Pakistan cataract evolve earlier in life and very few studies has been carried out. So it is aimed in the present study to estimate the status of antioxidant vitamins in nuclear and cortical cataract patients.

MATERIAL & METHODS

It is a cross sectional, comparative study. A total of 80 cataract patients were selected from the OPD of Al-Ibrahim Eye Hospital Karachi. Forty control subjects having no eye disease were selected from the same community. Duration of the study was from September 2016 to September 2017. The male and female subjects having no known morbidity except cataract were included while the patients having congenital cataract, below 40 years of age and suffering from any diseases were excluded from the study. The ethical approval of the study was taken from the research committee of the Isra University, Hyderabad IERC/ATMC/18/010. The consent form was filled by the patients and control subjects for the approval of their voluntary participation The Pre diagnosed patients were grouped according to the morphology of cataract that is cortical, and nuclear types of cataract. The demographic measurements were taken from the patients and the blood pressure was noted before surgery. 10ml blood sample was also taken out from each patient and serum was preserved at -70^{O} for analysis of vitamins A, and E. Random blood sugar was estimated by glucose oxidase method. The serum vitamins A and E were analyzed by Elisa kit (supplied by Glory science Co. Ltd catalog: 11345). Vitamin C was analyzer by kit (supplied by DRG international USA REF: ENZ4888). For statistical l analysis one way anova was applied by SPSS version 20.

RESULT

Global burden of diabetes is increasing which may be attributed to increasing world population, increased life expectancy, more of population living in urban areas and variation in dietary habits leading to obesity and decreased physical inactivity. The present study included nuclear, cortical cataract patients and healthy control subjects. The mean age of the three groups of subjects in the current study were 53.53 ± 9.76 years in controls, 58.00 ± 10.22 years in nuclear cataract patients and 59.57* ± 6.85 years in cortical cataract patients. (Table–I). The mean weight of patients in the present study were 21.56 ± 5.2, 23.54 ± 4.25 and 25.78* ± 5.15 kgs in control, nuclear and cortical cataract patients respectively. (Table –I). The human eye is subjected to oxidative stress due to high metabolic activities, sunlight and oxygen tension. The environment and pathological conditions generate reactive oxygen species (ROS) which produce oxidative damage to the eye. Oxidative stress is the main contributor for cataract formation. In the present study the antioxidant vitamins A, C and E were investigated. Vitamin E level in blood were significantly decreased in cortical and nuclear cataract patients with diabetes as compared to control subject. Vitamin E is an important chain breaking antioxidant and can directly scavange reactive oxygen species. It is the major lipid soluble vitamin which is found in cellular membranes which protects against lipid peroxidantion. In Table-II the variation of blood sugar and vitamins A, E and C are shown. Vitamin E levels are low in nuclear and cortical cataract patients as compared to control subjects.

	Control (40)	Nuclear (40)	Cortical (40)
Age (Year)	53.53 ± 9.76	58.00 ± 10.22	59.57* ± 6.85
BMI (Kg / m^2)	21.56 ± 5.2	23.54 ± 4.25	25.78* ± 5.15
Systolic BP (mmHg)	122.10 ± 11.53	141.40* ± 27.16	126.63 ± 14.72
Diastolic BP (mmHg)	77.50 ± 8.97	84.93* ± 12.84	79.33 ± 07.39

Table-I. Age, BMI, and Blood Pressure of control, nuclear and cortical cataract in diabetic patients. *P< 0.05 as compared to control

	Control (40)	Nuclear (40)	Cortical (40)
RBS (mg/dl)	122.83 ± 9.53	137.23 ± 64.55	125.93 ± 57.11
Vitamin A (μ M/L)	1.40 ± 0.49	0.915 ± 0.47	3.53 ± 11.39
Vitamin C (μ M/L)	40.90 ± 9.98	27.03 ± 15.44	40.08 ± 61.12
Vitamin E (μ M/L)	15.00 ± 3.94	6.33* ± 2.84	8.77* ± 10.27

Table-II. Random Blood Sugar, Serum Vitamin A, C and E in Control, Nuclear and Cortical Cataract in diabetic patients. (*P< 0.05 as compared to control)

DISCUSSION

The nutritional Components can decrease the risk of cataract[14] an inverse association between cataract progression and nutritional exposure is of great scientific interest. An inverse association between total antioxidant capacity and the risk of age related cataract has been reported earlier.[15]

Oxidative stress may deplete the endogenous oxidative defense system in the nucleus of the lens, which might be involved in the reduction of antioxidant, entering in this area, causes to unable to repair the oxidative damage of the eye.[16] The highly toxic reactive oxygen species that are formed by photo chemical reactions of oxygen in the presence of electron donors are converted to less toxic hydrogen peroxide via ascorbic acid mediated reactions.[17] Previous studies also had shown a strong relationship of vitamin C with nuclear cataract.[18]

A Meta-analysis proposed that vitamin E might have a beneficial result on the prevention of age related cataract particularly nuclear cataract; this might be due to the fact that different risk factors and different pathophysiological process are involved.[19] Vitamin E present in lens fibers and membrane, inhibit age related cataract formation. A number of literature review showed a reciprocal suggestion between α-tocopherol and the chance of senile cataract formation.[20] In the present study serum vitamin E was less in nuclear and cortical cataract patients as compared to control subject's vitamin E is associated with decreased prevalence of cortical cataract.[21] Nuclear cataract may be linked with vitamin E inversely.[22,23] Antioxidant vitamin E inhibits lipid peroxidation and also stabilizes cell membrane. Vitamin E enhances glutathione recycling.[23]

In a study in south India, the frequency of Posterior sub capsular (PSC) opacities was greater than in western population and also had found no significant difference for vitamin A. in different types of cataract.[24] Blood levels of antioxidants might be influenced by lifestyle, environmental factors and individual variance in the absorption. The blood levels of antioxidants may have threshold effects on the nuclear and cortical cataract rather than a dose response effects. Vitamin E concentration has been found reduced with respect to healthy control.[25] Another study reported low plasma vitamin E concentration as compared to control. This depletion may be due to oxidative stress and inflammation or may be due to excessive loss of vitamin E due to oxidation by O- 2.[26] Present study reveals low levels of vitamin E in both cortical and nuclear cataract when compared with healthy individuals.

CONCLUSION

The blood level antioxidant vitamin had shown statically significant difference among different type of cataract. The serum vitamin E level was decreased in nuclear and cortical cataract patients as compared to control subject.

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