



AN OBSERVATIONAL STUDY FOR POSSIBLE RISK FACTORS OF SENILE CATARACT

Ophthalmology

Dr. Devesh Rao* Junior resident, Department of Ophthalmology, Subharti Medical College, Meerut.
*Corresponding Author

Dr. Sanjiv Kumar Professor, Department of Ophthalmology, Subharti Medical College, Meerut.

Dr. V.K. Malik Professor and Head of Department, Department of Ophthalmology, Subharti Medical College, Meerut.

ABSTRACT

Aim: To evaluate the various risk factors causing early cataracts in a tertiary hospital catering to the needs of population belonging to Uttar Pradesh.

Material and method: This prospective observational study was conducted in the Department of Ophthalmology, Subharti Medical College, Meerut (U.P.). The duration of the study was of 1 year. This study involved people of ≥ 45 years of age. The sample size was of 200 patients each in two groups i.e. Group A (Control group) and Group B (Senile Cataract group). A detailed questionnaire was used to elicit the information on personal characteristics like name, age, sex, educational level, habits, environmental variables like occupation (indoors/outdoors), duration of occupational exposure, sunlight exposure and personal habits like tobacco (chewing/smoking), alcohol consumption.

Results: It was found that as age advances, prevalence of cataract increases. There was female preponderance in relation to senile cataract. Prevalence of cataract was found more in subjects with occupations involving longer daily exposure to sunlight like farmers and salesman subjects. Smoking habit was found among 19% in group A and 29.5% in group B. In terms of fruit and/or green tea and drug (antioxidants/multivitamins) consumption, it was found that group A subjects had significantly consumed more than group B, indicating their strong association with prevention of cataract.

Conclusion: The results of the present study pointed towards more unhealthy dietary habits with prolonged radiation exposure and with the myopic population having increased susceptibility thus multifactorial causation were found.

KEYWORDS

Cataract, Sociodemographic, Smoking, Environmental variables

INTRODUCTION:

Cataract is the clouding of the lens in the eye leading to decrease in vision. Cataract is primarily a disease of older age groups. The prevalence of cataract is higher in females than males in the developed and developing countries. 3.38 million people above 50 years were operated for cataract in the year 2001 in India and it is expected to rise to 7.63 million by the year 2020¹.

Multiple mechanisms such as oxidative stress, protein aggregates, osmotic gradation, phase separation and post-translational protein changes were proposed for cataract formation, but the exact etiopathogenesis is a subject for research². Several risk factors like UV light exposure, diet, quality of life, some metabolic disorders, lens metabolism disorder and cationic pump malfunction are believed to have a role in cataract formation. The lens metabolism is usually accompanying with aqueous humor and this fluid itself is produced from plasma secretions and serum electrolytes concentration directly regulates electrolytes of aqueous humor and likewise the metabolism of the lens. Biochemical researchers had reported significant results according to serum electrolytes concentration in patients suffering from senile cataract³.

Identifying risk factors may help to identify prevention and treatment options that ultimately may lessen the economic and public health burden of this disease⁴. In a comparative study conducted in Punjab comparing with the prevalence rates according to age with Framingham eye center in the United States of America, the age-specific prevalence of cataract in India was 3 to 6 times higher⁵. Such findings suggest that may be the Indian population is either genetically prone or widely exposed to environmental risk factors (ultraviolet light [UVL], nutritional deficiencies, and severe dehydration from diarrhea/heatstroke)⁶.

MATERIAL AND METHOD:

This prospective observational study was conducted in the Department of Ophthalmology, Subharti Medical College, Meerut (U.P.). The duration of the study was of 1 year. This study involved people of ≥ 45 years of age.

The sample size was of 200 patients each in two groups:

1. Group A- Control group 200 patients of ≥ 45 years of age with no signs of cataract
2. Group B- Senile Cataract group 200 patients of ≥ 45 years of age with signs of cataract

INCLUSION CRITERIA:

- a) Age more than 45 years.
- b) Any significant opacity in the lens or its capsule suggestive of senile cataract for group B patients.
- c) Patients without any signs of cataract for group A.

EXCLUSION CRITERIA:

- a) History suggestive of congenital and secondary acquired cataract.

Procedure

1. A Detailed Questionnaire was used to elicit the information on
 - a.) Personal characteristics like name, age, sex, educational level, habits.
 - b.) Environmental variables like occupation (indoors/ outdoors), duration of occupational exposure, sunlight exposure.
 - c.) Disease history like history of diarrhea within 1 year of patients visit, diabetes, glaucoma, myopia having onset < 20 years of age, family history of cataract, hypertension, renal failure.
 - d.) Personal habits like tobacco (chewing/smoking), alcohol consumption, steroid use, use of screen (computer/smart phone), duration of use of screen, use of regular medication (more than 2 weeks).
2. Ocular examination
3. General examination
4. Lab procedure
 - a) Blood sugar (random)

STATISTICAL ANALYSIS:

Data so collected was tabulated in an excel sheet, under the guidance of statistician and analysed using SPSS 22.00 for windows (SPSS inc, Chicago, USA). Univariate analysis was used to test the association of various dependent variables with senile cataract and the level of significance was set at $p < 0.05$.

RESULTS:

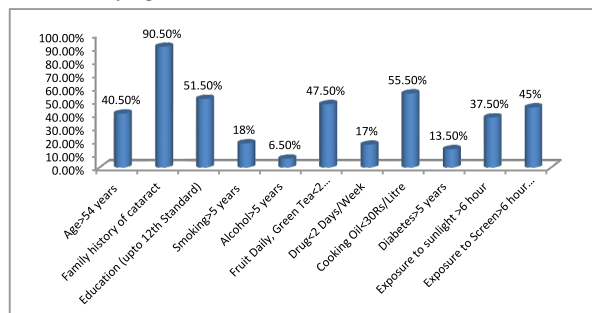
Univariate analysis was conducted to analyse the association of various risk factors in group B. Among the group B cases, subjects with family history of cataract, smoking > 5 years, daily fruit and/or green tea < 2 Days/Week intake, consumption of cooking oil costing < 30 Rs/Litre, diabetes of > 5 years duration, exposure to sunlight > 6 hour/day and exposure to screen > 6 hour/day (Computers/TV/Mobile) were having 12.99, 3.89, 5.70, 15.98, 2.97, 2.59 and 4.73 times more

chances of having cataract than their vice versa with statistically significant difference. Alcohol consumption was found among 7% and 10.5% of subjects out of which 4% and 6.5% of the subjects consumed >100ml/sitting in group A and group B respectively. Also onset of myopia was found as 5.5% and 29.5% of the subjects in group A and B respectively.

Table 1: Univariate analysis to predict occurrence of cataract vis a vis various risk factors

Risk Factors	Cataract	Odds ratio	p value
Age>54 years	81 (40.5)	0.92	0.83
Family history of cataract	181 (90.5%)	12.99	<0.01*
Education (upto 12 th Standard)	103 (51.5%)	1.16	0.43
Smoking>5 years	36 (18%)	3.89	0.009*
Alcohol>5 years	13 (6.5%)	1.24	.62
Fruit Daily, Green Tea<2 Days/Week	71 (47.5%)	5.704	<0.01*
Drug<2 Days/Week	34 (17%)	1.13	0.48
Cooking Oil<30Rs/Litre	111 (55.5%)	15.98	<0.01*
Diabetes>5 years	27 (13.5%)	2.97	0.03*
Exposure to sunlight>6 hour	75 (37.5%)	2.59	0.04*
Exposure to Screen>6 hour (Computers/TV/Mobile)	90 (45%)	4.73	<0.01*

*: statistically significant



GRAPH 1: Occurrence of cataract vis a vis various risk factors

DISCUSSION:

In this study, we aimed to explore this disease cause relationship by studying an association between presence of senile cataract with multiple epidemiological, social, and personal factors.

Influence of age and gender

Our study data indicates that as age advances, prevalence of cataract increases. This is confirmed by Rim et al⁷ as their study revealed that with increased age, one is more likely to suffer from cumulative exposure to numerous risk factors, especially environmental factors, such as either longer duration of radiation or oxidative damage. Female preponderance was seen among senile cataract subjects in our study. These results were in accordance with study done by Gopal K. Das et al⁸. This higher prevalence of cataract in women may be related to gender-based differences in socioeconomic factors like low level of literacy, low income, behavioral factors like poor health seeking behavior, indoor cooking, exposure to smoke from cooking fuels, and/or to biological factor such as hormonal influences possibly due to some effect of estrogen and progesterone.

Role of education

In our study, group A had statistically significant more educated subjects in comparison to group B. Previous studies have reported lower educational levels to be associated with higher prevalence of age related cataract. Similar results were observed in the present study with cataract being significantly more common among less educated subjects, while no such association was observed by Xu L et al⁹. In contrast, Sharma M et al¹⁰ observed that cataract prevalence was more among educated than illiterates (75% versus 70.1%).

Impact of smoking

In our study, smoking habit was found among 19% in group A and 29.5% in group B, out of which 11% and 16.5% of the subjects smoked >1 bundle everyday in group A and group B respectively with statistically significant difference. Smoking is known to be a risk factor for development of age-related cataract. Smoking might also induce

oxidative stress and affect the level of antioxidant micronutrients and lipids under different health conditions. On the other hand, the proportion of smokers and those with smoking habit 5–10 packs/year was significantly lower in controls. L Robman et al¹¹ in their meta-analysis shows a consistency of this association across eight out of 10 studies. Strength of association, lower cataractogenic effect in past smokers vs current smokers, which address the issue of reversibility, and a clear dose–response effect were demonstrated. A population-attributable risk of smoking for nuclear cataract can reach upto 17%.

Dietary Habits

In terms of fruit and/or green tea and drug (antioxidants/multivitamins) consumption, it was found that group A subjects had significantly consumed more as compared to group B. Paul F. Jacques et al¹² in their study revealed that subjects with high levels of at least two of the three vitamins (vitamin E, vitamin C, or carotenoids) are at reduced risk of cataract relative to subjects with low levels of one or more of these vitamins (odds ratio, 0.2). Indirectly our study also endorses the same opinion that by consuming sources of antioxidants (fruits and drugs) reduce the risk of developing senile cataract.

Exposure to sunlight <3 Hour, 3–6 Hour and >6 Hour was found as 41.5%, 34%, 24.5% and 32%, 30.5%, 37.5% of the subjects in group A and B respectively with statistically significant difference. Similar difference was reported in relation to exposure to Computers/TV/Mobile (Duration) in our study. Pragati Garg et al¹³ in their study found similar findings. They revealed that majority of cases (65.8%) had sunlight exposure > 6 hrs/week as compared to 44.2% of controls. Thus, the proportion of those having sunlight exposure >6 hrs/week was significantly higher in cases as compared to that in controls. Laboratory investigations have suggested that age-related cataract might result from oxidative stress after sunlight exposure. The findings of the present study also validated this proposition.

Univariate analysis revealed that among the group B cases, subjects with family history of cataract, smoking>5 years, daily fruit and/or green tea<2 Days/Week intake, consumption of cooking oil costing <30Rs/Litre, diabetes of >5 years duration, exposure to sunlight >6 hour/day and exposure to screen >6 hour/day (Computers/TV/Mobile) were having 12.99, 3.89, 5.70, 15.98, 2.97, 2.59 and 4.73 times more chances of having cataract than their vice versa with statistically significant difference in our study. Similarly Pragati Garg et al in their study revealed that on binary logistic regression, taking smoking, sun exposure, and cholesterol levels as independent predictors of cataract¹³.

This study has few limitations. First, because of the inability to fully adjust for various confounders, the risk factors for early cataractogenesis may be attributed to other unmeasured confounders. Second, the data collection was based on recall basis; there may be a potential for recall bias that might have affected the results.

CONCLUSION:

The present study thus endorsed the findings that antioxidant micronutrients play a significant role in prevention of senile cataract. The present study also highlighted that outdoor occupation, family history of cataract, cheap cooking oil, diabetes, myopia, increased sun exposure and smoking habit could play a detrimental role in oxidative stress, which affected the antioxidant levels and lipid levels and thus played a role in the pathogenesis of cataract. The results of the present study point towards a multi-factorial causation. Therefore, to tackle this problem of cataract, a multi-pronged strategy is required.

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