

# “A Study To Determine Risk Factors Of Presenile Cataract Among Patients Attending Tertiary Care Centre: A Descriptive Study”

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## ABSTRACT

### INTRODUCTION:

Presenile cataract is increasing the total burden of cataract apart from age-related cataract in India and around the world. Risk factors for the same are less studied.

**MATERIALS AND METHODS:** A cross-sectional study was conducted among 200 patients who were diagnosed with visually significant presenile cataracts from January 2020 to June 2021 attending Ophthalmology OPD at Vilasrao Deshmukh Govt. Medical College, Latur. The study commenced after IEC approval (Ref: 152/19) and consent from patients in the vernacular language.

**RESULTS:** 74.5% of study subjects belonged to the age group 30-40 years followed by 25.5% in 18-29 years. 66% of the study subjects were females with a female: male ratio of 1.94: 1. 30% of the participants were educated up to the intermediate level, 70 % were from lower socioeconomic classes, and 65% of the subjects were involved in the occupations with  $\geq 4$  hours of outdoor exposure to sunlight. Posterior sub-capsular cataract was the most common type of cataract among 45% of the study subjects, and 72.5% of the patients had bilateral presentation. Among the study subjects 37.5% were smokers, 48.5% were diabetic, and 42% were hypertensive. High myopia was seen in 21.5% of the cases. Diabetes Mellitus (OR: 3.94), Hypertension (OR: 2.79), and Outdoor Activity  $>4$  hr (OR: 2.91) were significantly associated with posterior subcapsular presenile cataracts. Diabetes Mellitus (OR: 2.85), Smoking (OR: 2.25), Hypertension (OR: 4.1) and Outdoor Activity  $>4$  hr (OR: 2.91), Hypercholesterolemia (OR: 5.02) and high myopia (OR: 3.15) were significantly associated with nuclear sclerotic presenile cataract. Steroid use (OR: 2.96) has a positive association with cortical presenile cataracts.

**CONCLUSION:** Avoidance of direct exposure to sunlight by use of umbrellas and sunglasses, refraining from tobacco use in any form, avoidance of long-term use of steroids (topical or systemic), regular screening for diabetes, hypertension, lipid profile in addition to regular refraction screening of eyes will help retarding the early onset of cataract and might play a major role in delaying the early onset of age-related cataract as well.

**KEYWORDS:** Etiology, Presenile, Cataract, Sunlight, Steroids.

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## I. INTRODUCTION:

Presenile cataract is defined as the opacification of lens and/or its capsule before the age of 40 years when all other known causes of cataract have been ruled out.(1–3) Cataract is the leading cause of blindness in India and worldwide.(4–7) About 1.8 to 3.8 million new cases is added to the backlog every year.(8) This will definitely add on to the already existing burden of age related cataract in India and worldwide. Some important studies have clearly identified several factors that contribute to both age-related and presenile cataracts.(9–14)

The prevalence of cataract is higher in females than males in the developed and developing countries. (15,16) In developing countries, cataract occurs at an earlier age.(17,18) Population based studies have reported high prevalence rates of cataract in India (19–21) compared with western populations. Environmental, nutritional, and genetic factors may be important explanatory factors for such high rates of cataracts, but till date, there is limited information on these in the Indian setting.(13)

Identification and early detection of these risk factors in the younger population will allow health care professional to formulate a preventive strategy to decrease the already existing burden of age-related cataract in the society. Very few studies are conducted in Maharashtra regarding the risk factors for presenile cataracts and

their association. Present study was done to assess the various risk factors in presenile cataracts, clinical profile, and the association of presenile cataract with various risk factors.

## **II. MATERIAL AND METHODS:**

This was hospital-based cross sectional study conducted on 200 patients attending ophthalmology OPD from January 2020 to June 2021 aged 18-40 years with presenile cataract at GMC Latur. The study has been approved by the Institutional Ethics Committee. (Ref: 152/19) After explaining the purpose of the study in the local language, those who agreed and consented to take part in the study were included. The patient's identity and details were kept confidential. Predesigned and pretested case record form was used as a tool for data collection.

### **Inclusion Criteria:**

Patients diagnosed with visually significant presenile cataract.

### **Exclusion Criteria:**

- 1) Patients undergoing combined surgery,
- 2) Patients associated with other ocular disease,
- 3) Patients not willing to participate in study.

All patients fulfilling the inclusion criteria were subjected to detailed history taking regarding symptoms and duration of disease. Data was collected about sociodemographic characteristics of study subjects like age, sex, address, occupation education status and socioeconomic status. Also data regarding past medical history and co morbid conditions like diabetes and hypertension was collected in case record form. A careful and detailed ocular and clinical examination was undertaken. Cataracts were classified based on the Morphological Classification. (22, 23) Complete pre-operative examination, investigation and thorough preparation were done. Complete ocular examination was done which included:

- a) Visual Acuity: Visual acuity was measured by Snellen's chart
- b) Complete and detailed Slit lamp examination
- c) Fundus examination
- d) Sac syringing
- e) Keratometry
- f) A-Scan biometry and IOL power calculation with immersion technique

Investigations included: Complete hemogram, Blood sugar level, Urine examination, ECG. All the patients were subjected to detailed general and physical examination and preoperative fitness was taken from physician patients undergoing cataract surgery. Written informed consent was taken before surgery.

On the previous day of surgery patients eyes were instilled with antibiotic drops. Dilatation of the pupil was done with tropicamide and Phenylephrine drops every 10 minutes for 2 hours before surgery.

Qualitative data was presented with the help of frequency and percentage tables. Association among the study groups is assessed with the help of Chi-square test. 'p-value' less than 0.05 is considered significant. Appropriate statistical software, including but not restricted to MS Excel was used. SPSS version 2.0 was used for statistical analysis.

## **III. Results:**

This cross sectional study was done among 200 cases with presenile cataract at tertiary care hospital with the aim to study various risk factors associated with presenile cataract from rural Maharashtra. 74.5% of study subjects were belonging to age group 30-40 yrs followed by 25.5% in 18-29 yrs.

Female preponderance was seen with female: male ratio of 1.94: 1. 66% study subjects were females and 34% were males. 30% of participants were educated up to intermediate level followed by secondary education 27.5% , Graduate or PG were 15% , Higher secondary educated were 15% , Primary education was received by 10% and 2.5% were illiterate. Posterior subcapsular cataract was the most common type of cataract among study subjects i.e. 45% followed by nuclear cataract 26%, cortical cataract 19.5% and others were 9.5% respectively.(Chart No.1) Majority of study participants were from lower socioeconomic classes (class III, IV and V) contributing to 70 % of cases followed by 30% were from upper classes (class I and II). 65% of the subjects were involved in the occupations with  $\geq 4$  hours of outdoor exposure to sunlight and 35% were presented with  $< 4$  hours of outdoor exposure. (Table-1)

Bilateral cataract was present in 72.5% of subjects and unilateral presentation was seen in 27.5% cases. Smoking was present in 37.5% of cases and 62.5% were non-smokers. 48.5% of the cases were diabetic whereas 51.5% of cases were non diabetic. 42% of the cases were hypertensive and 58% were normotensive.

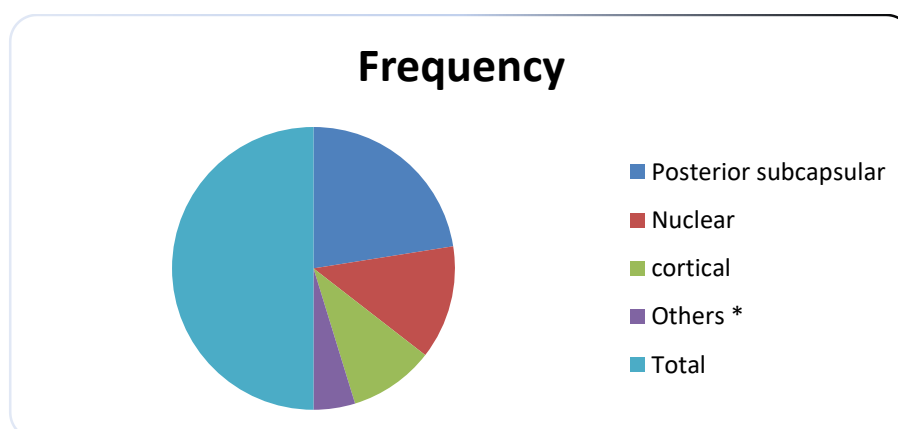
Hypercholesterolemia was present in 39% of cases while high myopia was observed in 21.5% of cases. (Table-2)

Diabetes Mellitus (OR: 3.94), Hypertension (OR: 2.79) and Outdoor Activity >4 hr (OR: 2.91) were significantly associated with posterior subcapsular presenile cataract. (Table-3) Diabetes Mellitus (OR : 2.85), Smoking (OR: 2.25), Hypertension (OR: 4.1) and Outdoor Activity >4 hr (OR : 2.91), Hypercholesterolemia (OR : 5.02) and high myopia (OR : 3.15) were significantly associated with nuclear sclerotic presenile cataract. (Table-4) Steroid use (OR: 2.96) has positive association with cortical presenile cataract. (Table-5)

**Table No. 1: Demographic Characteristic of study population**

Sr. No.	Demographic Characteristic	Frequency (n)	Percentage (in %)
1.	Age (in years)		
	18-29	51	25.5
	30-40	149	74.5
	Total	200	100
2.	Gender		
	Male	68	34
	Female	132	66
	Total	200	100
3.	Education		
	Illiterate	5	2.5
	Primary	20	10
	secondary	55	27.5
	Higher secondary	30	15
	Intermediate	60	30
	Graduate or PG	30	15
	Total	200	100
4.	Socioeconomic class ( Modified B.G Prasad Classification )		
	I	20	10
	II	40	20
	III	75	37.5
	IV	45	22.5
	V	20	10
	Total	200	100
5.	Duration of outdoor activity		
	≥4 Hours	130	65
	< 4 Hours	70	35
	Total	200	100

Upper class: Class I and II, Lower class: Class III, IV, V.



Others\*: Mixed cataract, polar cataract, mature cataract.

**Chart No.1: Distribution of study participants according to morphological types of presenile cataract (N=200)**

**Table No. 2: Distribution of risk factors for presenile cataract**

Associated Risk Factors	Frequency (n)	*Percentage (%)
1. Smoking	75	37.5
2. Diabetes Mellitus	97	48.5
3. Hypertension	84	42
4. Hypercholesteremia	78	39
5. High Myopia	43	21.5
6. Use of steroid	33	16.5

\*Coexistence of multiple risk factors together lead to percentage aggregate more than 100%.

**Table No. 3: Risk factors for posterior subcapsular presenile cataract (N=200)**

Risk Factor	Status	PSC		OR	95% CI	P value
		Present	Absent			
DM	yes	60	37	3.94	2.1865 to 7.1210	< 0.0001*
	No	30	73			
Smoking	yes	40	35	1.71	0.9619 to 3.0551	0.0675
	No	50	75			
Hypertension	yes	50	34	2.79	1.5644 to 4.9904	0.0005*
	No	40	76			
Steroid use	yes	15	18	0.68	0.3253 to 1.4567	0.3289
	No	75	92			
Out. A > 4 hr	yes	70	60	2.91	1.5647 to 5.4368	0.0008*
	No	20	50			
HC	Yes	35	43	0.99	0.5601 to 1.7554	0.9768
	No	55	67			
High Myopia	Yes	15	28	0.58	0.2906 to 1.1806	0.1347
	No	75	82			

\* Significant at p<0.05, HC-Hypercholesterolemia, Out. A- Outdoor activity

**Table No.4: Risk factors for the nuclear sclerotic presenile cataract. (N=200)**

Risk Factor	Status	Nuclear cataract		OR	95%CI	P value
		Present	Absent			
DM	yes	35	62	2.85	1.4685 to 5.5536	0.002*
	No	17	86			
Smoking	yes	27	48	2.25	1.1820 to 4.2830	0.0135
	No	25	100			
Hypertension	yes	34	50	3.70	1.9036 to 7.2001	0.0001*
	No	18	98			
Steroid use	yes	06	27	0.58	0.2266 to 1.5077	0.2667
	No	46	121			
Out A >4 hr	yes	30	100	0.62	0.3665 to 1.0659	0.0844
	No	22	48			
HC	Yes	35	43	5.02	2.5483 to 9.9180	< 0.0001*
	No	17	105			
High Myopia	Yes	20	23	3.15	1.5409 to 6.4484	0.0017*
	No	32	116			

Significant at p<0.05, HC-Hypercholesterolemia, Out. A-Outdoor activity.

**Table No. 5: Risk factors for cortical presenile cataract. (N=200)**

Risk Factor	Status	Cortical Presenile Cataract		OR	95%CI	P value
		Present	Absent			
Steroid use	yes	12	21	2.96	1.3047 to 6.7290	0.0094*
	No	27	140			
Smoking	yes	0	75	-	-	-
	No	39	86			
High Myopia	yes	8	35	0.92	0.3920 to 2.2015	0.8672
	No	31	126			
DM	yes	0	97	-	-	-
	No	39	64			
Out. A >4 hr	yes	20	110	0.48	0.2399 to 0.9930	0.0478*
	No	19	51			
Hypertension	Yes	0	84	-	-	-
	No	39	77			
HC	Yes	8	70	0.33	0.1452 to 0.7751	0.010*
	No	31	91			

Significant at  $p < 0.05$ , HC-Hypercholesterolemia, Out. A-Outdoor activity.

#### IV. DISCUSSION:

Cataract is the clouding of the lens in the eye leading to decrease in vision. Cataract is a disease of the elderly groups. (22) The prevalence of cataract is higher for women than for men in developed and developing countries. Presenile cataract is defined as lens opacification and / or its capsule before the age of 40 years when all other known causes of cataract have been removed.(1–3)

**Age distribution of study participants [Table No. 1] :** Majority of study subjects belonging to age group 30-40 yrs contributing 74.5% (149 cases) followed by 25.5%(51 cases) in 18-29 yrs. Similar finding was observed in study by **Jyothi R et al (2017)**. (25) It was observed that the mean age of the study population was 41.88 years. A study by **Rahman A et al (2011)** (12) revealed similar findings in which the mean age was 43.8 years,

**Distribution of study subjects as per gender [Table No. 1]:** Female preponderance was seen with female: male ratio of 1.94: 1. Most of the study subjects were females contributing 66% (132 cases) followed by 34% (68 cases) were males. Similar study by **Jyothi R et al (2017)**(25) revealed female preponderance which was consistent with present study. Study population constituted 88 males and 112 females.

**Education [Table No. 1]:** Majority of participants was educated up to intermediate level contributing 30% of cases followed by secondary education 27.5% cases, graduate or PG is 15% of the study population. 15% cases were educated up to higher secondary, primary education was received by 10% and 2.5% were illiterate respectively.

**Morphological types of presenile cataract [Graph no. - 1] :** Posterior subcapsular cataract was the most common type of cataract among study subjects contributing 45% of cases followed by nuclear 26% , cortical cataract among 19.5% of cases and other morphological types constituted 9.5% respectively. A similar study by **Dhanya V S et al (2021)** (26) concluded in their study that, most common type of cataract seen was posterior subcapsular cataract (PSC) (47%), followed by mature cataract (18%), immature cataract (17%), nuclear sclerosis (13%), and Others (5%).

A study by **Jyothi R et al (2017)** (25) concluded in their study that, the most common type of cataract seen was posterior subcapsular ( 42 % ) , followed by mature cataract (23.5%), nuclear sclerosis (NS) (21.5%), combined cataract (10%), and cortical cataract (CC) (3%). Findings of these studies are consistent with our study. A similar study by **Daniel L et al (2021)** (27) revealed that, PSC was found in 65 eyes (39.6%) at presentation and CC was found in 22 eyes (13.4%). Grade 2 nuclear sclerosis was found in 42 eyes (25.6%).

**Exposure to outdoor activity [Table No. 1]:** 65% of subjects were involved in the occupations with  $\geq 4$  hours of outdoor exposure to sunlight and 35% with  $< 4$  hours of outdoor exposure. A similar study by **Vasudevan M et al (2014)** (28) revealed that, outdoor exposure to sunlight more than 4 hrs a day is associated with development of presenile cataract.

**Socioeconomic status [Table No. 1]:** Majority of study participants were from lower

socioeconomic classes (class III, IV and V) contributing 70% of cases followed by 30% were from the upper classes (class I and II). A similar study by **Vasudevan M et al (2014)** (28) revealed that, lower socioeconomic status was associated with presenile cataract, which was similar with findings of the present study.

**Laterality of cataract:** Bilateral cataract was present in majority of subjects contributing 72.5% of cases while unilateral presentation was seen in 27.5% of cases. A study by **Daniel L et al (2021)** (27) revealed that, 76.8% had bilateral cataracts. This finding was consistent with present study.

**Risk factors for presenile cataract [Table No. 2, 3, 4 and 5]:** Smoking was present in 37.5% of cases whereas 62.5% of cases were nonsmokers' .48.5% of cases was diabetic and 42% of study populations were hypertensive. Hypercholesterolemia was present in 78 cases (39%) and high myopia was observed in 21.5% of cases .Diabetes Mellitus (OR: 3.94), Hypertension (OR: 2.79) and Outdoor Activity >4 hr (OR: 2.91) were significantly associated with posterior subcapsular presenile cataract. Diabetes Mellitus (OR : 2.85), Smoking (OR : 2.25), Hypertension (OR : 4.1,) and Outdoor Activity >4 hr (OR : 2.91), Hypercholesterolemia (OR : 5.02) and high myopia (OR : 3.15) were significantly associated with nuclear sclerotic presenile cataract. Steroid use (OR: 2.96) has positive association with cortical presenile cataract. A study by **Jyothi R et al (2017)**(25) revealed that, DM was found to be the most common risk factor in the study population with 31% (62 cases) of patients having diabetes. Nearly 12.5% (25 cases) of the study population gave a history of ocular trauma preceding the development of cataract. Seventeen patients (8.5%) gave a history of some form of atopy, out of which 5% (10 cases) patients were on regular inhalational steroids. Other risk factors observed were high myopia (5.5%, n=11), thyroid disorders (5%, n=10) and uveitis (3%, n=6).

Study by **Oktem C et al (2020)** (29) concluded that vitamin D deficiency was associated with early age-related cataract in a statistically significant manner. Similar study by **Vasudevan and Premnath (2014)**(28) revealed that in cases with presenile cataract risk factors like steroid use, alcohol use, cigarette smoking, and exposure to sunlight were identified. The Blue Mountains Eye Study was a similar study conducted by **Tan AG et al (2020)** (30) in urban community of Australia. Study concluded that, dietary factors, smoking, alcohol consumption, medications, and refractive errors were risk factors for age-related cataract formation. In a study conducted in western India to investigate the risk factors for the early onset of cataracts in India by **Vashist P et al(2020)** (31) found that atopy was found to be the most common risk factor associated with cataract formation, being associated in 25.6% of the cases. A study by **Daniel L et al (2021)** (27) shown that, 50% were known diabetics and 20.7% were known hypertensive. 17.07% of cases had both diabetes mellitus (DM) and HT. 3.7% gave a history of bronchial asthma, 2.4% of photo dermatitis, 4.9% of smoking, and 6.1% of alcohol consumption.

A study by **Raman et al (2010)** (32) had found elevated serum triglycerides as a significant risk factor in their large study group. In a similar studies smoking was associated with presenile cataract. (30, 31)

## V. CONCLUSION:

Our study concluded that female preponderance was seen among cases of presenile cataract. Most of the cases belong to lower socioeconomic class. Posterior subcapsular cataract was the most common morphological type of cataract among study subjects followed by nuclear and cortical cataract. Diabetes mellitus, hypertension and outdoor exposure to sunlight were risk factors associated with posterior subcapsular cataract.

Diabetes mellitus (DM) , Hypertension (HTN), outdoor exposure to sunlight, hypercholesterolemia, high myopia and tobacco use are the most common risk factors associated with nuclear presenile cataract whereas, steroid use (Inhalational or topical) has positive association with cortical presenile cataract. However further case-control trials are required in this category to determine the cause of early cataract onset and to further evaluate modifiable risk factors.

## VI. RECOMMENDATIONS

Incidence of presenile cataract is on the rise due to changes in the lifestyle like diet, addictions, occupational exposure and environmental influences. In general avoidance of direct exposure to sunlight by use of umbrellas and sunglasses, refraining from tobacco use in any form, avoidance of long term use of steroids (topical or systemic), regular screening for diabetes, hypertension, lipid profile in addition to regular refraction screening of eyes will help retarding early onset of cataract and might play major role in delaying early onset of age related cataract as well. However, we recommend further case control trials to study risk factors of presenile cataract.

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**Conflict of interest:** None declared.

**Ethical approval:** The study was approved by the Institutional Ethics Committee. (Ref: 152/19)

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