

TO STUDY TYPES OF PRESENILE CATARACT AND ITS RISK FACTORS AT A TERTIARY HEALTH CARE CENTRE IN EAST BIHAR

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ABSTRACT

Objectives: A cataract is defined as opacity within the clear lens inside the eye that reduces the amount of incoming light and results in deterioration of vision. Cataract is considered as one of the most common causes of visual defect or impairment in the world. According to the World Health Organization, cataract is the leading cause of blindness all over the world, responsible for 47.8% of blindness and accounting for 17.7 million blind people. In India, the major cause of blindness is cataracts, which accounts for 62.6%. However, detailed epidemiological data on types of presenile cataracts and its risk factors, especially in regions, such as Eastern Bihar, are sparse. (1) To determine the proportion of different types of presenile cataracts and (2) Risk factors associated with the occurrence of presenile cataracts.

Methods: Patients in the age group of 20–50 years attending the tertiary Health care center out-patient clinic of the Ophthalmology Department who were found to have presenile cataracts were to be recruited as cases. Those who gave consent to participate in the study were interviewed and underwent a complete ocular examination.

Results: The thesis presents a detailed analysis of cataract types and their distribution among 165 cases based on various demographic, occupational, and clinical factors. The most prevalent cataract type was nuclear sclerosis plus posterior subcapsular cataract (30.3%), followed by mature cataract and posterior subcapsular cataract (both 15.2%). Alcohol consumption (12.7%) and smoking (11.5%) were the most prevalent risk factors.

Conclusion: This comprehensive study on cataract epidemiology revealed nuclear sclerosis plus posterior subcapsular cataract as the most prevalent type, with a higher incidence among older adults, females, individuals from lower socioeconomic backgrounds, and those with occupations involving prolonged sun exposure, such as farming and housework.

Keywords: Presenile cataract, Risk factors of cataract, Prevalence.

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INTRODUCTION

Cataract is defined as opacity within the clear lens inside the eye that reduces the amount of incoming light and results in deterioration of vision [1]. Cataract is considered as one of the most common causes of visual defect or impairment in the world. According to the World Health Organization (WHO), cataract is the leading cause of blindness all over the world, responsible for 47.8% of blindness and accounting for 17.7 million blind people [2]. In India, major cause of blindness is cataract, which accounts 62.6% [1]. However, detailed epidemiological data on types of presenile cataract and its risk factors, especially in regions like Eastern Bihar, are sparse.

Presenile cataracts can be sporadic or familial. The mode of its inheritance can be dominant – principally in isolated forms or recessive – typical in syndromic forms among inherited non-syndromic cataract phenotypes, cataracts affecting the lens nucleus are common while cataracts limited to the lens cortex are rare [2].

Some medical conditions can also make it more likely that you'll develop presenile cataracts. These include refractive errors, such as high myopia and metabolic disease, such as diabetes mellitus, in which glycosylation of lens crystallins occurs resulting in the accumulation of glycation-derived crosslinks, thereby causing aggregation of high molecular weight material responsible for lens opacification. People with high blood pressure or a history of smoking are also at increased risk for developing this type of cataract [3-7].

Other possible causes for presenile cataracts include atopic dermatitis, long-term use of corticosteroids that is related to dose and duration of treatment, and mode of administration whether systemic, topical, sub-conjunctival, and in the inhaled form leads to cataract formation [8]. Active smoking, alcohol use, severe malnutrition, ultraviolet β -radiations (290 nm–320 nm), and severe diarrhea causing dehydration are among other risk factors for cataract formation. In young patients, ionizing radiations such as X-rays (0.001–10 nm) wavelength can cause cataract development [13-15]. Other etiological factors include trauma, intra-ocular inflammation, electrical current injury, outdoor occupation, and occupational exposure to heavy metals [8-10].

METHODS

Study design and setting

This cross-sectional study was conducted at the Department of Ophthalmology, M.G.M. Medical College and L.S.K. Hospital, Kishanganj, Bihar. The study spanned from September 01, 2022, to April 30, 2024.

Study population

Patients aged 20–50 years, who attended the Out-Patient Clinic of the Ophthalmology Department at the tertiary Health Care Center, were eligible. Cases included individuals diagnosed with presenile cataract.

Inclusion criteria

Diminution of vision due to cataract in patients aged between 20 and 50 years of age.

Table 1: Type of cataract

Type of cataract	Frequency	Percentage
Hyper mature cataract	4	2.4
Cortical cataract	6	3.6
Intumescent cataract	21	12.7
Mature cataract	25	15.2
Nuclear sclerosis	14	8.5
Nuclear sclerosis plus posterior subcapsular cataract	50	30.3
Nuclear sclerosis plus cortical cataract	12	7.3
Polar cataract	8	4.8
Posterior subcapsular cataract	25	15.2
Total	165	100.0

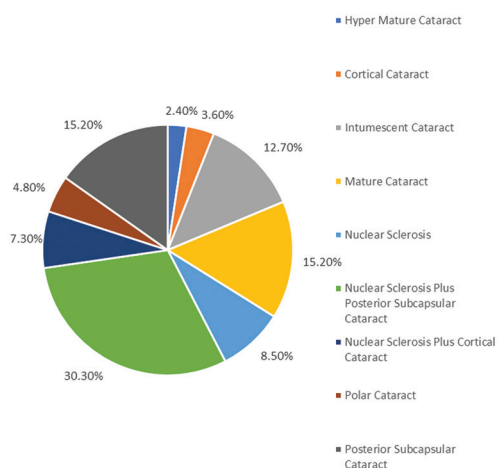
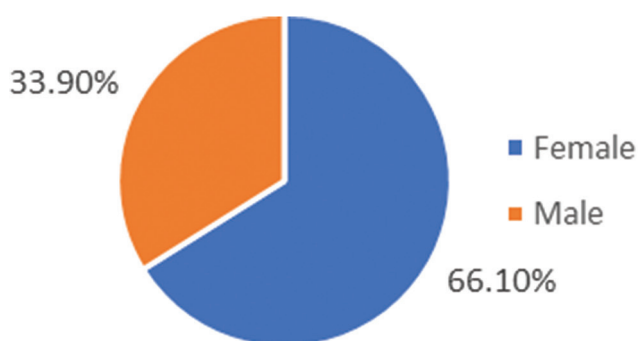


Table 2: Age distribution

Age group	Frequency	Percentage
≤30	14	8.5
31-40	63	38.2
>40	88	53.3
Total	165	100.0

Table 3: Sex distribution

Sex	Frequency	Percentage
Female	109	66.1
Male	56	33.9
Total	165	100.0



Exclusion criteria

Patients below 20 years or above 50 years of age were excluded. In addition, individuals with congenital, developmental, traumatic, and complicated cataracts were excluded from the study.

Table 4: Occupation

Occupation	Frequency	Percentage
Ambulance driver	2	1.2
ANM	4	2.4
Farmer	46	27.9
Househelp	3	1.8
Housewife	64	38.8
Labourer	3	1.8
Maid	3	1.8
Nurse	8	4.8
Shopkeeper	4	2.4
Staff	10	6.1
Student	2	1.2
Tailor	8	4.8
Teacher	6	3.6
Ward boy	2	1.2
Total	165	100.0

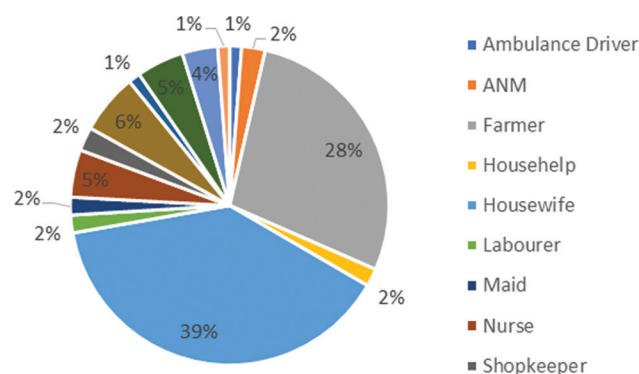


Table 5: Sociodemographic status

Sociodemographic status	Frequency	Percentage
Lower	108	65.5
lower middle	27	16.4
Middle	30	18.2
Total	165	100.0

Patients in the age group of 20–50 years attending the tertiary Health Care Centre Out-Patient Clinic of the Ophthalmology Department who were found to have presenile cataracts were to be recruited as cases. Those who gave consent to participate in the study were interviewed and underwent a complete ocular examination.

The cases were interviewed to record the information about:

1. Occupation,
2. Sociodemographic profile,
3. Smoking,
4. Alcohol use,
5. Any systemic disorders (hypertension, diabetes, asthma, atopic dermatitis),
6. Long-term drug therapy,
7. Hours of Sun Exposure.

Ocular examination

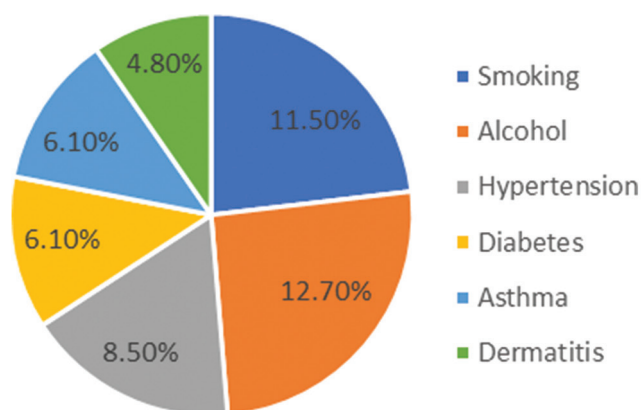
- Visual acuity testing using Snellen’s chart
- Anterior segment evaluation using a slit lamp
- Pupil dilation using topical 1% tropicamide eye drops
- Slit lamp examination for confirming cataract presence and analyzing its type
- Posterior segment evaluation using direct and indirect ophthalmoscope
- “A” scan to determine axial length.

Table 6: Eye involved

Eye	Frequency	Percentage
Bilateral	101	61.2
Unilateral	64	38.8
Total	165	100.0

Table 7: Risk factors

Risk factor	Frequency	Percentage
Smoking	19	11.5
Alcohol	21	12.7
Hypertension	14	8.5
Diabetes	10	6.1
Asthma	10	6.1
Dermatitis	8	4.8



Categorization of cataract types

Nuclear, cortical, posterior subcapsular, and posterior polar cataracts based on the morphological appearance of lenticular opacity.

Statistics

Data were entered in Microsoft Excel and statistical analysis was done using Statistical Packages for the Social Sciences version 21. Mean and standard deviation were calculated for quantitative variables, such as axial length and age. Frequencies and percentages were calculated for categorical variables such as type of cataract, age group, sex, occupation, sociodemographic factors, visual acuity, bilateral/unilateral cataract, and various medical conditions (smoking, alcohol, hypertension, diabetes, asthma, dermatitis, sun exposure, long-term drug therapy). Qualitative data were analyzed using the Chi-square test of independence to examine associations between cataract type and the categorical variables. To calculate any difference in the mean axial length and age between different categories of cataract type, one-way analysis of variance was used and a $p < 0.05$ was considered statistically significant.

RESULTS

The study presents a detailed analysis of cataract types and their distribution among 165 cases based on various demographic, occupational, and clinical factors.

Types of cataracts

- The most prevalent cataract type was nuclear sclerosis plus posterior subcapsular cataract (30.3%), followed by mature cataract and posterior subcapsular cataract (both 15.2%).
- Other types included intumescent cataract (12.7%), nuclear sclerosis (8.5%), nuclear sclerosis plus cortical cataract (7.3%), polar cataract (4.8%), cortical cataract (3.6%), and hypermature cataract (2.4%).

Table 8: Hours of sun exposure

Hours of sun exposure	Frequency	Percentage
1	62	37.6
2	56	33.9
3	12	7.35
4	12	7.3
5	11	6.7
6	12	7.3
Total	165	100.0

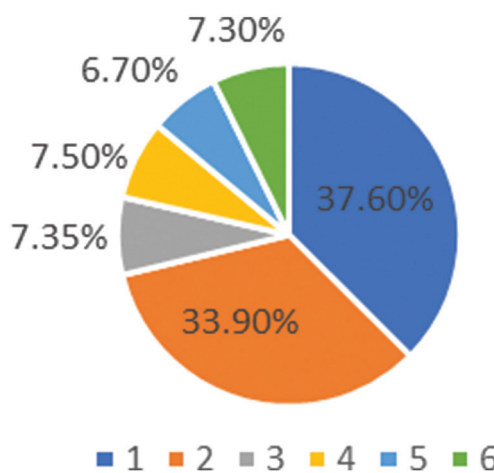


Table 9: Long term drug therapy

Long term drug therapy	Frequency	Percentage
No	157	95.2
Yes	8	4.8
Total	165	100.0

Age distribution

- The majority of cases (53.3%) were in the >40 age group, followed by the 31-40 age group (38.2%), and ≤30 age group (8.5%)
- $p = 0.014$ suggests a statistically significant association between age group and the type of cataract.

Sex distribution

- Females (66.1%) had a higher prevalence of cataracts compared to males (33.9%)
- $p = 0.481$ suggests a statistically non-significant association between sex and the types of cataracts.

Occupational distribution

- The highest prevalence was among housewives (38.8%) and farmers (27.9%)
- $p = 0.000$ suggests a statistical association between occupation and the type of cataract.

Socioeconomic status

- Most cases (65.5%) belonged to the lower socioeconomic class
- $p = 0.005$ suggests a significant association between sociodemographic status and type of cataract.

Visual acuity

- Severe visual impairment (6/60-3/60) was present in 48.5% of cases
- Profound visual impairment or blindness (fc4m - pl+) was observed in 51.5% of cases.

Bilateral versus unilateral involvement

- Bilateral eye involvement (61.2%) was more common than unilateral (38.8%)

- $p=0.000$ suggests a statistically significant association between bilateral and unilateral eye and type of cataract.

Hours of sun exposure

- 71.5% of cases received 2 h or less of sun exposure per day and 28.5% received 3 or more hours of sun exposure per day.
- $p=0.000$ suggests a statistically significant association between hours of sun exposure and type of cataract.

Risk factors

- Alcohol consumption (12.7%) and smoking (11.5%) were the most prevalent risk factors.
- Other identified risk factors were hypertension (8.5%), diabetes, and asthma (6.1%) and dermatitis was the least common risk factor accounting for 4.8% of the cases.
- No significant associations were found between cataract types and risk factors, such as hypertension, diabetes, asthma, or dermatitis. (p -value more than 0.05)
- The study found statistically significant associations ($p<0.05$) between cataract types and age group, occupation, socioeconomic status, visual acuity, bilateral/unilateral involvement, and hours of sun exposure.

In Table 1: The most prevalent cataract is "Nuclear Sclerosis Plus Posterior Subcapsular Cataract" at 30.3%, accounting for nearly one-third of the total 165 cases.

In Table 2: The youngest age group, comprising individuals aged 30 years or younger (≤ 30), accounts for 8.5% of the total cases. The age group between 31 and 40 years (31-40) represents the largest proportion, with 38.2% of the cases falling into this category. However, the majority of cases, 53.3%, belong to the age group of individuals over 40 years of age.

In Table 3: The majority of cases, 66.1%, are females. In contrast, 33.9% of the cases are males. This indicates that females outnumber males in the present study.

In Table 4: The table shows the distribution of cases across various occupations. The largest proportion, 38.8%, are housewives. This is followed by farmers at 27.9%.

In Table 5: The table presents the distribution of cases across different socioeconomic classes or income groups. The majority of cases, 65.5%, fall into the "Lower" socioeconomic class or income group. The "lower middle" class accounts for 16.4% of the cases, while the "Middle" class comprises 18.2% of the cases.

In Table 6: The majority of cases, 61.2%, are classified as bilateral, indicating that both eyes are affected by visual impairment. In contrast, 38.8% of cases are unilateral, where only one eye is affected.

In Table 7: The most prevalent risk factor is alcohol consumption, accounting for 12.7% of cases, closely followed by smoking at 11.5%. Hypertension is identified as a risk factor in 8.5% of cases. Diabetes and asthma both account for 6.1% of cases each. Dermatitis is the least common risk factor in the data set, present in 4.8% of cases.

In Table 8: The highest percentage of cases, 37.6%, had 1 hour of sun exposure. A similar proportion, 33.9%, had 2 hours of sun exposure. The remaining cases were distributed across higher durations of sun exposure, with 7.35% having 3 hours, 7.3% having 4 hours, 6.7% having 5 hours, and 7.3% having 6 hours of sun exposure.

In Table 9: The majority of cases, 95.2%, fall under the "No" category, indicating that they are not receiving long-term drug therapy. In contrast, only 4.8% of cases belong to the "Yes" category, representing those who are undergoing long-term drug therapy.

DISCUSSION

In the present study, the prevalence of nuclear sclerosis plus posterior subcapsular cataract (30.3%) is the most common type which is consistent with findings from other studies conducted by Das *et al.* [16] This could be because posterior subcapsular cataract causes early impairment of vision, significant enough to hamper the daily activities of an individual, which prompts them to report to the ophthalmologist early [1].

The age distribution in this study, with a higher proportion of cases (53.3%) in the >40 age group, is expected and corroborates the well-established association between increasing age and cataract development.

The study found a higher prevalence of cataracts among females (66.1%) compared to males (33.9%), which is in line with other studies conducted in India by Das *et al.* [16]

This gender disparity is often attributed to hormonal factors, longer life expectancy, and increased exposure to biomass fuel smoke among women in developing countries [11,12].

The study found a significant association between socioeconomic status and cataract types, with a higher proportion of cases in the lower socioeconomic class (65.5%) which is in concordance with the study done by Das *et al.* [16] These associations could be related to poor health-seeking behaviors, poor compliance, less finances to seek medical help, and overall poor general health status in low social income groups.

The lack of significant associations between risk factors, such as smoking, alcohol, hypertension, diabetes, asthma, and dermatitis with cataract types in this study could be attributed to factors such as a relatively small sample size limiting statistical power, unique characteristics or exposures in the study population, differences in measurement and classification methods, inadequate control for confounding variables, varying levels of risk factor exposure, failure to account for potential interactions or effect modifications, and examining associations at a single time point rather than over a longitudinal period. These methodological and population-specific differences may have contributed to the contrasting findings compared to other studies that reported positive associations between these risk factors and cataract development or progression.

Overall, the study provides valuable insights into the distribution of cataract types and their associations with various demographic and clinical factors in the study population. Further research with larger sample sizes and diverse populations may be necessary to confirm or refute these findings and deepen our understanding of the complex interplay between various factors and cataract development.

CONCLUSION

This comprehensive study on cataract epidemiology revealed nuclear sclerosis plus posterior subcapsular cataract as the most prevalent type, with a higher incidence among older adults, females, individuals from lower socioeconomic backgrounds, and those with occupations involving prolonged sun exposure, such as farming and housework. While age, occupation, socioeconomic status, visual acuity, laterality, and sun exposure duration showed significant associations with cataract types, no clear links were established with risk factors such as smoking, alcohol, hypertension, diabetes, asthma, or dermatitis. The findings underscore the need for early detection, accessible eye care services, and targeted preventive strategies considering demographic, occupational, and socioeconomic risk factors to mitigate vision impairment and promote eye health, particularly among vulnerable populations. Further research exploring population-specific variations and risk factor interactions could enhance our understanding of cataract etiology and inform more effective cataract control measures.

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