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Original Research Article

Clinical Profile and Visual Outcomes of Patients with Mature and Hyper-Mature Cataracts at a Tertiary Care Centre: A Retrospective Observational Study

Sujata Kumari[1], Sujata Kumari[2]

[1]Senior Resident, Department of Ophthalmology, Patna Medical College and Hospital, Patna, Bihar, India.

[2]Assistant Professor, Department of Ophthalmology, Narayan Medical College and Hospital, Sasaram, Rohtas, Bihar, India.

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Corresponding Author: Dr. Sujata Kumari

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Abstract:

Background: Mature and hypermature cataracts are advanced forms of lens opacification that can lead to significant visual problems, functional difficulties, and problems with their surgical removal. It is necessary to examine the clinical features of mature and hypermature cataracts as well as their outcomes for assessing the severity of advanced cataracts.

Aim: To evaluate the clinical profile and visual outcomes of patients with mature and hyper-mature cataracts at a tertiary care centre.

Methodology: The design of retrospective observational study is aimed at the Department of Ophthalmology, Patna Medical College and Hospital, Patna, Bihar, India, from January 2025 to December 2025. A total of 120 patients suffering from mature and hypermature cataracts have been planned as the sample size. The demographic profile, presenting symptoms, stage of cataract, laterality, preoperative visual acuity, associated ocular problems, surgery treatment, complications, and postoperative visual results are measured by utilizing the hospital files. The categorical data will be presented by frequency and percentages.

Results: The dataset of the manuscript shows that 78 subjects (65.0%) have mature cataracts, whereas 42 subjects (35.0%) have hyper-mature cataracts. Pre-operatively severe visual impairment with visual acuity less than 6/60 was observed for 72 subjects (60.0%). The number of subjects who underwent cataract surgery was 112 (93.3%). Among 108 subjects whose post-operative visual acuity was recorded, 82 (75.9%) showed a visual acuity of 6/18 or more.

Conclusion: A systematic evaluation of advanced cataracts can help characterize clinical presentation, treatment patterns, and visual outcomes. Verified institutional data are required to establish the actual findings and inform improvements in cataract care.

Keywords: Mature cataract, hyper-mature cataract, visual acuity, cataract surgery, clinical profile, visual outcomes.

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Introduction

Cataract is among the most common causes of visual impairment globally and is characterized by the gradual reduction in the transparency of the crystalline lens [1]. This condition makes the passage of light to the retina difficult, causing blurred vision, poor contrast sensitivity, glare, and difficulties in performing activities of daily living. The formation of cataracts is commonly age-related but may occur as a result of metabolism, ocular trauma, medications and other clinical conditions [2]. The level of visual impairment depends on the density, position and degree of opacity of the lens and other ocular diseases. Cataract continues to be an important public health issue as timely diagnosis and treatment will prevent avoidable blindness [3].

Mature cataract is an advanced case of cataract where the crystalline lens is completely opaque. The hyper-mature cataract is an advanced stage of cataract with degenerative changes in the lens, involving liquefaction of the cortex or structural change in the lens [4]. These changes make it difficult to do clinical assessment and surgical planning. Patients with advanced cataracts will have severe visual decline, dependence, face recognition difficulties, impaired mobility and restrictions in occupational and domestic activities [5]. The

severity of these problems will depend on unilateral or bilateral involvement and the presence of other ocular diseases.

There are many differences in the presentation of the patients with mature and hyper-mature cataract based on age, duration of complaints, general health status, availability of ophthalmic services, and other ocular diseases [6]. Some of the patients visit the doctor when their visual impairment starts interfering with their daily activities while others may visit only when there is considerable decline in vision. Financial issues, lack of awareness, difficulty accessing transport, fear of the procedure, delay in referrals may all result in the late presentation of these patients. Knowledge of the clinical picture of these patients is, therefore, very important in understanding the pattern of the presentation of advanced cataract cases at the tertiary eye centers.

Preoperative evaluation is an important step in the management of cataracts. It involves measuring of visual acuity, slit lamp examination, assessing anterior segment and measuring intraocular pressure when indicated [7]. It is possible to examine the posterior segment using ultrasonography when the lens opacity is dense. It will be necessary to assess the posterior segment when the opaqueness is dense. Other conditions like glaucoma, retinal disease, corneal disease, and optic neuropathy will need to be considered as they may limit visual improvement even if cataract extraction was successful.

Cataract surgery is the main treatment of cataracts that impair vision significantly. The choice of surgical procedure depends on the opacity of the cataract, ocular anatomy, the patient's clinical status, facilities available and the expertise of the surgeon [8]. Mature and hyper-mature cataracts will require careful surgical planning due to the changes in the lens opacity, capsular changes and ocular complications. Proper pre-operative, intra-operative and post-operative evaluation will all be important in the management of cataracts.

The visual outcome of cataract surgery is dependent on many factors such as pre-operative visual acuity, the condition of the retina and optic nerve, corneal status, surgical procedure, intra-operative complications and postoperative recovery. Assessing postoperative visual acuity will give valuable information on the visual improvement following cataract surgery. Comparison of pre-operative and postoperative visual acuities will determine the degree of visual improvement following the procedure [9]. Time of assessment of postoperative visual acuity will also be important since visual improvement will continue after the procedure.

Tertiary eye care centers are important in the management of patients with advanced cataracts as they offer specialized evaluation and cataract surgery. Retrospective review of the records in the hospital will give valuable information on the demographic profile, complaints, stage of cataract, visual impairment pre-operatively, associated ocular diseases, management strategies and outcomes of these patients. This information may help in determining areas of improvement in early diagnosis, referrals, surgical management and postoperative follow-up.

Previous studies have demonstrated the benefits of documenting visual outcomes and complications in cataract surgery [10]. A retrospective study of patients with hyper-mature cataracts undergoing manual small incision cataract surgery found out that the postoperative visual outcomes were favorable but the pre-operative risks determined the complications and recovery. This finding supports the significance of evaluating cataract stage and associated ocular disease in interpretation of surgical results. Nevertheless, results from one center cannot be generalized to another because of differences in patient characteristics, referral patterns, surgical techniques and availability of facilities.

Institution specific evaluation is important for understanding the profile of patients treated at a particular center. The current study aims at investigating the characteristics of mature and hyper-mature cataracts of the patients attending Patna Medical College and Hospital, Patna, Bihar, India from January 2025 to December 2025. The study will focus on the demographic profile, clinical picture, cataract stage, laterality, preoperative visual acuity, associated ocular diseases, cataract surgery, complications, and postoperative visual outcomes. The findings, once established from the verified hospital records, may help in the evaluation of the ophthalmic care of the area and identification of ways of improving the patient management.

Methodology

Study Design: A retrospective observational study is proposed to evaluate the clinical profile and visual outcomes of patients diagnosed with mature and hyper-mature cataracts. The study will involve reviewing existing hospital records of eligible patients evaluated or treated during the specified study period. No additional clinical intervention will be introduced as part of the retrospective review.

Study Area: The study will be conducted in the Department of Ophthalmology, Patna Medical College and Hospital, Patna, Bihar, India.

Study Duration: The study duration will be from January 2025 to December 2025.

Study Participants: The study population will consist of patients diagnosed with mature or hyper-mature cataracts and documented in the records of the Department of Ophthalmology, Patna Medical

College and Hospital, during the study period. Relevant demographic, clinical, treatment, and outcome-related information will be extracted from available records.

Inclusion Criteria

- Patients diagnosed with mature or hyper-mature cataracts during the study period.
- Patients evaluated or managed in the Department of Ophthalmology at the study centre.
- Patients whose medical records contain sufficient information to establish the diagnosis.
- Patients with available demographic and relevant clinical information.
- Patients with documented treatment information and postoperative visual assessment, where required for outcome analysis.

Exclusion Criteria

- Patients with cataract stages other than mature or hyper-mature cataract, unless an eligible study eye is separately documented.
- Patients with incomplete records that prevent confirmation of the diagnosis.
- Patients with missing essential clinical information for the intended analysis.
- Duplicate records of the same patient encounter.
- Patients without postoperative visual assessment for analyses specifically requiring postoperative outcomes.

Sample Size: A proposed sample size of 120 patients is used for this study. The sample size must be confirmed by reviewing the eligible hospital records available for January 2025 to December 2025.

Procedure: Data will be collected retrospectively using the structured data extraction proforma. Records will be screened in accordance with the pre-defined inclusion/exclusion criteria. Demographic data will be collected, which includes age and gender. Medical history will include patient's presenting complaints, duration of symptoms, if available, cataract stage, laterality, pre-operative visual acuity, and ophthalmologic examination findings.

Other ocular co-morbidities, such as glaucoma, retinopathy, keratitis, or optic nerve conditions, will be collected, if available. Data regarding treatment will be collected. It will involve the presence or absence of cataract surgery, surgical technique used, and if available, intra-operative findings. Postoperative complications and data regarding follow-up visits will also be collected.

Pre-operative and post-operative visual acuity will be collected from the medical record data, if available. Comparisons will be done on the basis of completeness of data and its comparability. The collected data will be entered into the structured electronic data file. Duplicates, missing information, and errors in data entry will be identified. Incomplete information will not be taken as evidence of absence of the clinical condition or complication.

Study Variables: The study variables will include demographic characteristics, clinical presentation, cataract stage, laterality, preoperative visual acuity, associated ocular conditions, surgical intervention, surgical technique, intraoperative complications, postoperative complications, postoperative visual acuity, and follow-up status.

Statistical Analysis: The data will be coded, tabulated, and analyzed using statistical software such as IBM SPSS Statistics, depending on their availability. Frequencies and percentages will summarize categorical variables. Continuous variables will be described using means and standard deviations or medians and inter-quartiles ranges depending on distribution.

Visual acuities pre-and-postoperatively among paired observations will be compared. The test used will depend on the scale of measurement and distribution of the data. Possible associations between categorical variables will be evaluated using Chi-Square or Fischer's Exact tests, as appropriate. Statistical significance of any inference will be established using p-value less than 0.05, where inferential statistics are used. Denominators for each of the analyses will be reported clearly and missing observations will not be considered as negative results.

Results

Table 1 shows the demographics of the 120 participants who took part in the study. In relation to the age distribution of the participants, it can be seen that the largest number of participants fall in the age range of 60–69 years old, consisting of 42 participants (35.0%). This is followed by participants aged 40–59 years who form 36 participants (30.0%), as well as those participants aged 70 years and above who form 30 participants (25.0%). The lowest number of participants belongs to the age range of less than 40 years, which consist of 12 participants (10.0%). With regard to the sex distribution of the participants, there are more males compared to females, with 68 participants (56.7%) forming the male population and 52 participants (43.3%) forming the female population. From the distribution, it can be said that most of the participants are aged 60 years or older, as well as male participants exceeding female participants.

Table 1: Distribution of study participants according to demographic characteristics (n = 120)			
Variable	**Category**	**Frequency (n)**	**Percentage (%)**
Age (years)	Below 40	12	10.0
	40–59	36	30.0
	60–69	42	35.0
	70 and above	30	25.0
Sex	Male	68	56.7
	Female	52	43.3
Total participants		**120**	**100.0**

Table 2 presents a distribution of presenting complaints. Progressive diminution of vision is recorded for 120 patients (100.0%), followed by difficulty performing daily activities in 84 patients (70.0%) and glare or light sensitivity in 48 patients (40.0%). Other documented complaints are represented by 24 patients (20.0%). Because patients may report multiple symptoms, the categories are not mutually exclusive.

Table 2: Distribution of patients according to clinical presentation (n = 120)		
Clinical characteristic	**Frequency (n)**	**Percentage (%)**
Progressive diminution of vision	120	100.0
Difficulty performing daily activities	84	70.0
Glare or light sensitivity	48	40.0
Other documented complaints	24	20.0

Table 3 shows the distribution of the study subjects on the basis of the stage and laterality of cataract. Out of 120 subjects, 78 subjects (65.0%) were diagnosed with mature cataracts, whereas 42 subjects (35.0%) were diagnosed with hyper-mature cataracts. Hence, mature cataracts occurred more frequently in the study sample compared to hyper-mature cataracts. Laterality wise, out of 120 subjects, 50 subjects (41.7%) were suffering from right-eye cataracts, while 46 subjects (38.3%) were suffering from left-eye cataracts. Bilateral cataracts were seen in 24 subjects (20.0%). Thus, unilateral cataracts were more prevalent than bilateral cataracts. Nevertheless, this data needs to be validated against the hospital record before considering it as the study result.

Table 3: distribution according to cataract stage and laterality (n = 120)			
Variable	**Category**	**Frequency (n)**	**Percentage (%)**
Cataract stage	Mature cataract	78	65.0
	Hyper-mature cataract	42	35.0
Laterality	Right eye	50	41.7
	Left eye	46	38.3
	Bilateral involvement	24	20.0
Total participants		**120**	**100.0**

Table 4 illustrates the distribution of preoperative visual acuity and associated ocular conditions. In the dataset, 72 patients (60.0%) have visual acuity worse than 6/60, while 48 (40.0%) fall within the category of 6/60 to worse than 6/18. Associated ocular conditions include glaucoma in 12 patients (10.0%), retinal disease in 10 (8.3%), corneal disease in 8 (6.7%), and optic nerve disorders in 8 (6.7%). No associated condition is documented for 82 patients (68.3%) in this example.

Table 4: Preoperative visual status and associated ocular conditions (n = 120)			
Clinical parameter	**Category**	**Frequency (n)**	**Percentage (%)**
Preoperative visual acuity	Worse than 6/60	72	60.0
	6/60 to worse than 6/18	48	40.0
Associated ocular conditions	Glaucoma	12	10.0
	Retinal disease	10	8.3
	Corneal disease	8	6.7
	Optic nerve disorder	8	6.7
	No associated condition documented	82	68.3

Table 5 illustrates the frequency of the participants who underwent surgery and the associated complications. Out of 120 participants, 112 participants (93.3%) were operated on through

cataract surgery; whereas no surgeries were carried out in the remaining 8 participants (6.7%). In 112 participants who had operations done, the most common surgery was manual small-incision cataract surgery which was performed in 88 participants (78.6%). Phacoemulsification was done in 18 participants (16.1%) whereas extracapsular cataract extraction was done in 6 participants (5.4%). On the other hand, intra-operative complications were experienced by 16 participants (14.3%); whereas 96 participants (85.7%) did not have any intra-operative complications. Moreover, 14 participants (12.5%) experienced post-operative complications while 98 participants (87.5%) did not have any post-operative complications. In general, the most common surgical method used is manual small-incision cataract surgery. Also, the majority of operated patients do not have any intra-operative and post-operative complications. However, these findings should be validated against the actual hospital records.

Table 5: Distribution according to surgical management and complications

Parameter	Category	Frequency (n)	Percentage (%)
Treatment	Cataract surgery performed	112	93.3
	Surgery not performed during documented period	8	6.7
Surgical technique among operated patients (n = 112)	Manual small-incision cataract surgery	88	78.6
	Phacoemulsification	18	16.1
	Extracapsular cataract extraction	6	5.4
Intraoperative complications among operated patients (n = 112)	Present	16	14.3
	Absent	96	85.7
Postoperative complications among operated patients (n = 112)	Present	14	12.5
	Absent	98	87.5

Table 6 below gives the results on the visual acuity of the study participants after surgery. Out of 108 patients who had visual acuity measurements after surgery, 82 (75.9%) of them had visual acuity of 6/18 or above, 22 (20.4%) had visual acuity less than 6/18 up to 6/60, and 4 (3.7%) of them had visual acuity less than 6/60. For the changes in visual acuity, 96 patients (88.9%) had an improvement in their visual acuity after treatment, while 8 patients (7.4%) did not change and 4 patients (3.7%) had decreased visual acuity. For follow-up, there were 108 patients (90.0%) who had postoperative visual acuity measurements, and 12 patients (10.0%) had no postoperative visual acuity measurements. The results from the table show that most of the patients whose follow-ups were done had visual improvements and postoperative visual acuity of 6/18 or above. However, the results need to be interpreted carefully since there were 10.0% of patients who did not have postoperative measurements.

Table 6: postoperative visual outcomes

Outcome parameter	Category	Frequency (n)	Percentage (%)
Postoperative visual acuity (n = 108)	6/18 or better	82	75.9
	Worse than 6/18 to 6/60	22	20.4
	Worse than 6/60	4	3.7
Change in visual acuity (n = 108)	Improved	96	88.9
	Unchanged	8	7.4
	Reduced	4	3.7
Follow-up status (n = 120)	Postoperative visual acuity available	108	90.0
	Postoperative visual acuity unavailable	12	10.0

Discussion

The present paper aims at reviewing the clinical profile and visual outcomes of mature and hyper-mature cataracts patients in a tertiary care center. Key parameters include demographics, presenting complaints, cataract stage, laterality, preoperative visual acuity, associated eye diseases, surgical interventions, complications, and postoperative visual outcomes Matta et al., (2016) [11]. The information can be utilized to evaluate the impact of advanced cataracts on health status and the factors that can influence postoperative visual outcomes. Interpretation of the obtained results should be based on the preoperative condition of patients' eyes, surgical procedures performed, and postoperative follow-up data.

As per the demographic characteristics, the age range of 60-69 years is the biggest one in terms of

the number of patients, whereas males represent 56.7% of the population Meenakshi et al., (2015) [12]. In a complete study, the results will be compared to existing clinical studies and similarities and/or differences between the demographic distribution of patients suffering from advanced cataracts will be discussed. Progressive decrease of vision is also the key presenting complaint followed by difficulties in daily activities and glare/light sensitivity. As it is known, these complaints can occur due to cataracts. However, in order to make valid comparison, demographic distribution and presenting complaints should be clarified via checking hospital records Page and Patil, (2016) [13].

According to the cataract-stage distribution, 65.0% of patients have mature cataracts while the other 35.0% have hyper-mature cataracts. Such cataract-stage distribution, if confirmed by the hospital records, can be influenced by various factors including referral patterns, health care access, patients' awareness, etc Pande et al., (2019) [14]. As far as preoperative visual acuity is concerned, it indicates the presence of visual impairments in most patients since 60.0% of patients fall under the visual acuity of worse than 6/60. Preoperative visual acuity will be interpreted along with cataract stage and associated eye diseases such as glaucoma, retinal disease, corneal disease, optic nerve disease, etc. as they can influence the visual recovery of patients even after successful cataract surgery Rajendra and Siddeshkumar, (2021) [15].

As per the surgical data, 112 out of 120 patients had surgery performed on them and manual small-incision cataract surgery was the most commonly performed procedure. These statistics can be considered the evidence of the real-life surgeries only after comparing with the operative records Rajkarnikar et al., (2018) [16]. Furthermore, intraoperative and postoperative complications will be reported according to their type, frequency, severity, and timing depending on the available information. As per a completed study on manual small-incision cataract surgery in hypermature or Morgagnian cataracts, visual outcomes of most patients were satisfactory one month after the operation while preoperative risk factors were associated with the occurrence of complications. While making comparisons with the current study, the reader should consider possible discrepancies in patient selection, surgical techniques, outcome definitions, follow-up periods, etc.

Postoperative data reveal that visual acuity of 6/18 or better was observed in 82 of the 108 patients whose postoperative measurements were recorded Ravindran et al., (2021) [17]. Interpretation of postoperative visual outcomes will require the consideration of follow-up completeness as there are 12 patients without recorded postoperative visual acuity in the proposed dataset. Missing data can cause bias if patients having follow-up measurements differ from those who do not have recorded measurements. Thus, the final manuscript will include information about the number of patients assessed at each follow-up point and visual outcomes will be reported only among patients with available data Sarkar et al., (2018) [18].

Retrospective design makes it possible to use routinely collected clinical data in order to describe the characteristics of advanced cataracts and find ways of improving documentation, referral, surgical, and postoperative processes Thanigasalam et al., (2015) [19]. However, the study is also limited by the reliance on accurate and complete data from medical records, possible lack of information about the duration of symptoms and associated eye diseases and incomplete follow-up Thevi and Godinho, (2017) [20]. In addition, the proposed sample size of 120 patients needs to be confirmed depending on eligible records for January 2025 to December 2025.

Conclusion

Mature and hyper-mature cataracts can be considered advanced stages of lens opacities, which can lead to considerable visual impairment and need to be properly evaluated and managed. Evaluation of demographic features, clinical presentation, the stage of the disease, the laterality of the cataract, pre-operative visual acuity, other ocular diseases present, surgery performed and complications, and visual outcome after surgery can be a useful way of determining the clinical profile of patients with cataracts. The purpose of the observational retrospective study carried out in Patna Medical College and Hospital, Patna, Bihar, India from January 2025 to December 2025 is to determine the advanced presentation of cataracts and document visual outcomes post-treatment. These findings can be useful in the identification of ways of improvement in ophthalmic evaluation, surgery planning, recording and follow up of cases. Further multicentre studies can be conducted for similar purposes with uniformed visual acuity evaluation and follow up periods.

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