

## A Clinical Study of Lens Induced Glaucoma

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### Abstract

**Background and aims:** There is an ever-increasing backlog of cataract due to the population explosion, increased life expectancy, and low productivity in terms of utilization of the available surgical services. The present study has endeavoured to determine the characteristics, risk factors, and their consequences on postoperative visual outcome, intraocular pressure (IOP), including optic disc changes in LIGs. **Materials and methods:** This prospective hospital-based study includes a total number of 80 cases of lens induced glaucoma patients who were clinically examined to diagnose the type of LIG. All aspects of the lens induced glaucoma's namely, the age, sex incidence, complaints and their duration, clinical features of various forms of lens induced glaucoma's, pre-operative management, surgical procedures done and post-operative follow up have been recorded. **Results:** The total number of cases studied were 80, of which 52 were female and 28 were male showing that occurrence of LIG is more common in females. Numbers of cases were more in the age group of 60- 75 years showing lens induced glaucoma is a condition of old age. Most common type was found to be phacomorphic type of lens induced glaucoma. The occurrence of phacoanaphylactic glaucoma and glaucoma due to subluxation of lens. BCVA at 6 weeks post operatively was 6/18 or better in 57.5% patients. Visual outcome bears a definite relationship with the duration of symptoms. BCVA of 6/6-6/18 in 77.6% of cases was attained in patients with duration of symptoms of less than one week. The postoperative IOP was within normal limits in 87.5% of patients. **Conclusion:** Despite the widespread availability of cataract surgical treatments, inadequate health education and a lack of awareness of symptoms and disease were identified to be the primary causes of LIG. There is need for public health education regarding the need of timely surgery for a better visual prognosis.

**Keywords:** Phacoanaphylactic glaucoma, cataract, visual prognosis.

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### Introduction

Cataract is a major cause of preventable blindness in India accounting to 62.6%. A significant proportion of patients still present with advanced cataract leading to complications like Lens-induced glaucoma. Lens-induced glaucoma is a secondary glaucoma in which the crystalline lens is involved in the mechanism of intraocular pressure increase [1,2]. There is an ever-increasing backlog of cataract due to the population explosion, increased life expectancy, and low productivity in terms of utilization of the available surgical services. Late reporting for treatment of cataract leading to serious complications like LIG remains one of the most important cause of irreversible loss of vision, especially so in the rural population. The uptake of eye care services by the rural community has also been suboptimal in countries like India where LIG is not an uncommon cause of ocular morbidity. Mode of treatment is Small incision cataract surgery with PCIOL, or extracapsular cataract extraction with posterior chamber IOL implantation (ECCE with PCIOL) with or without iridectomy. However, postoperative recovery in these conditions remains guarded. The occurrence of Lens Induced Glaucoma in India has high probability. Thus an analysis of magnitude of lens induced glaucoma and assessment of the visual outcome after cataract surgery in patients attending tertiary care centre would provide important information regarding the morbidity produced by this condition and its effect on incidence of blindness. This study the clinical profile of

various types of lens-induced glaucomas and outcome of current management in a patient seen over a two year period in a tertiary eye hospital.

#### Materials and Methods

This is a prospective hospital-based study on the patients attending the outpatient department of Ophthalmology from 2015 to 2017.

**Inclusion criteria:** All patients were diagnosed as lens induced glaucoma on the basis of clinical symptoms and signs.

**Exclusion criteria:** Glaucomas other than those due to phacogenic cause, congenital cataract, traumatic cataract, complicated cataract, secondary cataract and cataract with corneal dystrophy and corneal opacity. Eighty cases were studied, encountered during the period of 2 years. Only those cases which are amenable to follow up were taken up for the study. A detailed case history was taken providing address, age, sex and duration of pain. A detailed clinical examination of both eyes included the visual acuity, status of the lens, peripheral anterior chamber depth by slit lamp biomicroscopy, measurement of intraocular pressure with applanation tonometry, angle of anterior chamber examination by gonioscopy with three mirror Goldmann contact lens. Fundus examination done with a +90.0D lens. Clinical features included pain, loss of vision, redness of the eye, the presence of intumescent, mature or hypermature cataract with raised intraocular pressure of more than 21 mm Hg. Gonioscopy was not feasible in some cases due to corneal edema which precluded the visualization of the angle of anterior chamber details. Phacomorphic glaucoma was diagnosed on the basis of acute pain, corneal edema, circumciliary congestion, dilated fixed pupil, intumescent cataract with shallow anterior chamber and on gonioscopy shows narrow angle. Phacolytic glaucoma was diagnosed on the basis of pain, corneal edema, with or without anterior chamber

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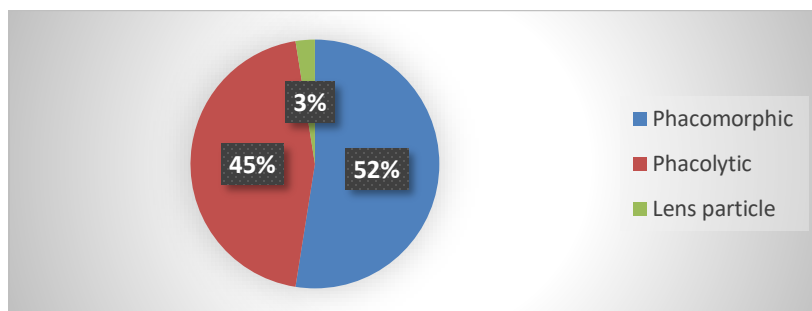
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flare, deep anterior chamber with open angle on gonioscopy, floating lens particles in AC and or pseudohypopyon. Patients with LIG due to lens displacement (subluxation or dislocation) were diagnosed by history and slit lamp examination may show hypermature morgagnian type of cataract with phacodonesis and iridodonesis. All cases were treated preoperatively with oral carbonic anhydrase inhibitors, topical  $\beta$  - Blockers and intravenous mannitol 20% 1 g/kg body weight over 30-40 minutes one hour before surgery to reduce the intraocular pressure. In addition topical steroids were given to reduce the inflammation. All the patients were explained about the guarded prognosis and an informed consent was obtained. A small incision cataract surgery was done in all patients and posterior chamber IOL implanted. Sub conjunctival injection of 0.5 CC of dexamethasone 2 mg and gentamycin 20 mg was given at the end of the procedure. The postoperative stay varied from 3 to 5 days with an average of 4 days depending on complications. They were given systemic antibiotics, topical steroid-antibiotic and cycloplegics postoperatively. Systemic and or subconjunctival steroids were given

to patients with a severe exudative reaction. At discharge a detailed examination including uncorrected visual acuity, slit lamp biomicroscopy was performed. Patients were discharged with instruction to use a topical steroid antibiotic combination hourly for 1 week and tapered over 6 weeks duration and were reviewed once in a week. Tonometry, slit lamp biomicroscopy, funduscopy with +90 D lens and BCVA were examined at the end of 6 weeks. BCVA > 6/18 was considered to be a reasonably good visual recovery and IOP < 21 mm Hg was considered to be within normal range. The results of the study were analyzed in terms of incidence, amount of IOP control preoperatively in response to medical treatment, postoperative IOP range, and visual outcome with respect to the duration of symptoms. All the data was arranged in a tabulated form and analyzed descriptively using SPSS software

#### Results

This study includes a total number of 80 cases of lens induced glaucoma patients who were clinically examined to diagnose the type of LIG.



**Fig 1: Number of cases and percentages of various forms of LIGs**

Among the 80 cases examined the most common pathophysiological mechanism was found to be phacomorphic type. There were no

phacoanaphylactic glaucoma and phacotopic glaucoma cases recorded in this study period.

**Table 2: Incidence of LIG in groups**

Age	Number of cases	Percentage
0-11	-	-
11-20	-	-
21-30	-	-
31-40	-	-
41-50	1	1.25%
51-60	31	38.75%
>60	48	60%
<b>Gender</b>		
Males	28	35%
Females	52	65%
<b>Duration of symptoms</b>		
< 1 week	43	53.75%
1-2 weeks	26	32.5%
2-4 weeks	9	11.25%
>4 weeks	2	2.5%

Lens induced glaucoma is a unilateral condition. Among the 80 cases examined right eye was affected in 43 cases and left eye in 37 cases. Lens induced glaucoma is a disease of old age. Majority of patients seen in this study about 48 patients were above the age group of 60

years. No patients were seen below the age of 48 years in our study. About 31 patients were seen between the age group of 51 to 60. In this study it was observed that LIG was more common in females than males. Among 80 patients observed 52 were female and 28 were male patients.

**Table 2: Range of IOP at the time of treatment**

Range of IOP at the time of admission	Number of cases	Percentage
21-25	2	2.5%
26-40	44	55%
>41	34	42.5%
<b>Range of IOP in response to medical therapy</b>		
<21 mm of Hg	6	7.5%

21-26 mm of Hg	56	70%
26-30 mm of Hg	12	15%
31-40 mm of Hg	4	5%
>40 mm of Hg	2	2.5%
<b>Range of IOP at 6 weeks post operatively</b>		
<21 mm of Hg	70	87.5%
>21 mm of Hg	5	6.25%
Lost for review	5	6.25%

Majority of the patients in this study presented within 1 week of onset of symptoms. About 44 cases out of the 80 cases studied presented within 1 week of onset of symptoms. Rest of the cases had symptoms for more than 1 week. In this study 44 out of 80 cases

presented with IOP presented with an IOP in the range of 26-40. About 34 patients presented with IOP more than 41 and 2 cases presented with IOP less than 26.

**Table 3: Percentage of patients with visual acuity at presentation, first post op week and 6 weeks post operatively**

Visual acuity	Preoperative (uncorrected vision)	First week (uncorrected)	6 weeks BCVA
6/6 – 6/18	-	27.5 %	57.5 %
6/24 – 6/60	-	52.5 %	26.25 %
6/60- HM	7.5 %	20 %	10 %
PL +	92.5%	-	-

Majority of the cases in this study were operated after the IOP has come down to normal limits using medical therapy. About 62 cases had IOP less than 25 mm of Hg pre-operatively. Rest of the cases had higher pre op IOP of more than 26 mm of Hg. Post-operative IOP at 6 weeks was found to be within normal range in 87.5% of patients. About 74 cases in this study presented with visual acuity of perception of light only. Only about 6 cases had visual acuity of Hand movements. In the first postoperative week majority of the

cases (52.5%) between 6/24 to 6/60. This was due to post-op iritis and corneal edema which reduced on follow up visits with topical antibiotic-steroid medication. About 22 cases achieved vision better than 6/18 and 16 cases had vision less than 6/60. 46 cases out of the 80 cases studied had visual acuity 6/6 to 6/18. About 21 cases had vision between 6/24 to 6/60 and 8 cases with less than 6/60. 5 cases were lost for review at sixth post op week.

**Table 4: Visual acuity in relation to duration of symptoms**

Duration of symptoms	6/6	6/9	6/12	6/18	6/24	6/36	6/60	CF - HM	LF
<1 week	11	10	7	5	6	2	1	0	1
1-2 weeks	3	3	4	2	2	4	4	2	2
2-4 weeks	-	-	-	1	-	-	1	6	1
>4 weeks	-	-	-	-	-	-	1	-	1

In this study it was noted that 33 cases out of 43 cases who presented within 1 week achieved BCVA of 6/6 – 6/18 at 6 weeks post operatively.

### Discussion

Lens induced glaucomas occur commonly in India. Though these are clinically distinct entities, they have certain common factors in that they are lens induced, they compromise the function of the optic nerve due to rise of intraocular pressure, cataract surgery is curative in these cases and finally they uniformly share a guarded prognosis. Lens induced glaucomas are either angle closure or open angle type, resulting due to some disorder of crystalline lens. Phacomorphic glaucoma is defined as secondary angle closure glaucoma due to lens intumescence. An acute rise of IOP can hamper the optic nerve function and may lead to irreversible visual loss if not treated on time. Phacolytic glaucoma is the sudden onset of open angle glaucoma caused by a leaking hypermature cataract. It was observed in this study that patients with phacolytic glaucoma seek medical advice earlier than phacomorphic glaucoma because of the quicker onset of pain, redness and watering in eye with acute elevation of IOP. Lens particle occurs in case of hypermature cataract, traumatic rupture of lens capsule or post-operative retained lens matter. Signs include mild to moderate signs of iridocyclitis, deep anterior chamber

and very few or no keratic precipitates. The most common form observed in this study was of phacomorphic type constituting 52.5% followed by phacolytic which was 45%. Similar observations were made by other studies where phacomorphic was more common than phacolytic glaucoma. Bhuyan et al found that phacomorphic glaucoma was more frequent accounting to 58.86% and phacolytic cases where 33.33% [3]. Sharanabasamma et al also observed that phacomorphic glaucoma (86%) was more frequent than phacolytic glaucoma (14%) [4]. Similar observation was noted in Madurai study (52.68%) [43] and Lahan study (72%) [5]. In a study conducted by Chandrasekhar et al phacomorphic glaucoma was observed to be more than phacolytic glaucoma [6]. Prajna et al also found that phacomorphic (52.7%) was slightly more common than phacolytic (47.3%) [7]. Ushalatha et al also states that phacomorphic glaucoma (62%) is more common than phacolytic glaucoma (38%) [8]. Rijal AP et al, Sharma RG et al also documented phacomorphic glaucoma to be commoner than other forms of glaucoma [9]. Occurrence of various LIGs in the above studies shows variations. Almost always phacomorphic glaucoma is the most common type of LIG among several studies, even in the present study, which is peculiar to the developing countries.

**Table 5: Percentages of phacomorphic and phacolytic glaucoma in different studies**

	Phacomorphic	Phacolytic
This study	52.5%	45%
Bhuyan et al [3]	58.86%	33.33%
Sharanabasamma et al [4]	86%	14%
Ushalatha et al [8]	62%	38%
Prajna et al [7]	52.7%	47.3%
Chandrasekhar et al [6]	68%	12%
Pradhan et al [5]	72%	28%
Rijal AP [9]	65%	35%

Phacomorphic and phacolytic glaucoma formed the main bulk of cases constituting 97.5% and lens particle glaucoma constituted 2.5%. Phacoanaphylactic uveitis with secondary glaucoma is seen in cases where there is history of cataract surgery or injury to lens. Very severe clinical picture of iridocyclitis and large number of mutton fat keratic precipitates are seen. In this study no cases of phacoanaphylactic glaucoma were reported indicating the refinement of cataract surgery. Glaucoma secondary to ectopia lentis/ phacotopic glaucoma is seen in cases where there is anterior or posterior dislocation of lens across pupillary plane leading to raised IOP. As phacomorphic and phacolytic glaucoma are seen following neglected cataract till it attains hypermaturity and leads to glaucoma, this emphasizes the importance of early detection and treatment of

cataract. Studies indicated that phacolytic glaucoma occurred more commonly with increasing age probably due to aggregation of high molecular weight proteins over time. Lens induced glaucoma being a secondary glaucoma is a unilateral condition. In this study right eye was effected in 43 (53.75%) of patients and left eye in 37 (46.25%). There was no significant association with the type of LIG. Peram et al showed that 52% cases had LIG in left eye were as 48% cases had LIG in right eye[10]. In a study conducted by Chandrasekhar et al left eye (52.5%) was more affected than right eye (47.5%)[6]. Similar results were found by Rijal and Karki. Left eye was affected in 62% of cases and right eye in 38% cases[9]. They suggested that there was no preponderance for right eye or left eye.

**Table 6: Laterality in different studies**

	Right eye	Left eye
This study	53.75%	46.25%
Chandrasekhar et al[6]	47.5%	52.5%
Rijal et al[9]	38%	62%
Peram et al[10]	48%	52%

In this study the age range was 42-75 years with a mean age of 62.13. The highest number of cases occurred in the age group of more than 60 years (48%). The youngest case in the study group was 42 years old whereas the oldest was 74 years old. Phacolytic glaucoma was seen more in older age groups than phacomorphic glaucoma. In a study conducted by Bhuyan et al. incidence was higher in the fifth decade and above[3]. Similar observations were made by Pradhan et al.<sup>5</sup> In a study conducted by Vaibhav et al. highest number of cases were seen in the age group of 60 to 69 years[4]. In a study conducted by Chandrasekhar et al majority of the cases occurred in the age group of 66-75 years[6]. This correlates well with our study. A study conducted by Prajna et al stated that age may be a confounding factor in obtaining better visual acuity as in older age groups optic nerve is more susceptible to damage with increasing intraocular pressure[7].

In our study this could not be stated as most of the patients obtained better visual acuity and no relation was made with respect to age.

In Lahan study, it has been found that occurrence of LIG is in the age range of 40 to 80 years and highest in the 60 to 69 years age group, indicating that LIGs are a condition of old age[5].

Ushalatha et al stated that onset of senile cataract is earlier in Indian patients and late reporting for treatment of cataract leads to serious complications like LIG[8]. Occurrence of LIG in the older age group is attributed to the fact that cataract is neglected till they become hyper mature producing symptoms other than diminished vision and pain requiring immediate medical help. This is because of insidious onset, lack of medical awareness, lack of regular eye check-up, ignorance and limited resources in developing countries.

**Table 7: Maximum number of cases in different age groups in various studies**

	Highest number of cases in the age group	Percentage of cases in this age group
This study	60-75 years	48%
Chandrasekhar et al[6]	66-75 years	40%
Sharanabasamma et al[4]	60-69 years	60%
Bhuyan et al[3]	56-70 years	47.05%
Rohtagi et al[11]	60-75 years	41.3%

The lens induced glaucoma was found to be higher in females than males in our study. This was about 65% with a ratio of 1.8:1. Study conducted by Bhuyan et al. also showed that incidence was higher in females showing 60.78% with a ratio of 1.6:1. Ushalatha et al[8] also found that incidence of LIG was more common in females than males in a ratio of 2:1. They stated that the reason could be lesser attention received by old women in rural India. This is identical with the studies of Sinha A and Prajan et al[7] Sharanabasamma et al[4] also showed that females had an increased risk of LIG over males with a ratio of 1.7:1. In this study it was also stated that cataract is more prevalent in females than males. This data was consistent with Madurai study and Punjab study conducted in India and MATLAB study in Bangladesh[7]. In a study conducted by Chandrasekhar et al incidence of LIG was slightly higher in females (58%) than in males (42%)[6]. Similar results were reported by Rijal AP and Pradhan et al[9]. They observed that socio-economic and cultural constraints like most of the patients were daily wage workers, lack of literacy and dependency on other family members play a role leading to neglect and late presentation of cataract in females and also females have shallow anterior chamber, making them more prone to angle closure. In this study also female preponderance was found to be due to socioeconomic repression in this region. Majority of cases in our study presented within first week of developing symptoms i.e about 53.75% and rest presented after 1 week (46.25%). Most of the patients in our study were from rural and semi urban areas and of

poor socio economic background. This might be the cause for late presentation in our study. In a study conducted by Bhuyan et al majority of cases (50.98%) presented within first week of developing symptoms[3]. Pradhan et al in his study found 70% of cases presented after 10 days of onset of symptoms. He stated the reasons for late presentation were "no escort" and "lack of money" [5]. Chandrasekhar et al found that out of 50 cases 29 cases i.e about 58% presented within first week[6]. In a study conducted by Ushalatha et al about 86% of patients presented to the hospital within 10 days of onset of symptoms[8]. A study conducted by sharanabasamma et al stated that reasons for late presentation were probably because of poverty, ignorance, lack of awareness, facilities for treatment, quackery at peripheries and lack of prompt referral and helplessness of patients[4]. In Kothari et al study, they observed that delayed reporting for treatment of cataract leads to serious complications like LIG. In spite of easy availability of services for cataract surgery, reasons such as poor health education, acceptance of poor vision as part of aging, fear of operation, lesser expectations appear to be the leading causes. In their study, Rijal and Karki also found that after taking history of all patients of LIG, all cases are having poor socio-economic conditions due to which negligence towards symptoms and disease, cases came after longer duration of symptoms[9]. Many of them were from far flung areas without any nearby facility of eye care services. This might be one of the causes for late presentation in our study. In Kothari et al study, they found

that longer the duration of symptoms greater the time to start treatment for LIG[12]. Also many people especially in rural areas take treatment for redness and pain in eyes from some local practitioners who miss the diagnosis initially. It was only when the symptoms became worse, they report to the hospital. Another factor about late reporting found was that the very elderly visually handicapped persons were left to their own fate as no one bothered to bring them to the hospital. All the patients in this study were admitted and started on IOP lowering drugs. Topical Timolol 0.5% eye drops given twice a day and topical steroids were started in cases of phacolytic glaucoma cases, oral acetazolamide or IV mannitol 20% was given depending on the severity and IOP. Pre-operative IOP control in all the cases were achieved medically to acceptable limits before going for definitive surgery under guarded prognosis. When the IOP is lowered, corneal edema decreases and enables better evaluation of the anterior segment. Peribulbar block with 4 ml of 2% xylocaine mixed with hyaluronidase and 2 ml of 0.5% bupivacaine was given before surgery. Digital pressure was applied minimally. Planned manual small incision cataract surgery with IOL implantation was done in all cases. Thorough anterior chamber wash was given. At the end of the procedure, sub conjunctival injection of steroid and antibiotic was given. Post operatively all the patients received topical antibiotic-steroid combination 1 drop hourly a day. A cycloplegic was also given twice a day to prevent posterior synechiae formation. If severe uveal inflammation was present, oral prednisolone 1 mg/kg body weight was given in a tapering dose over 3 weeks. All the subjects were followed up at day 1, 1 week, 4 weeks and 6 weeks after surgery. At every visit patients were evaluated for visual acuity with snellen's chart, IOP by Goldmann applanation tonometer, slit lamp examination of anterior segment and posterior pole examination with direct ophthalmoscope and 90 D lens. In our study all the 80 patients underwent manual small incision cataract surgery. 4 cases out of them had posterior capsular rupture with vitreous disturbance where vitrectomy was done and IOL was not implanted. Prajna et al[7] also performed extracapsular cataract surgery in all cases and found that there was no specific increase in the intraoperative complication rate. The rate of complications also did not differ between the types of LIG except for shallow anterior chamber seen in phacomorphic glaucoma. However they noticed that these cases had higher post-operative complications like hyphema and pupillary capture of PCIOL. In a study conducted by Sharanabasamma et al few cases required peripheral iridotomy[4]. Ushalatha et al[8] found that combined surgery with iridectomy was required in cases where the angle of anterior chamber was closed by peripheral anterior synechiae more than 180°. In a study conducted by Bhuyan et al combined surgery (SICS+PCIOL+Trabeculectomy) was required in cases with longer duration of attack. Laser iridotomy was done preoperatively in cases where IOP was not controlled with maximal medical management. A K Mandal states that it is always preferable to wait for 2 to 3 days before surgical intervention so that the IOP is lowered and the anterior chamber reaction is reduced[13]. He also stated and alternate way to manage weak zonules associated with phacolytic glaucoma and hypermature morgagnian cataracts by a V-shaped anterior capsulectomy by using angled Vannas scissors which obviated the need for traction on the capsule or the zonules [13,14] Chandra Das et al in his study stated that a combined surgery is required for better visual gain and IOP control. They used the Ahmed glaucoma valve implant that maintains an IOP at 8mmHg or higher. This study shows better control of IOP with cataract surgery combined with implant in cases where filtration surgery may fail[15]. At the time of admission the range of IOP at the time of admission was found to be 26-40 mm of Hg in majority of patients i.e in 55% of cases. In 42.5% of cases the IOP range was found to be above 40mm of Hg. Only 2.5% of patients were found to have IOP of 21-26 mm of Hg. According to other studies, most of the patients presented with IOP more than 40 mm of Hg. In a study conducted by Ushalatha et al 76% of cases have IOP more than 30 mm Hg. They

observed that the height of intraocular pressure has no relationship with duration of attack and type of cataract[8]. The highest IOP recorded in this study was 58 mm of Hg with applanation tonometer in case of phacolytic glaucoma. There was no significant difference in IOP among LIG subgroups. In a study conducted by Kothari et al., cases with delay in presentation between 2 and 4 weeks tend to present with higher IOP. Sharanabasamma et al also found that intraocular pressure tends to be higher if there is a delay in presentation beyond 30 days than the duration of presentation less than 2 weeks[4]. Though in this study, we observed that height of IOP had no relationship with duration of attack and type of cataract. Adequate control of IOP with medical therapy was achieved in 77.5% of cases, the IOP was about within 25 mm of Hg. In a study conducted by Sharanabasamma et al found that the reduction of IOP is greater after medication for glaucoma[4]. Nevertheless, surgical removal of lens is the definitive treatment for Lens induced glaucoma and response to medication is good in these cases. This indicates that in LIG, IOP should be reduced by medical line of management prior to surgery near-normal to normal to achieve stable IOP post-operatively without any further anti-glaucoma medications. In all these cases IOP decreased with medical management. The IOP was found to be within normal limits in 87.5% of patients at 6 weeks follow-up. P value of the post op IOP compared to pre op IOP is 0.0001 showing that IOP reduction was statistically significant after cataract surgery. Ushalatha et al also found that all the patients maintained a normal postoperative pressure of less than 20 mm Hg at 6 weeks without any additional medical therapy[8]. This correlates with Venkatesh R et al and Singh G studies who too achieved IOP <20 mm Hg in all their patients at the end of follow up period without any anti-glaucoma medication[16,17]. Chandrasekhar et al found that the IOP tends to be higher with the delay in presentation beyond 2 weeks than the duration of presentation <2 weeks. Though the mean IOP in this study at the last follow up was normal, cases with delay in presentation of more than 30 days tend to be on higher end of normal[6]. A good intraocular pressure control was defined as a final postoperative intraocular pressure of <21 mmHg, without the need for any anti-glaucoma medication. Those patients who had IOP of more than 21 mm of Hg after surgery which was about 6.25% had severe post-operative iritis and exudative membrane in the pupillary area. About 5 patients 6.25% were lost for review at 6 weeks post op. All the patients in this study presented with visual acuity of light perception and accurate projection of rays. As the patients in this study were illiterates and from rural areas, they ignore the mild symptoms and visited the doctor only after gross fall of vision. Also most of the patients had fairly good vision in the other eye leading to negligence till they developed complications in the effected eye. Only 7.5% patients presented with visual acuity of <6/60. About 27.5% of patients achieved good visual acuity of 6/6-6/18 within one week postoperatively. 52.5% patients got 6/24-6/60 vision and only 20% patients had less than 6/60 vision. The BCVA of 6/6 – 6/18 at 6 weeks post-operative period was obtained in 57.5% of cases. BCVA of 6/24 -6/60 was obtained in 26.25% cases. This was noted in cases that had longer duration of symptoms and presented late to the hospital. In a study conducted by Ushalatha et al at 6 weeks BCVA of 6/12 was achieved in 80%, 6/18 to 6/60 in 10% and <6/60 in 12%[8].

Chandrasekhar et al in their study found that BCVA of 6/12 or better was achieved in 44% of patients and visual acuity less than 6/60 was seen in 22% patients[6]. The Madurai study found that higher number of patients (59.13%) achieved 6/12 or better than those less than 6/60 (11.82%). Prajna et al found that 57% of phacomorphic glaucomas and 61% of phacolytic glaucomas attained postoperative corrected visual acuity of 6/12 or better. 10.2% patients with phacomorphic glaucoma and 13.6% patients with phacolytic glaucoma had visual acuity less than 6/60. The poor vision in these patients was found to be due to compromised optic nerves due to



glaucomatous process[7]. Prajna N V et al also showed that BCVA of >6/60 was achieved in 88% and less than 6/60 in 10%. They documented that the common cause of poor visual outcome was optic atrophy. As in our study they too related the final visual acuity more to the duration of attack than to the type of LIG or to the type of surgery, stating that there is a great need to impart health education to the public about the importance of timely surgery for better visual outcome. In this study, duration of symptoms had a linear relation with best corrected visual acuity at the final follow up. About 76.7% of patients presented within 1 week achieved BCVA between 6/6 – 6/18. Other cases that presented within one week but did not achieve good vision were found to have post-operative complications like corneal edema, posterior capsular opacification and exudative membrane formation. Sharanabasamma et al found that good visual acuity was achieved in cases presented within 2 weeks (72%) was more than cases presented beyond 2 weeks (16%). This study shows linear relationship between the symptom duration and BCVA at final follow up. Sharanabasamma et al also studied the influence of inflammation on final visual acuity. Visual acuity achieved in cases with mild to moderate inflammation (52.78%) was better than cases with severe to very severe inflammation (21.43%)[4].

Prajna et al also analyzed the role of age and sex of the patient including the duration of glaucomatous process in the visual outcome. They found that patients above the age of 60 years had a marginally significant increase in odds of obtaining a poor visual acuity[7]. About 35% patients who presented with less than 40 mm of Hg achieved good visual acuity of 6/6-6/18. 41.1% of patients who presented with IOP more than 40 mm Hg achieved good visual acuity of 6/12 or better. In our study poor visual acuity was not related to the pre op IOP. About 20.5% patients presenting with IOP above 40 mm Hg had vision 6/60 or less. A study conducted by Chandrasekhar et al showed that cases with IOP at presentation <30 mm of Hg achieved good visual acuity (60%) than cases with IOP more than 40 mm of Hg (20%)[6]. The Madurai study found no significant association between level of preoperative IOP and final visual acuity. Most of the patients in our study had mild post-operative complications like striate keratopathy and iritis which subsided on hourly institution of topical steroids. Few cases had pupillary capture of PCIOL. Other cases with low visual acuity at 6 weeks post op were found to have exudative membrane in the pupillary area, posterior capsular opacification and pigment deposits on the IOL. 4 of the patients in our study were left aphakic due to posterior capsular rupture. At 6 weeks post op fundus examination showed normal optic disc in majority of the patients. In 2 cases of the cases glaucomatous optic atrophy was seen which was correlated to the duration of symptoms. Patients who presented beyond 2 weeks had less visual acuity compared to those presented within 2 weeks. Sharanabasamma et al also observed similar results where optic disc was normal in 58% of patients at the last follow up. Glaucomatous disc damage was found in 42% cases. Optic disc damage was found to be more in patients presented beyond 2 weeks (64.28%) and especially beyond 30 days (100%) than in cases presented before 2 weeks. According to Ushalatha et al 8% cases have developed glaucomatous optic atrophy and 4% developed atrophic bulbi due to delay in attending the hospital. In a study conducted by prajna et al postoperative poor visual acuity was found to be due to glaucomatous optic atrophy and severe persistent postoperative uveitis with resultant cystoids changes in the macula[4,7,8]

#### Conclusion

Lens-induced glaucomas are a group of presentations in old age with increased risk among females in the lower socioeconomic stratum.

#### Conflict of Interest: Nil

#### Source of support: Nil

Results from the present study have shown that, good visual acuity can be attained in lens induced glaucoma patients who presented with less than two weeks duration, with intraocular pressure values of less than 21 mmHg. In spite of easy availability of services for cataract surgery socio-economic conditions, poor health education and negligence towards symptoms and disease was found to be the main reason for occurrence of LIG. This study signifies that there is a great need to impart health education to the public about the importance of timely surgery for better visual outcome. Educating people and strengthening of ophthalmology services in rural areas may be helpful in prompt referral of lens induced glaucomas thereby reducing further morbidity caused by the disease.

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