

# Pre-operative Clinical Profile of Lens-Induced Glaucoma in a Tertiary Care Hospital in Karnataka – A Descriptive Study

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## Abstract

**Introduction:** Lens-induced glaucoma (LIG) can be defined as a secondary glaucoma characterized by raised intraocular pressure (IOP) due to lens related problem, secondary angle closure associated with pupillary block, and secondary to open angle associated with lens matter and products of inflammation. It includes phacomorphic, phacolytic, phacotoxic, and phacotopic glaucomas.

**Methods:** This is hospital-based prospective study of 1 year with sample size of 50. The material for study was drawn from patients attending the outpatient department of ophthalmology. Patients satisfying the inclusion criteria were selected among the patients presenting with LIG. Patients were subjected to detailed ophthalmic history and examination.

**Results:** A total of 50 patients were included in this study, 18 (36%) were male and 32 (64%) were female. Phacomorphic cases were more than noted in phacolytic cases. Maximum cases were found in 60–70 years of age group 26 (52%). Patients presented with reduced vision in 48 (96%) cases, eye pain in 43 (86%) cases, redness of eye in 38 (76%) cases, corneal edema noted in 14 (28%) cases, anterior chamber inflammation in 15 (30%) cases, vomiting as presenting complaints in 9 (18%) cases, and headache in 17 (34%) patients. Average IOP measured was 41.5 mmHg. Maximum patients in this underwent small incision cataract surgery with posterior chamber intraocular lens implantation of about 43(86%), PI done in 5 (10%) cases, and trabeculectomy in 2 (4%) cases.

**Conclusions:** Early presentation and prompt treatment have a better visual outcome. The treatment for LIG is the lens extraction followed by an intraocular lens implantation.

**Key words:** Intraocular pressure, Lens-induced glaucoma, Phacolytic glaucoma, Phacomorphic glaucoma

## INTRODUCTION

Lens-induced glaucoma (LIG) was first described in the year 1900 by Gifford<sup>[1]</sup> and Von Reuss<sup>[2]</sup> independent of each other. While the former described it as a glaucoma associated with hyper mature cataract, the latter described it as a glaucoma associated with spontaneous absorption of lens substance through intact lens capsule. Subsequently, various workers described such types of cases under

different names such as LIG, lens-induced uveitis and glaucoma, phacotoxic glaucoma, phacogenic glaucoma, and finally phacolytic glaucoma.<sup>[2-5]</sup> These terms including the more popular term phacolytic glaucoma have been discarded for various reasons and convenience in favor of the term “LIG.” At present, LIG is a clinical condition characterized by (1) a violent secondary glaucoma (resembling acute angle closure glaucoma) in one eye with senile mature cataract, hyper mature senile cataract (rarely immature senile cataract) yet with an open angle, (2) normal intraocular pressure (IOP) and open angle in other eye, and (3) a prompt relief of symptoms and restoration of vision after cataract extraction in the effected eye.

Late reporting for the treatment of cataract leading to serious complications like LIG remains one of the

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most important cause of irreversible loss of vision, especially so in the rural population. This preventable and curable condition, though rare in developed countries, is unfortunately still prevalent in India. In the developing world, like India, financial, cultural, and psycho-social barriers to accessing excellent surgical services still exist. 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 uptake of eye care services by the rural community has also been sub optimal in countries like India, where LIGs are a common cause of ocular morbidity.<sup>[6]</sup>

It has long been recognized clinically that several forms of glaucoma may occur in association with the formation of cataracts, which are an important cause of secondary glaucoma in the developing world. These LIGs are a common occurrence in India, hardly surprising in a situation where the incident of cataract cases far exceeds the total number of surgeries performed currently.<sup>[7]</sup>

The outstanding features of this group of patient's are

1. Sudden onset of glaucoma in an eye with mature or hyper mature cataract
2. Advanced age of the patient, generally above fifties
3. Almost constant observation of fairly good vision and normal tension in the opposite eye which may be aphakic or otherwise.<sup>[7]</sup>

### Objectives

The objectives are as follows:

1. To study clinical profile of LIG
2. To find out age- and sex-wise distribution of LIG (socio-demographic profile)
3. To evaluate the visual prognostic factors before surgery
4. To educate the patients for prevention of the same for the other eye.

### METHODS

This hospital-based prospective study was conducted at Raichur Institute of Medical sciences in accordance with tenets of the Declaration of Helsinki. Ethical clearance was obtained from Institutional Ethical Committee. Study duration was 1 year with sample size of 50 was taken using purposive sampling method. The material for study was drawn from patients attending the outpatient department of ophthalmology. Patients were subjected to detailed ophthalmic evaluation and data were recorded in a specially designed pro forma which was transferred to master sheet. The data were subjected to statistical analysis by the biostatistician of our institution. During the above

said period, patients satisfying the inclusion criteria were selected among the patients presenting with LIG.

### Inclusion Criteria

All cases of LIG with senile immature cataract, senile mature cataract, and senile hyper mature cataract, who attended the outpatient department of RIMS Raichur were included in the study.

1. Associated with acute rise in IOP above a level known to cause clinical signs and symptoms
2. Slit lamp examination to diagnose phacomorphic, lens particle, and phacolytic glaucoma.

### Exclusion Criteria

The following criteria were excluded from the study:

1. Primary open and closed angle glaucoma
2. Other secondary glaucoma's (such as due to trauma, intraocular inflammation, and neovascular glaucoma)
3. Abnormal material deposition in anterior chamber (mainly pigment dispersion syndrome, and pseudo exfoliation syndrome)
4. Complicated cataract
5. Lens displacement
6. Corneal dystrophies and degenerations with cataract
7. Patient unfit for surgery due to extremely poor general condition such as uncontrolled diabetes mellitus (DM), hypertension (HTN), and ischemic heart disease (IHD)
8. Non-compliant patients.

### Assessment of Patients Consists of

#### Pre-operative

1. External examination and assessment of ocular motility
2. Visual acuity recording
3. Detailed systemic clinical examination of patients will be done
4. Slit-lamp bio microscopy
5. Examination of the pupil with special attention to the presence of relative afferent
6. Pupillary defect
7. IOP measurement
8. Gonioscopy
9. A scan.

#### Post-operative

1. Visual acuity on 1<sup>st</sup>, 7<sup>th</sup> post-operative day and finally at 6<sup>th</sup> week
2. Refraction at 6<sup>th</sup> week
3. IOP measurement at 6<sup>th</sup> week
4. Slit-lamp bio microscopy
5. Detailed examination of the optic disc and retina
6. Visual fields: If glaucoma is suspected, and automated perimetry is performed.

### Surgical procedure

Informed written consent was taken from all patients. After controlling IOP with appropriate treatment, all patients will undergo manual small incision cataract surgery (SICS) with intraocular lens implantation with iridectomy and or trabeculectomy when necessary had been the established treatment.

### Technique of surgery

1. Peribulbar injection of lignocaine+ bupivacaine is given using 24 gauge needle under aseptic precautions
2. Eye ball and periorbital region is painted and draped
3. Universal wire speculum is used to keep the lids apart during surgery
4. Superior rectus bridle suture is placed, then fornix based conjunctival flap is made
5. Incision is made around 2 mm away from the superior limbus using 15 no. surgical blade, length of incision being 6–6.5 mm
6. Using a 2.6 mm crescent blade, sclera-corneal tunnel is made up to 1.5 mm into the clear cornea
7. Side port is made using keratome at 9 or 3 o'clock limbus depending on RE/LE respectively
8. AC formed using air and anterior chamber stained with Trypan blue
9. AC formed using viscoelastic
10. Capsulotomy was done either by continuous curvilinear capsulorhexis/can-opener technique using cystitome
11. AC formed with visco-elastic and entry into the AC through the main tunnel done using 2.8 mm keratome
12. Hydro dissection was done using 27 gauge hydro dissection needle
13. Nucleus prolapsed into AC and delivered out by viscoexpression
14. Remaining cortical matter removed by continuous irrigation and aspiration
15. AC formed using viscoelastic and capsular bag distended
16. IOL is implanted into capsular bag/sulcus
17. AC wash was done to remove the visco-elastic
18. wound closed by hydrating the side port
19. Subconjunctival injection of gentamycin+ dexamethasone was given
20. Eye padding and bandage was done.

### Statistical Analysis

Descriptive statistics were done for all data. Based on normality, parametric, and non-parametric tests were done and were declared statistically significant for  $P < 0.05$ .

## RESULTS

A total of 50 patients were included in this study, out of which 50 patients 18 (36%) were male and 32 (64%) were

female with ratio of 1:2 [Table 1]. In this study, we noted that phacomorphic noted in 37 (74%) and phacolytic in 13 (26%) patients. Maximum cases were found between 60 and 70 years age group of about 26 (52%) cases. After that, 10 (20%) cases found in between 70 and 80 years age group, 8 (16%) cases in above 80 years age group, and 6 (12%) cases between 50 and 60 years age group. In almost, all age group females had maximum presentation in comparison to males. Patients presented to the hospital with reduced vision in 48 (96%) cases, eye pain in 43 (86%) cases, redness of eye in 38 (76%) cases, corneal edema noted in 14 (28%) cases, anterior chamber inflammation in 15 (30%) cases, vomiting as presenting complaints in 9 (18%) cases, and headache in 17 (34%) patients. Average IOP measured was 41.5 mmHg and in the range of 28–55 mm Hg. Maximum patients in this underwent SICS with posterior chamber intraocular lens (PCIOL) implantation of about 43 (86%), PI done in 5 (10%) cases, trabeculectomy in 2 (4%) cases. In maximum post-operative cases, IOP was average of about 14.6 mmHg and visual acuity was above 6/24 in 27 (54) patients [Table 2].

## DISCUSSION

In 2014, Yaakub *et al.* reported that out of 38 patients of LIG, phacomorphic (28) was the main cause of LIG, followed by phacolytic<sup>[8]</sup> and in our study we noted 37 cases of phacomorphic and 13 cases of phacolytic. The main clinical symptoms were reduced vision (94.7%), eye pain (84.2%), and eye redness (81.6%). In our study, it was 96%, 86%, and 76%, respectively. Most patients presented with visual acuity of hand movements (84.2%) or worse and in our study we have in 86% of cases. Ocular pressure more than 40 mmHg (53.3%) and in this study

**Table 1: Age-and group-wise distribution of patients**

Age group	No of cases n (%)	No of male n (%)	No of females n (%)
50–60	6 (12)	2 (4)	4 (8)
61–70	26 (52)	8 (16)	18 (36)
71–80	10 (20)	4 (8)	6 (12)
>80	8 (16)	4 (10)	4 (6)
Total	50	18 (36)	32 (64)

**Table 2: Presentation of patients**

Symptoms/sign	No of cases n (%)
Reduced vision	48 (96)
Eye pain	43 (86)
Eye redness	38 (76)
Vomiting	9 (18)
Headache	17 (34)
Corneal edema	14 (28)
Anterior chamber inflammation	15 (30)

average IOP noted was 41.5 mmHg. Nineteen patients underwent extracapsular cataract extraction (ECCE) with primary PCIOL implantation; in our study, 43 (86%) cases underwent SICS with PCIOL implantation. Twenty-eight patients were able to stay free from pressure lowering drugs after operation. In the study done by Yakub, IOP reduced tremendously on discharge with a mean of 15.2 mmHg and vision had improved exceptionally (>6/36) and in our study it was 14.6mmHg and in 27 (54%) cases respectively.

In 2014, Dakshayini reported that among 50 cases of LIG, the maximum prevalence of LIG occurred in age group of 50–65 years. Females are more affected than male. Majority were affected by phacomorphic and phacolytic glaucoma's, ECCE or SICS with PCIOL implantation was alone is curative in LIG of duration <7 days. In case of duration more than 7 days, trabeculectomy has to be combined. The need for trabeculectomy in LIG needs further comparative study.<sup>[9]</sup>

In 2010, Ramakrishnan *et al.* published their results on visual prognosis following manual SICS. A total of 74 eyes with phacomorphic glaucoma were included in this study. The pre-operative mean IOP was 38.4 and mean IOP at last follow-up was 12.7 mmHg. The final post-operative best corrected visual acuity was 20/40 or better in 51 patients. Eighteen eyes had corneal edema and 36 eyes had anterior chamber inflammation. Both conditions resolved following standard medical therapy.<sup>[10]</sup> In 2007, Venkatesh *et al.* conducted a study on safety and efficacy of manual SICS for phacolytic glaucoma. Post-operative IOP was 22 mmHg or less in all cases and 87.9% achieved a post-operative visual acuity of 20/60 or better. They had no major complications.<sup>[11]</sup>

In 2001, Pradhan *et al.* reported a study on 413 patients with LIG who were followed over a 12 month period. Visual acuity was hand movements or less before surgery. 311 of these patients underwent cataract surgery. 120 of 311 operated eyes (38.6%) achieved 6/60 or better, 94 (30.2%) <3/60. The main causes of poor outcome in 94 patients were optic atrophy in 32 (34%), uveitis in 25 (26.6%) eyes, and corneal edema in 24 (25.5%) eyes. The results highlight the importance of early diagnosis and treatment of visually disabling cataract.<sup>[12]</sup>

In 1996, Prajna *et al.* reported a study review on 93 patients with LIG, 49 phacomorphic, and 44 phacolytic. About 57% with phacomorphic and 61% with phacolytic glaucoma recovered visual acuity of 6/12 or better. They

concluded that patients more than 60 years and in patients whom glaucoma was present for more than 5 days had a significantly higher risk of poor visual outcome.<sup>[13]</sup>

In 1994, Singh *et al.* published their results on phacolytic glaucoma its treatment by planned ECCE done on five patients, with a mean follow-up of 2 years, all patients (100%) maintained a normal postoperative IOP of <20 mmHg. The final best corrected visual acuity in four cases (80%) was 6/12 or better, while in one case it was 6/24 due to a senile maculopathy.<sup>[14]</sup>

## CONCLUSIONS

Late reporting for treatment of cataract leading to serious complications like LIG. It remains one of the most important causes of irreversible loss of vision, especially in the rural population of India. Early recognition and treatment are necessary for all mature and hypermature cataract cases.

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