ORIGINAL RESEARCH

A posterior segment evaluation by B-scan in mature and hypermature cataract

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INTRODUCTION

Visual loss due to cataract continues to be a major public health problem worldwide. Globally, cataracts remain the leading cause of blindness in middle- and low-income countries.The most recent estimates from who reveal that 47.8% of global blindness is due to cataract which includes India, 51% of blindness is due to cataract. Cataract surgery has been viewed as one of the most cost-effective health interventions. Cataract has been documented to be the most significant cause of bilateral blindness in India. India is committed to the goal of elimination of avoidable blindness by 2020 in line with the Global vision 2020: the right to sight initiative[3].

Many of cataract cases have advanced cataract that preclude visualization of fundus prior to cataract surgery. Such visualization is considered important to provide accurate prognosis for vision after cataract surgery. Under such circumstances ultrasonographic examination might provide information regarding such abnormalities[4].

Surgery for traumatic cataract is a potentially complex procedure. Careful ophthalmic imaging using ultrasound may result in finer pre-operative detail regarding lens support structures, and may give the surgeon the advantage to plan for surgery[5].

Ultrasound is a safe technique, cheaper, easily available and provide more affordability compared to other imaging techniques such as Computed Tomography (CT) scan and Magnetic Resonance Imaging (MRI)[6].

Its use has expanded to encompass biometric calculations, tissue characterization, and diagnosis of complex vitro-retinal conditions and differentiation of intraocular masses[15, 16]. In the orbit, ultrasound including Doppler, is used for the investigation of extraocular muscles[17, 18],retrobulbar optic nerve disease[19, 20], vascular anomalies[21]and orbital mass lesions[22, 23].

B-scan (brightness) mode is more useful than A (Amplitude) scan for a better demonstration of the shape and topographic relationship of lesions in the posterior segment[6].The purpose of the study is to visualize the status of posterior segment with B-scan ultrasound in pre-operative mature and hypermature cataract patients in order to evaluate posterior segment pathologies.

AIMS AND OBJECTIVES OF THE STUDY

To evaluate the prevalence and nature of posterior segment pathologies detected by B-scan ultrasound in pre-operative mature and hypermature cataract patients and to study various

patient risk factors that increase the likelihood of posterior segment pathology to help the ophthalmologist in predicting possible **visual prognosis** in addition to proper planning and execution of surgery and to decide postoperative management.

PROPERTIES OF ULTRASOUND

Like sound, ultrasound obeys wave equation[35].

$V = \upsilon \lambda$

V = velocity of the sound in meters/sec, υ = the frequency in Hz and

λ =wavelength in meter.

There are four main categories of ultrasound image display – A mode, T or TM mode, B mode and Doppler.

METHODS OF PERFORMING SCANS

CLOSED EYE CONTACT SCANS

Certainly in some situations, the eye must remain closed in orderfor an ultrasound exam to be performed. Some of these conditions are:

- Recent trauma, surgery or open wound
- Infants and children
- One-eyed patients
- An examiner who feels uncomfortable with placing the probe directly on the globe.

OPEN EYE CONTACT SCANS

MINI-IMMERSION SCANS

Now the anterior segment structures will be within the zone of maximum resolution, 10 to 30 mm.Mini-immersion scans are used in the special case of such pathologies as iris cyst, ruptured lens capsule, and ciliary body melanoma[47].

WATER BATH IMMERSION SCANS

REAL TIME SCANNING

DYNAMIC SCANNING

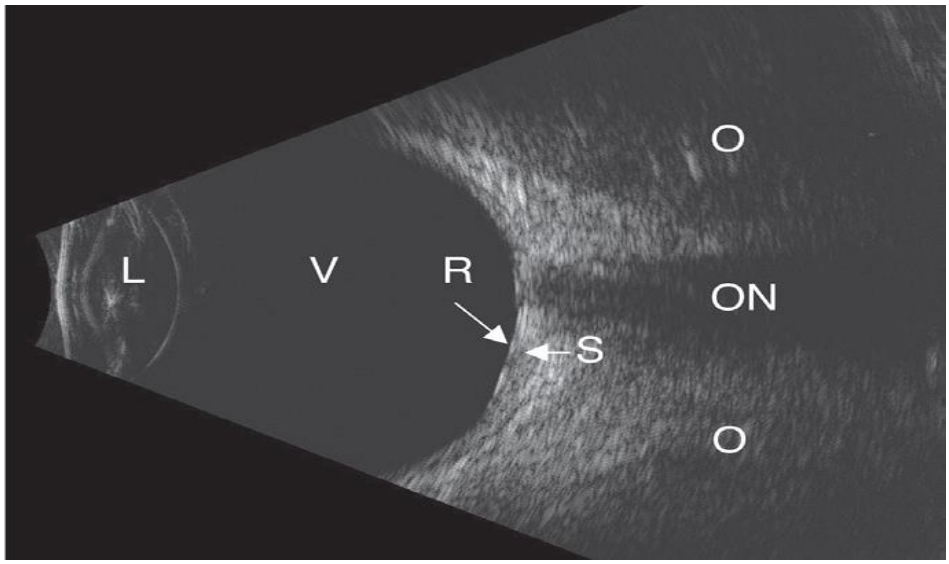

Figure 14: Axial probe position. B-scan probe tip placed directly over the cornea (A).Corresponding ultrasonographed fundus (B, line). Resulting B-scan image showing the centered crystalline lens and optic nerve (C), L = lens, V = vitreous, R = retina, S = sclera, ON = optic nerve, O = orbital tissue) [5]

PROTOCOL FOR A BASIC EXAM

There are six basic probe positions which make up the protocol. Ifa pathology is detected during the exam; other positions such as the longitudinal and oblique scans should follow.
Position #1 is horizontal transverse with the probe marker directed nasally.
Position #2 is vertical transverse with the probe marker directed superiorly.
Position #3 is horizontal transverse with the probe marker directed nasally.
Position # 4 is vertical transverse with the probe marker directed superiorly.
Position # 5 is vertical axial with the probe marker directed superiorly
Position # 6 is horizontal axial with the probe marker directed nasally.

Table 1: Screening Technique

Clock hour-probe position	Clock area-area screened
3-Limbus	9-Posterior
3-Equator	9-Equator
3-Fornix	9-Enterior
6-Limbus	12-Posterior
6-Equator	12-Equator
6-Fornix	12-Anterior

Table 2: Structures Viewed

Scan	Probe Position	Aspect View
Horizontal Transverse	6- Limbus	Postero Superior
Vertical Transverse	Temporal Limbus	Nasal
Horizonatal Transverse	12- Limbus	Inferior
Vertical Transverse	Nasal Limbus	Temporal
Vertical Axial	Primary Gaze	Cornea, Posterior Lens, Optic Nerve
Horizontal Axial	Primary Gaze	Macula Imaged Below Optic Nerve

ANATOMY AND ULTRASOUND FEATURES

Various ocular abnormalities are as follows:

Vitreous abnormalities: In **vitreous degeneration**, the liquefied vitreous contains cholesterol crystals that move with eye movements, which appear as hyper reflective mobile foci within the vitreous chamber, also known as synchysisscintillans.

Persistent hyperplastic primary vitreous is a serious unilateral disorder of the vitreous that is seen in childhood. There is failure of regression of the primary vitreous. The primary vitreous persists in a microphthalmic eye and B-scan shows a retrolental membrane, which may be dense; there is a persistent hyaloidarteryextending from the retrolental region to the optic disc[62-65].

Vitreous haemorrhagecan result from tearing due to vitreo-retinal traction, diabetic retinopathy, vasculitis, subarachnoid haemorrhage, and blunt trauma to the eye. The presence of blood cells in the vitreous gives rise to low-intensity echoes. Later, the haemorrhage may organize and develop fibrinous membranes.

Subhyaloid haemorrhage occurs in a potential space created between the posterior vitreous detachment and retina. As compared to vitreous haemorrhage it resolves earlier.

Vitreous detachment - It is seen frequently in cataractous eyes on B-scan. B-scan shows reduced volume of vitreous gel. USG also shows marked mobility and elasticity of the detached vitreous, with a mirror image configuration when the eye is deviated to one side and then to the other. Posterior vitreous detachment with collapse has been described as the cause of acute rhegmatogenous retinal detachment.

RETINAL ABNORMALITIES

Retinal detachment is usually due to a break or tears in the retina; it may also be caused by vitreoretinal traction due to contracting membranes or because of **subretinal exudates/fluid**. The changes are – RD with dense proliferation, complete closed funnel RD, RD with thick sub-retinal exudates, cystic degeneration of RD, closed funnel RD with dystrophic, choroidal calcification and closed funnelRD with phthisis bulbi[70].

B

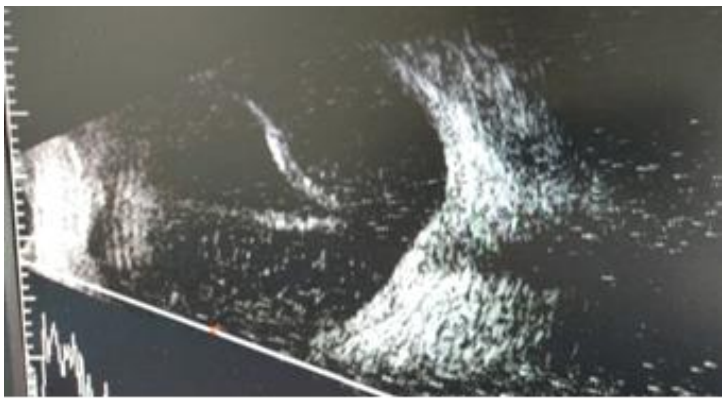

Figure 20: Retinal detachment (A, B). The retina has a funnel-shaped appearance due to firm attachment at the oraserrata anteriorly and the optic nerve head posteriorly.

Retinoblastoma - The tumor projects from the retina into the vitreous chamber. Some tumors produce subretinal lesions and cause retinal detachment. Calcium deposits are commonly seen within the tumor. The calcium deposits, which are seen as highly reflective foci, are pathognomonic of the condition. The tumor outline is irregular. B-scan may help in the detection of optic nerve invasion resulting from extraocularspread of the tumor[73].

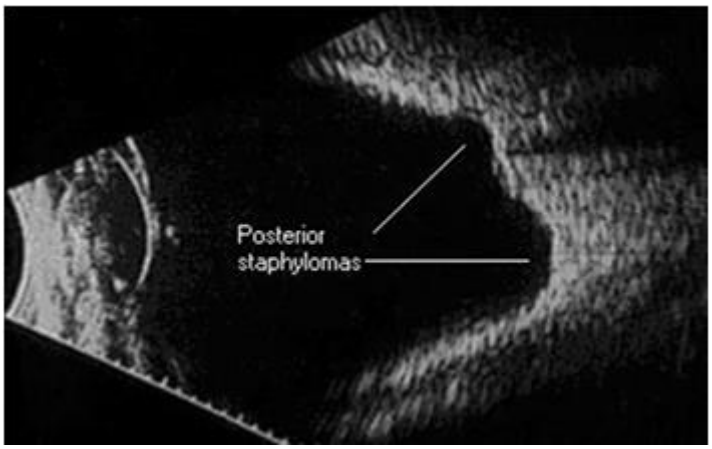

Figure 21: Posterior staphyloma

Choroidal abnormalities: A complete **Choroidal detachment** shows a fluid in the suprachoroidal space, limited by the attachments of the choroid- anteriorly to the ciliary body and hence the scleral spur, posteriorly – at the exit foramina of the vortex veins. A complete

detachment therefore appears on scanning as a biconvex indentation of the globe. Scanning may reveal choroidal tumors (melanoma, secondary deposits or retinoblastoma) as the cause of exudative RD, but the etiology also includes endogenous uveitis and infections[69].

Choroidal thickening may occur secondary to posterior uveitis or endophthalmitis. **Choroidal melanoma**, On B-scan, it is seen as a lenticular-shaped mass arising from the choroid. USG is used to assess scleral erosions and extraocular extension into orbital fat. Some tumors have a collar-button or mushroom shape.

Optic nerve abnormalities: Drusen (hyaline bodies), Scanning demonstrates a collection of calcific material in the optic nerve head, sometimes protruding into the vitreous and causing acoustic shadow.

Optic nerve tumors include neurilemmoma, glioma, meningioma, lymphangioma etc. Optic nerve sheath meningiomas arise from arachnoid villi and present with unilateral slowly developing impairment of the vision.

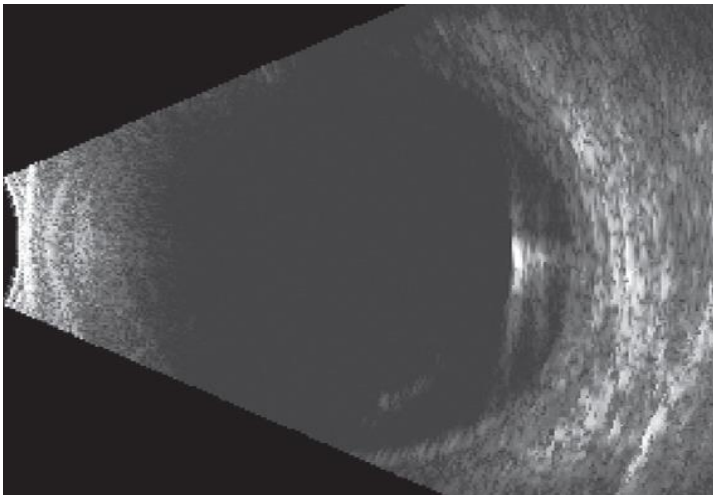

Figure 22: Intraocular foreign body.

MATERIAL AND METHODS

This study had been designed as **cross-sectional observational** study involving general population of Gandhinagar, Gujarat, India. The research protocol had been presented to the Institutional Ethics Committee (IEC) and approval had been taken before commencement of the study. Participants had been explained clearly about the nature and purpose of the study in the language they understand and written informed consent had been obtained before enrolling them for the study.

STUDY SITE

The study had been conducted in department of ophthalmology, GMERS Medical College, Gandhinagar, Gujarat.

TIME FRAME

23/05/2017 to 22/12/2018

STUDY DESIGN

Cross sectional observational study.

STUDY POPULATION

Patients were been presenting in outpatient department in ophthalmology department in GMERS Medical College, Gandhinagar, satisfying the inclusion criteria.

SAMPLE SIZE

Sample size n= [DEFF*Np(1-P)]/ [$d^2/Z^2_{1-a/2}$*(N-1)+p*(1-p)]

Using above formula, a sample size of 120 is obtained by using the hypothesis testing method and based on following assumptions: 95% confidence intervals, prevalence of blindness in India 1.1% [101] and 2% margin of error. The calculated minimum sample had beeninflated by 10% to account for anticipated subject non response.Sample size is calculated using OpenEpi software, which is freely available.. It has been represented as actual frequencies, percentage. For analysis of association chi-square test had been used. P value < 0.05 will be consider significant.

INCLUSION CRITERIA

All cases of mature and hyper mature cataract whether undergoing for cataract surgery or not.

EXCLUSION CRITERIA

Those who were having history of posterior segment lesions and those who had been previous history of ocular surgery specifically posterior segment surgery were excluded from the study

Congenital cataract, Grade 1-3 cataract, Macular lesions

METHODOLOGY

PARTICIPANT RECRUITMENT PROCEDURE

The present study had been conducted in a tertiary care teaching hospital from outpatient departments by ophthalmologists and diagnosed as mature and hypermature cataract patients. Patients who were meet the eligibility criteria have been enrolled in the study, a written and informed consent had been obtained from all patients after explaining the procedure.

Patient had been asked about the record of all the details. Detailed ocular, systemic, family history will be taken. Preoperative evaluation were recorded such as Visual acuity testing for distant vision using Snellen's chart, anterior segment examination by using of slit lampbiomicroscopy, measurement of IOP with schiotz tonometer and Goldmann'sapplanation tonometer after instilling paracaine eye drop and staining with fluorescein strip and B-scan examination[96-99].

B SCAN PROCEDURE

Patients had been briefly explained about the procedure for their co-operation. The patients have been examine in supine position on the examination table. They had been evaluated by Ultrasonic HiScan OPTIKON (B-scan) , calibrated on 30/10/2016 , equipped with 12.5 MHz probe placed in Ophthalmology department. Contact method of examination have been used. Ultrasonic probe had been placed over the closed eyelid after application of coupling gel then anterio-posterior, longitudinal and transverse views Of B-scan along with A-scan were taken. High gain (80 to 90dB) and low gain (60 to 70dB) sensitivity have been used in selected patients during ultrasonography[99].

INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENT

The study requires the following investigations like:

- Visual acuity testing for distant vision using Snellen's chart.Anterior segment examination by slit lamp biomicroscopy.
- Measurement of IOP with schiotz tonometer and Goldmann'sapplanation tonometer after instilling paracaine eye drop and staining with fluorescein strip.
- B-scan examination[96-99].

RESULT& OBSERVATION

Table 4: Distribution By Sex Of Patients (N=120)

Sex	Number (N)	Percentage (%)
Male	57	47.5%
Female	63	52.5%
Total	120	100%

In this study female patienthad been accounted for 52.5% patients and 47.5% patients had been accounted for male.

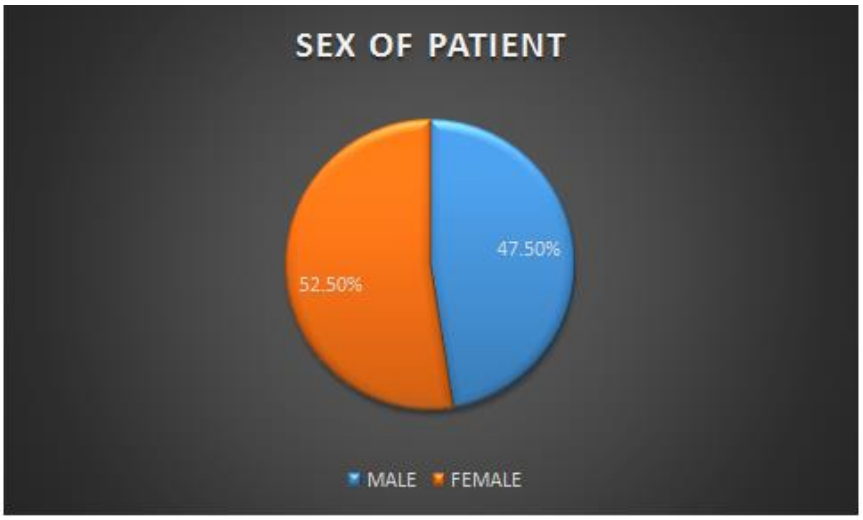

Figure 23: Distribution of the sex of the patient (N=120)

In this study out of 120 patients, 63 patients were female and 57patients were male.

Table 5: Distribution of the age group of patient (N=120)

Age In Years	Number (N)	Percentage (%)
<40	9	7.5 %
40 TO 60	60	50 %
>60	51	42.5 %
TOTAL	120	100 %

In this study, the majority of patients were between 40 to 60 years (n=60). Other age group more than 60 years (51). Only 9 patient were in less than 40 years.

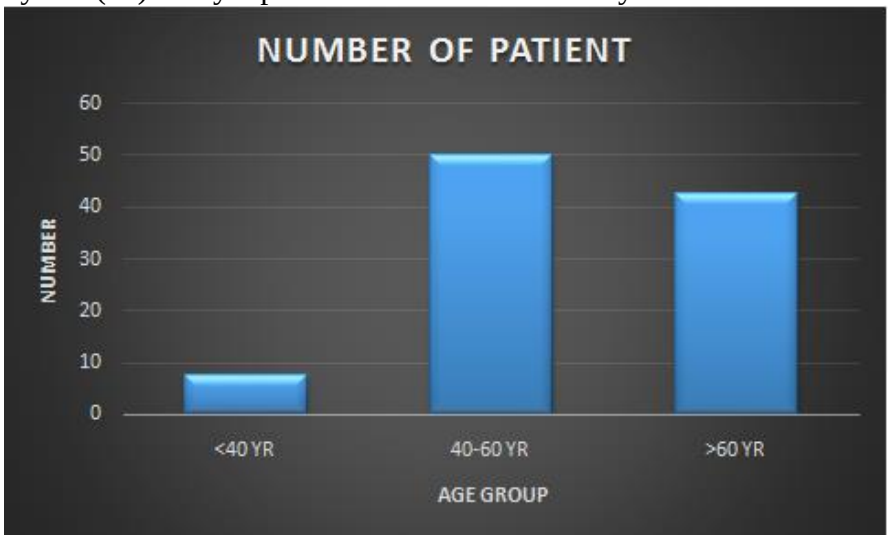

Figure 24: Distribution of the age group of the patient (N=120)

In this study, the majority of patients were between 40 to 60 years (50%). Other age group more than 60 years (42.5%). Only 7.5% patient were in less than 40 years.

Table 6: Distribution of the socio-economic status of the patient (N=120)

Socio-Economic Class	Number (N)	Percentage (%)
Upper	15	12.5
Middle	47	39.17
Lower	58	48.33
Total	120	100 %

The socio-economic classification was done using Modified Prasad's classification. In this study shows that majorities of patients under lower socio-economic status. This may be due to the fact that the study was conducted government civil hospital and majority patients in OPD came from nearby rural areas. Only 12.5% of the patients belong to upper socio-economic class while remaining 39.17% of patients belong to middle socio-economic class.

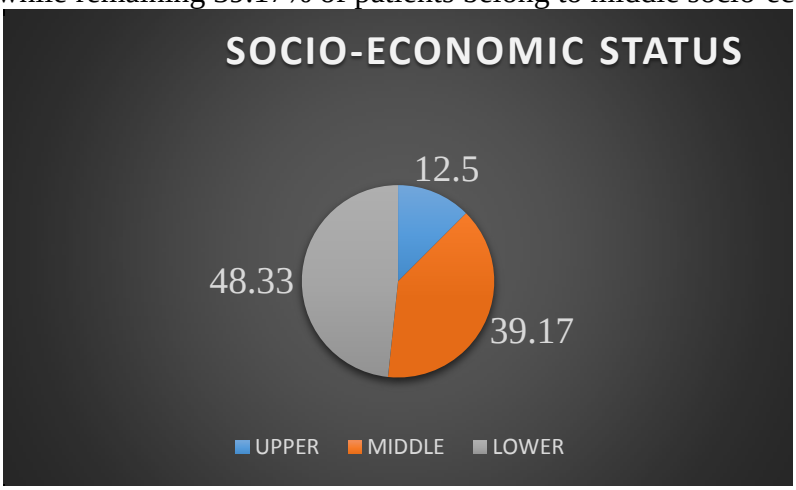

Figure 25: Distribution of the socio-economic status of the patient (N=120)

Table 7: Distribution of the patient based on type of laterality (N=120)

Laterality	Number (N)	Percentage %
RE	67	55.83 %
LE	50	41.67 %
BE	3	2.50 %

In this study 67 patients had dense lens changes in right eye, 50 patients had dense lens changes in left eye and 3 patients had bilateral cataract.

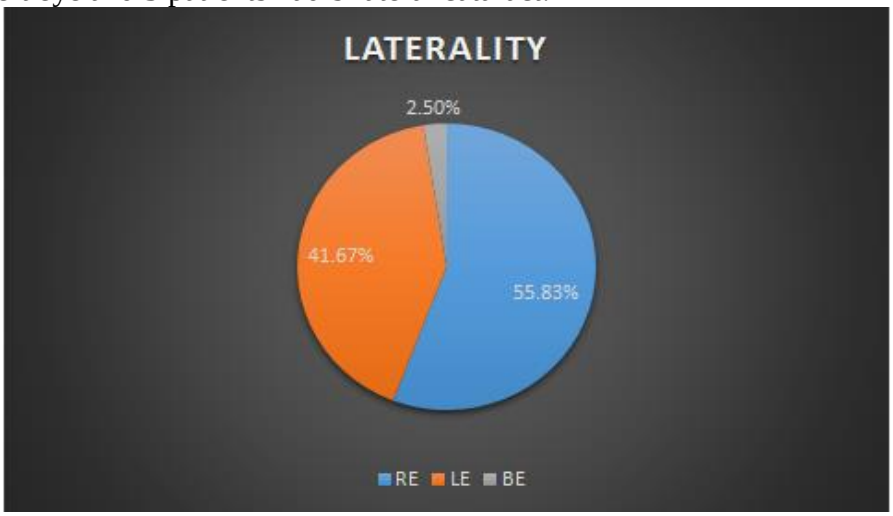

Figure 26: Distribution of the patient based on type of laterality (N=120)

Out of 120 patients in this study 55.83% patients had dense lens changes in right eye followed by 41.67% patients with dense lens changes in left eye and 2.5% patients with bilateral lens changes.

Table 8: Distribution of patient based on type of cataract (N=120)

Type Of Cataract	Number (N)	Percentage (%)
Mature Cataract	53	55.83 %
Hypermature Cataract	67	44.17 %
Total	120	100 %

In our study shows that out of 120 patients, 53 patients were mature cataract and 67 patients were hypermature cataract.

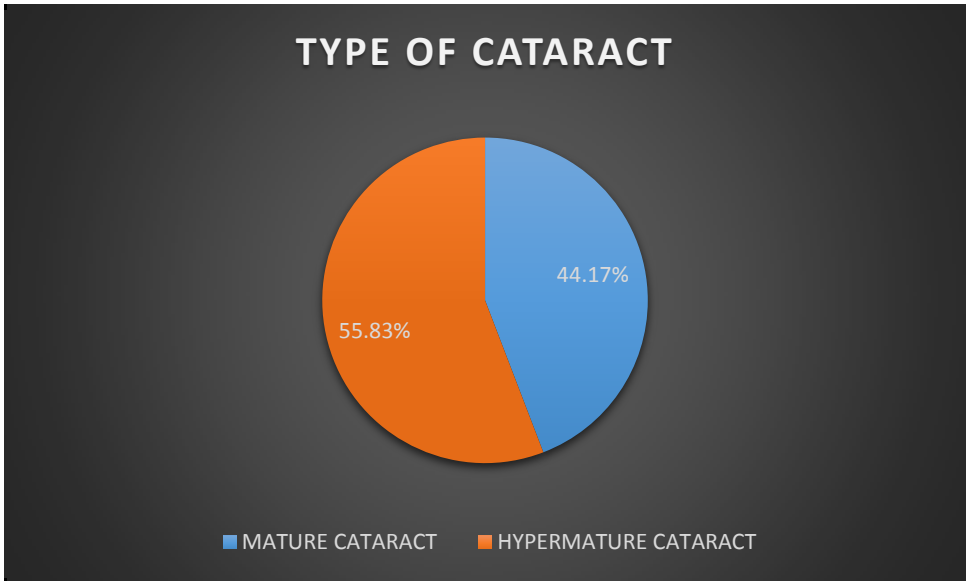

Figure 27: Distribution of patient based on type of cataract (N=120)

In our study shows that out of 120 patients, 55.83% patients were mature cataract and 44.17% patients were hypermature cataract.

Table 9: Distribution of patient based on visual Acuity (N=120)

Visual Acuity	Number (N)	Percentage (%)
CFCF (Counting Fingers Close To Face)	26	21.67 %
HM+	62	51.67 %
PL+ , PR in four quadrant	25	20.83 %
PL+, PR DEFECTIVE	4	3.33 %
NO PL	3	2.50 %
TOTAL	120	100 %

In this study 62 patients had vision of hand movements followed by 26 patients with counting fingers close to face, 25 patients with perception of light with projection of light in 4 quadrants, 4 patients with perception of light with projection of light defective, 3 patients with no perception of light.

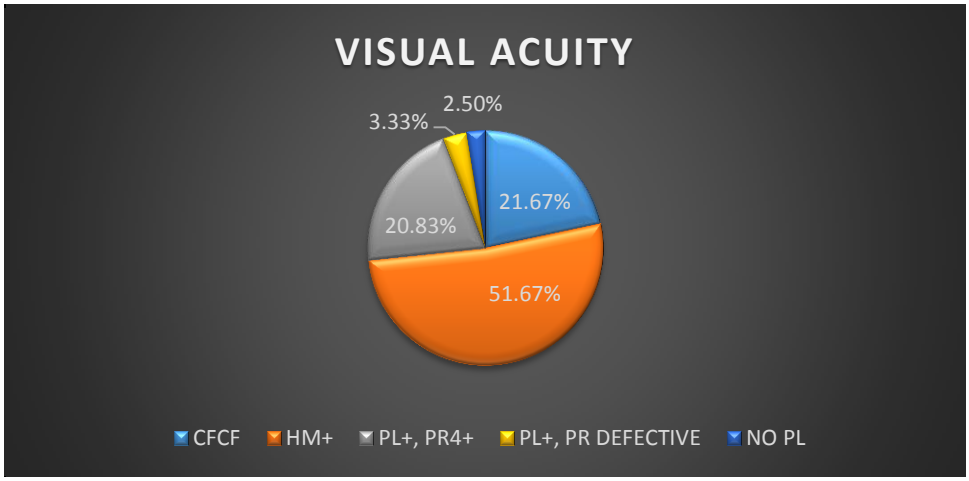

Figure 28: Distribution of patient based on visual acuity (N=120)

In this study 51.67% patients had vision of hand movements followed by 21.67% patients with counting fingers close to face, 20.83% patients with perception of light with projection of light in 4 quadrants, 3.33% patients with perception of light with projection of light defective, 2.5% patients with no perception of light.

Table 10: Distribution of patient based on intraocular pressure (N=120)

IOP	Number (N)	Percentage (%)
6	03	2.50 %
8	01	0.83 %
10	22	18.33 %
12	23	19.17 %
14	13	10.84 %
16	27	22.5 %
18	18	15 %
20	08	6.67 %
22	03	2.50 %
24	01	0.83
26	01	0.83

In this study, 27 patients had IOP of 16 followed by 23 patients with IOP of 12, 22 patients with IOP of 10, 18 patients with IOP of 18, 13 patients with IOP of 14, 8 patients with IOP of 20,3 patients with IOP of 22 and 6, one patient with IOP of 6,24,26.

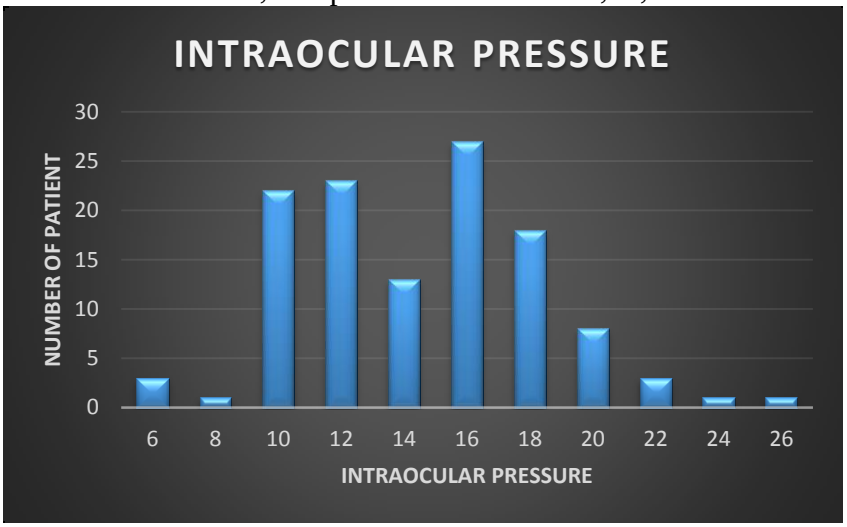

Figure 29: Distribution of patient based on intraocular pressure (N=120)

In this study most commonly 22.5% patients had IOP of 16 followed by 19.17% patients with IOP of 12, 18.33% patients with IOP of 10, 15% patients with IOP of 18, 6.67% patients with IOP of 20, 2.5% patients with IOP of 22, 2.5% patients with IOP of 6, 1.8% patients with IOP of 26, with least recorded IOP in 0.83% in each individual group in IOP of 8, 24, 26.

Table 11: Distribution of patient based on pupillary assessment (N=120)

Pupillary Assessment	Number (N)	Percentage (%)
NORMAL (NRL)	110	91.67 %
SD FIXED	2	1.67 %
SL TO LIGHT	3	2.5 %
SYNECHIAE	2	1.67 %
RAPD	3	2.5 %
TOTAL	120	100 %

In this study out of the 120 patients studied 110 had normal pupil followed by 3 patients with Relative afferent papillary defect, 3 Patients with sluggishly reacting pupil and 2 Patients had semidilated fixed pupil and 2 patients had synechiae in the pupillary area.

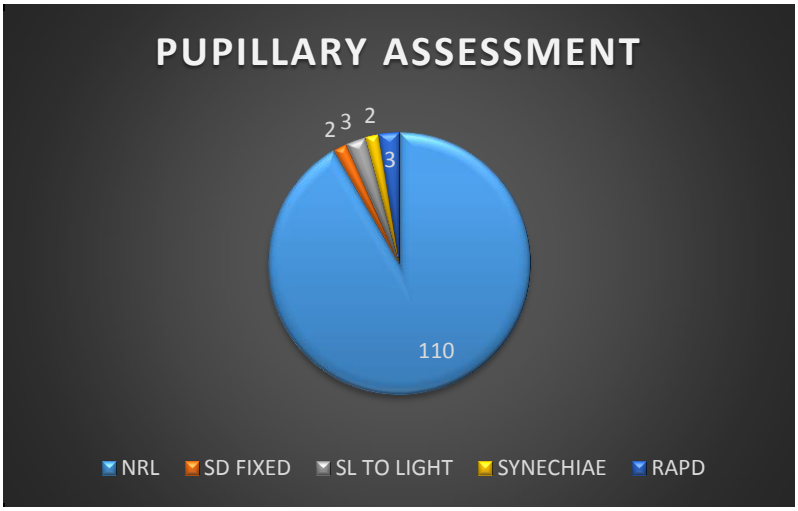

Figure 30: Distribution of patient based on pupillary assessment

In this study out of the 120 patients studied 91.67% had normal pupil followed by 2.5% patients with Relative afferent papillary defect, 2.5% patients with sluggishly reacting pupil and 1.67% patients had semidilated fixed pupil and 1.67% patients had synechiae in the pupillary area.

Table 12(a): Distribution of patient based on B-scan finding (N=120)

B-Scan Finding	Number (N)	Percentage (%)
Normal	75	62.5 %
PVD	15	12.5 %
Vitreous Degeneration	14	11.67 %
Asteroid Hydrosis	9	7.5 %
Retinal Detachment	4	3.33 %
Posterior Staphyloma	2	1.67 %
Vitreous Haemorrhage	1	0.83 %
Total	120	100 %

In this study shows that out of 120 patients, 62.5% patients had normal B-scan findings followed by 12.5% patients with posterior vitreous detachment, 11.67% patients with vitreous degeneration, 7.5% patients with asteroid hyalosis, 3.33% patients with retinal detachment,

1.67% patients had posterior staphyloma and vitreous haemorrhage was noted in 0.83% patient.

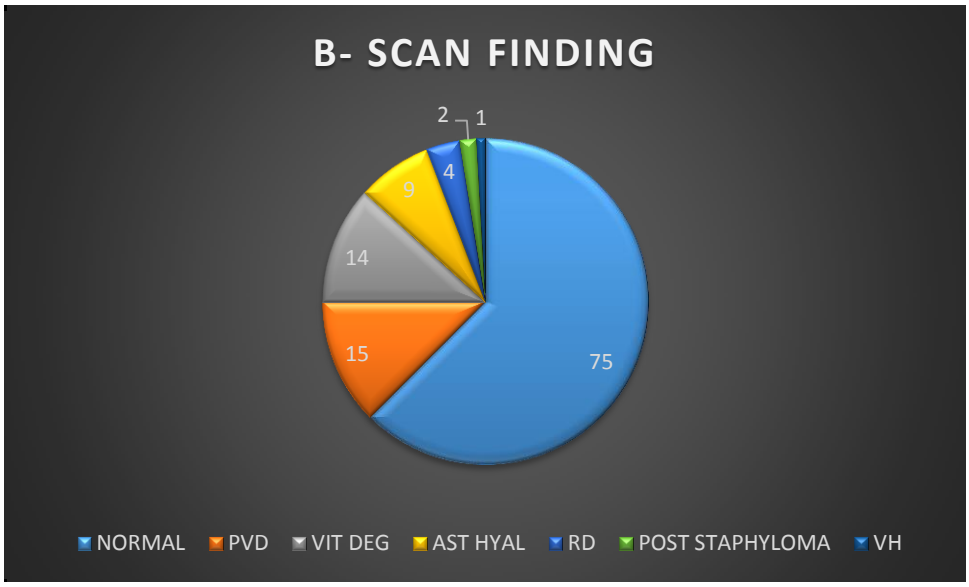

Figure 30(a): Distribution of patient based on B-scan finding (N=120)

In this study shows that out of 120 patients studied 75 patients had normal B-scan findings followed by 15 patients with posterior vitreous detachment, 14 patients with vitreous degeneration, 9 patients with asteroid hyalosis, 4 patients with retinal detachment, 2 patients had posterior staphyloma and vitreous haemorrhage was noted in 1 patient.

Table 12(b): Distribution of patient based on B-scan finding

B-Scan Finding	Senile Cataract	Non-Senile Cataract	Total
Positive	19	26	45
Normal	59	16	75
Total	78	42	120

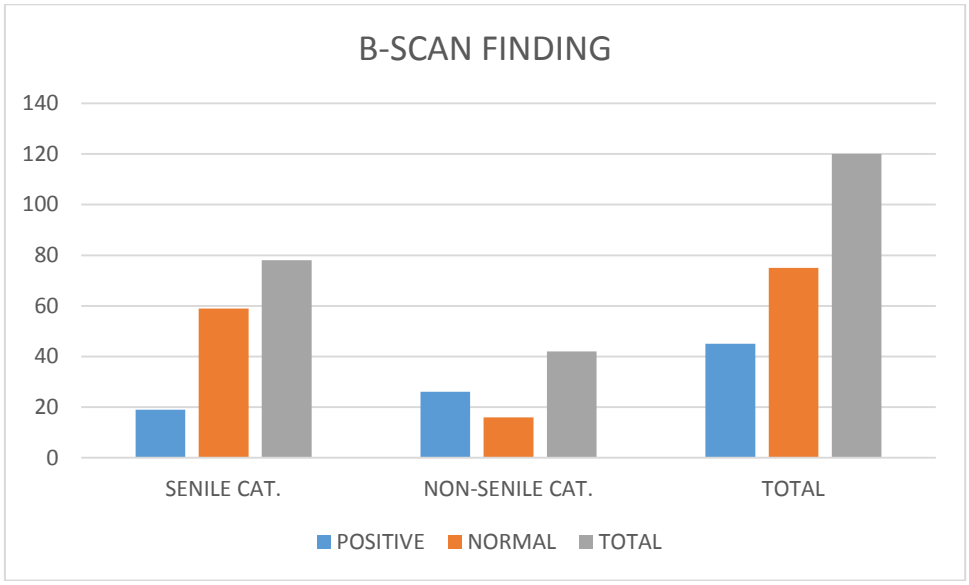

Figure 29(b): Distribution of patient based on B-scan finding

The chi-square statistic is 16.42. The p-value is .000051. The result is significant at $p < .05$.

Table 12(c): Distribution of patient based on B-scan finding

B-Scan Finding	Diabetic Cataract	Non-Diabetic Cataract	Total
Positive	22	23	45
Normal	11	64	75
Total	33	87	120

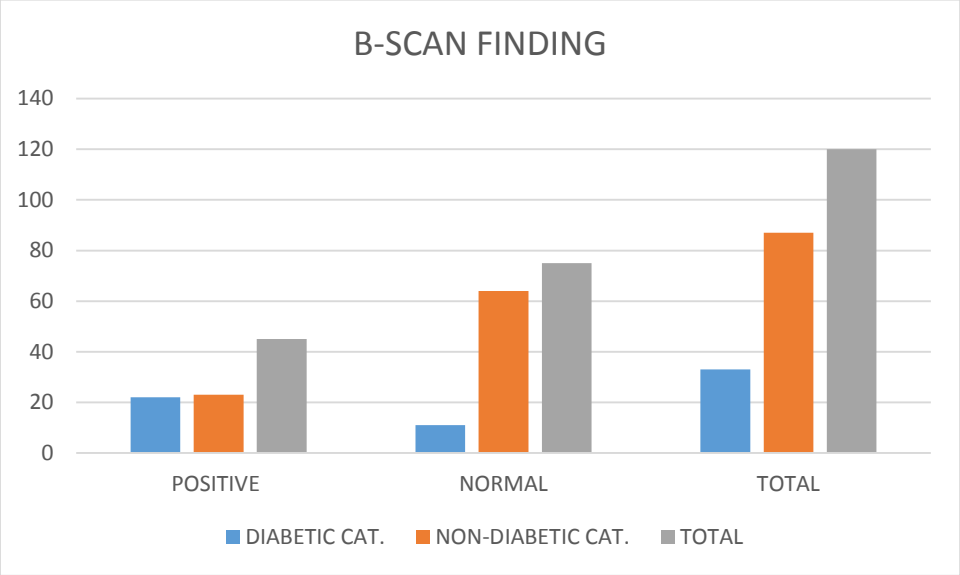

Figure 26(c): distribution of patient based on B-scan finding

The chi-square statistic is 16.5211. The p-value is .000048. The result is significant at $p < .05$. Although we didn't find any significant p-value for above mentioned study, we found greater association of findings in B-scan. A study with larger sample size would be required to show significant association.

COMPARATIVE STUDIES

STUDY I

The study done by Manzoor A Qureshi, KhalidaLaghari showed that B-scan is one of the diagnostic tool for detecting concealed posterior segment lesions and it can be performed routinely in cataract patients posted for surgery, to help in surgical planning. Out of 750 patients in the study, posterior segment lesions was detected in 90 patients, 25(3%) patients had RD, 14(2%) patients had PVD, 24(3%) patients had vitreous haemorrhage, 12(2%) patients had asteroid Hyalosis, 9(1.2%) patients had Posterior Staphyloma, 6(1%) patients had IOFB.

STUDY II

12- Month prospective study was conducted by Bello and Adeoti in 2006, B-scan ultrasound was done on 116 eyes of 80 patients. 110 eyes (94.8%) had a normal posterior segment. Total retinal detachment was noted in 3 eyes (2.59%), partial retinal detachment was noted in 1 eye (0.87%), 2 (1.72%) eyes with total retinal detachment along with vitreous haemorrhage were noted in the same patient.

STUDY III

A retrospective study of 509 cases was done in the department of ophthalmology to explain the role of preoperative ultrasonographic assessment for patients having dense cataract by Blumenthal et all, patients underwent ultrasound examination by B-Scan .19.6% of the patients had a posterior segment pathology. The most frequent abnormalities detected were

retinal detachment (4.5%), posterior staphyloma (7.2%), and vitreous hemorrhage (2.5%). One patient had a choroidal malignant melanoma .The prevalence of posterior segmental abnormalities was slightly higher in patients with traumatic cataract compared with the nontraumatic cataract patients (29.6% versus 19.0%, respectively; P = .1). The prevalence of retinal detachment was found to be high in the traumatic cataract subgroup (14.8% compared with 3.9%), but this was not of statistical significance.

DISCUSSION

The ability to evaluate the posterior segment of the eye precisely in the patients with mature and hypermature cataract is very essential to good surgical care of the cataract patient. In patients with mature and hypermature cataract, the posterior segment is not accessible to direct and indirect ophthalmoscopy and so adequate assessment of the posterior segment to exclude abnormalities becomes a difficult task. There is also a risk of poor visual prognosis in patients with cataracts who may also have co-existing posterior segment abnormalities. In these situations, B- scan ultrasonography provides a method of assessing the structural changes in the posterior segment in these patients. In the 500 eyes we studied, we were able to demonstrate and confirm the size location, shape and area of lesions like retinal detachment, vitreous haemorrhage, intraocular foreign body, vitreous degeneration, posterior vitreous detachment, asteroid hyalosis, thickened posterior lens capsule and posterior staphyloma.

In this study maximum patients 60(50%) were in 40-60 years age group followed by 42.5% in more than 60 years group followed by 7.5% in less than 40 years group. Our study included 63 females and 57 males. In a study done by OP Sharma ocular abnormalities were observed maximum in 4th to 5th decades[100].

In this study shows that majorities of patients (58) under lower socio-economic status (48.33%). This may be due to the fact that the study was conducted Government Civil Hospital and majority patients in OPD came from nearby rural areas. Only 12.5% of the patients belongs to upper socio-economic class while remaining 39.17% of patients belongs to middle socio-economic class.

In our study we came across 53 cases of mature cataract, 67 cases of hypermature cataract. We were found that out of 120 patients, 84 (70%) patients had a senile cataract, 33 (27.5%) patients had a diabetic cataract, 4 (3.33%) patients had a complicated cataract, 5 (4.17) patients had a traumatic cataract. This was Comparable to the study done by Quereshi which included 750 patients of which 71(9.47%) patients had traumatic cataract and 679(90.53%) patients had other types of Cataract.

In our study most of the patients (62) had a vision of hand movements accounting to 51.67% of patients, followed by counting fingers close to face (CFCF) had a 26 patients accounting for 21.67%, followed by perception of light (PL+) had a 25 patients accounting to 20.83%. The least common visual acuity, PL+ with PR defective and NO PL were observed subsequently in 4(3.33%) and 3(2.5%) patients.

Relative afferent papillary defect (RAPD) was present in 2.5% (3) of the patients and sluggishly reacting pupil was noted in 2.5% (3) of the patients. Synechiae in the pupillary region was noted in 2 (1.67%) patients with complicated cataract. Most of the patients (110) accounting to about 91.67% had normal Pupillary Reaction.

Intra ocular pressure was monitored in 120 patients.Maximum number of patients (27) accounting to about 22.5% patients had IOP of 16 mm of hg, 23 patients and 22 patients subsequently accounting to about 19.17% and 18.33% had an IOP of 12 mm of hg and 10 mm of hg. Least common IOP of 8, 24, 26 mm of Hg was observed in 0.83% of patient. The guarded visual prognosis was explained prior to surgery to patients with retinal detachment, vitreous hemorrhage vitreous degeneration, asteroid hyalosis, Posterior Staphyloma.

In this study out of 120 patients, 75 (62.5%) patients had normal B-scan findings followed by 15 (12.5%) patients with posterior vitreous detachment, 14 (11.67%) patients with vitreous degeneration, 9 (7.5%) patients with asteroid hyalosis, 4 (3.33%) patients with retinal detachment, 2 (1.67%) patients had posterior staphyloma and vitreous haemorrhage was noted in one (0.83%) patient.

In patients with retinal detachment included rhegmatogenous and tractional detachment. Long standing RD appeared as funnel shaped or T shaped highly reflective membranes with minimal after movements. This was helpful in pre-operative assessment and planning the surgery and to explain the visual prognosis in these patients before surgery. In the patients with posterior vitreous detachment a highly reflective membrane was noted with after movements. Follow up ultrasonic examinations to evaluate the changes such as absorption, further organization or extent of detachment was important in pre-operative assessment.

Vitreous degeneration was found in 14 patients. In 7 patients were found in senile cataract, 6 patients were found in diabetic cataract among 2 patients was found with PVD and 3 patients were found in complicated cataract. In patients who had long standing vitreous hemorrhage, the density and location of the hemorrhage was recorded and follow up ultrasonic examination was done to evaluate the changes such as absorption and organization.

The study done by Mansoor A Qureshi showed that retinal detachment was present in 25 patients (3%) in the study conducted Salman A, 3 patients (2.59%) had RD. In the study conducted by Blumenthal 4.5% patients had RD. These observations are comparable to our study which showed 4 patients with RD (3.33%).

In the study by Qureshi 14 patients (2%) had PVD .In our study there were 15 patients (12.5%) had PVD. In our study 14 patients (11.67%) had vitreous degeneration.

In the study by Qureshi 24 patients (3%) had vitreous hemorrhage. In the study by Salman A 2 patients (1.7%) had vitreous hemorrhage. The Blumenthal EZ study showed vitreous hemorrhage in 2.5% of patients. This is comparable to our study which showed 1 patients (0.83%) with vitreous hemorrhage. In Qureshi study posterior staphyloma was seen in 5 patients (0.6%) and 7.2% patients in the Blumenthal EZ study. Our study is showed posterior staphyloma in 2 patients (1.67%). Asteroid hyalosis was present in 12 patients (2%) in Qureshi study, this is comparable to our study which showed 9 patients (7.5%). In the Qureshi study 660 patients had a normal B scan, in the study bySalman A 110 patients (94.8%) had a normal B scan and in theBlumenthal EZ study 80.4% patients had normal B scan as compared to our study which showed 75 patients (62.5%) with normal B scan findings

SUMMARY& CONCLUSION

- The most common age distribution in the study group was 40-60 years (60). This accounted 50% of patients, least common age group was found to be less than 40 years with 9 patient. This accounted to about 7.5% of patients.
- Our study included 63 females and 57 males. This accounted to about 52.5% for females and 47.5% for males.
- In this study shows that majorities of patients (58) under lower socio-economic status (48.33%). Only 12.5% of the patients belongs to upper socio-economic class while remaining 39.17% of patients belongs to middle socio-economic class.
- 67 patients had dense lens changes in the right eye (55.83%), 50 patients had dense lens changes in the left eye (41.67%), 3 patients had bilateral dense lens changes (2.5%).
- 62 (51.67%) patients had vision of hand movements followed by 26 (21.67%) patients with counting fingers close to face, 25 (20.83%) patients with perception of light with projection of light in 4 quadrants, 4 (3.33%) patients with perception of light with projection of light defective, 3 (2.5%) patients with no perception of light.

- Pupillary assessment was done and pupillary reaction was normal (reacting to both direct and consensual light) in 110 patients (91.67%), Relative afferent pupillary defect was observed in 3 patients (2.5%), pupil was sluggishly reacting in 3 patients (2.5%), synechiae in the pupillary region was noted in 2 patients (1.67%), semidilated fixed pupil was noted in 2 patients (1.67%).
- Out of the 120 patients in our study 53 patients had mature cataract accounting to about 44.17% of patients and 67 patients with hypermature cataract accounting to about 55.83% of patients.
- 27 (22.5%) patients had IOP of 16 followed by 23 (19.17%) patients with IOP of 12, 22 (18.33%) patients with IOP of 10, 18 (15%) patients with IOP of 18, 13 (10.83%) patients with IOP of 14, 8 (6.67%) patients with IOP of 20,3 (2.5%) patients with IOP of 22 and 6 and least one patient (0.83%) recorded IOP in each individual group with IOP of 6,24,26.
- B-scan finding out of 120 patients, 75 (62.5%) patients had normal B-scan followed by commonly observed 15 (12.5%) patients with posterior vitreous detachment, 14 (11.67%) patients with vitreous degeneration, 9 (7.5%) patients with asteroid hyalosis, 4 (3.33%) patients with retinal detachment, 2 (1.67%) patients had posterior staphyloma and vitreous haemorrhage was noted in 1 (0.83%) patient.

CONCLUSION

- B-scan is a reliable, safe, cheap, non-invasive and rapid investigation.
- There is no exposure to ionizing radiations
- The high frequency probe provides excellent quality real-time imaging.
- B-scan helps in evaluating the posterior segment in the presence of opaque ocular media in great detail and with great accuracy.
- B-scan is useful for preoperative planning.
- B-scan is the preferred screening modality in extraocular lesions also.
- Hence I conclude that ultrasonography has helped usunderstand the nature of intraocular pathologies detected preoperatively in patients having dense cataracts. This has influence the surgical strategy and also the postoperative visual prognosis in limited resources settings.