REVIEW OF LITERATURE
Cataract may be simply defined as any opacity in the lens. It is the most common and fortunately one of the most easily remedied cause of visual incapacity and blindness.

Though the history of cataract goes back some 4000 years and probably further. This was in Hindu medicine in which Sushrute defined cataract as an opacity of lens due to derangement of the intra-ocular fluid. He used to treat it surgically by couching.

The term glaucoma first used in the Hippocratic writings as we have seen, was γλάυκωμα (glaucom) was used to describe blindness coming on in advancing years associated with a glazed appearance of the pupil (Duke Elder, 1969). Originally both diseases glaucoma and cataract considered in the lens. Only at a later date, it was differentiated by Celsus (25 B.C. AD 50) and Rufos (A.D. 95 - 117) and later by Galen (A.D. 131 - 210).

The first suggestion about glaucoma - that the disease is associated with a rise in intraocular pressure seems to occur in the Arabian Writings of At Tobari (10th Century). The first original and clear recognition
of such a condition in European writings, however, is due to Richard Banister, 1622. The first original and clear recognition of glaucoma with a raised ocular tension was given by Antoine - Pierre Demours (1818) and clinical picture was the appearance of the colour of rainbow around lights.

After the introduction of ophthalmoscope, the Heinrich Muller (1856) observed the phenomenon of cupping of the optic disc.

Von Graefe divided glaucoma into three categories - (i) acute; (ii) Chronic; and (iii) secondary.

The Donders (1862), recognized that increased intraocular tension without any inflammatory symptoms is simple glaucoma.

The medical therapy for glaucoma was started by Adolf Weber (1876) and advocated the use of the extract of Jaborandi (Pilocarpine). The surgical therapy for glaucoma was started by William Mackenzie (1830), who introduced sclerotomy to relief raised ocular tension. The modern surgical therapy for glaucoma was started by Curan (1920), who introduced peripheral iridectomy to re-establish the communication between posterior and anterior chamber. While Jacques Daviel (1748-53) a French surgeon introduced a new technique for the extraction of cataract.
The association of simple glaucoma with cataract is a common combination and the observation in earlier days, that an iris prolapse occurring after cataract extraction in a case of glaucoma usually controlled the ocular pressure. This belief was further strengthened, when such a prolapse was removed in a case of glaucoma, the intraocular pressure elevated again. These two co-existing condition is a problem of treating it simultaneously and the development of cataract may aggravate a pre-existing glaucoma.

The combined procedure in 4th and 5th decades was not accepted widely. One reason for this was the view that cataract surgery alone may result in better glaucoma control. Vonlint (1939) stated that if miotics have been able to control intra-ocular tension, pre-operatively, lens extraction alone would result in control afterwards. Guyton (1945) also recommended the same procedure in a survey of 100 cases of cataract extraction in eyes with chronic open angle glaucoma, which were controlled medically pre-operatively.

Mawas (1964) found that control of open angle glaucoma with cataract was as difficult after as before cataract extraction. Scudari et al (1967), stated that
occular pressure after elevated to a higher level than the pre-operative level 6 months after cataract surgery alone. Becher (1967) reported that glaucoma surgery will be required in some cases even after cataract extraction and the operations available for an aphakic eye are well known to be traumatic and unpredictable in results.

Chandler (1947); Thomas (1947); Sourdille (1950); Leydhecker (1954-56); Mehra & Dutta (1963) recommended that the glaucoma surgery undertaken before cataract extraction. There are many objections to this approach - the patient is exposed to double risk of two operation and filtering operation may itself accelerate the cataract progression (Sugar, 1970).

In a patient, who is suffering from glaucoma with cataract and operated for glaucoma, there has been little unanimity of opinion regarding the favourable site for cataract extraction. Williamson - Nobel (1953) advised a conventional incision ignoring the bleb. Most have favoured a corneal incision in front of the bleb (Scheie, 1962) advised inferior incision. Castroveijo, 1966; Collohan, (1952) used a lateral incision for the cataract extraction. Ingram (1963) using corneal section in 63 cases, reported only one failure in filtering bleb.
There are controversies and disadvantages to each of these procedures. The inferior section lacks the protective support of the upper lid during healing and cataract extraction through lower section is more difficult. An iridectomy in the 6'o clock often results in optical problem and its omission may lead to iris prolapse. The superior corneal with it the possibility of all the complications arising from corneal incision such a delayed wound healing delayed formation of anterior chamber and epithelial down growth.

Randolph et al (1971) is an analysis of 166 eyes treated with various methods have concluded that if a patient has controlled or uncontrolled glaucoma with cataract, a cataract extraction should be done first. The patient with uncontrolled glaucoma with field defects provide the surgeon with the choice of cataract extraction or combined extraction - filtration procedure. And it is ideal to obtain a filtering bleb, which will control the intra-ocular pressure without medications after cataract extraction.

The idea of simultaneous surgery for cataract and glaucoma by one stage operation is obviously attraction and many authors have described such operation in last
three decades. Claiming considerable success. The purpose of these operations had been to remove the cataract and at the same time to leave a fistulizing channel for the drainage of aqueous.

A small number of operations combining filtration and cataract extraction have been performed for many years.

Wright (1937) described combined extraction - iridectomy - sclerotomy for case of cataract and severe glaucoma. In the question and answer section of 1941 issue of Archives of Ophthalmology, a combination of iridencleisis and cataract extraction was recommended for such cases. Guyton (1945) mentioned the use of combination procedure but did not advocate them. Though later in 1952 Guyton in his discussion of Birge's paper mentioned the combination of cyclodialysis and cataract extraction in 10 cases with good results in all except one, in which, patient developed massive choroidal haemorrhage.

Lee & Weih (1950), reported the use of either iris inclusion or sclerotomy. They obtained excellent results and advised such combined operations for all the patients with uncontrolled tension and lenticular opacities.
Birge (1952), reported the first series of 25 eyes in which cataract extraction and iridencleisis performed simultaneously. In 66% cases glaucoma was controlled without further medical therapy.

Wolfe (1952), also recommended such combined filtration and cataract extraction in the same year.

Hughes (1959), described his procedure of combining anterior-sclerectomy and iris inclusion with cataract extraction in 57 cases. He in 1963 with Kazdan and co-workers reported the same operation in 122 patients. All types of glaucoma under went the combined procedure. In many cases a filtering operation had been successful.

Sugar (1962), mentioned combination of cataract extraction with iridencleisis might occasionally be an acceptable procedure.

Mawas (1964), incarcerated a rectangular iris flap in the incision, which controlled the pressure in 19 out of 22 eyes.

Stocker (1964), described an operation combining cataract extraction and scleral cauterization, but did not mention the statistics.

Birge (1966), who previously has used iris inclusion alone, later advocated posterior lip sclerotomy with iris
inclusion. The results were good in a follow-up period of five years. It was not associated with any greater complication than a simple intracapsular cataract extraction. Incidence of flat anterior chamber or infection was less than 1%.

Scudari (1967) combined cataract extraction with iris inclusion and sclerotony in 59 eyes. 49 eyes had tension below 20 mm of Hg.

Dellaporta (1971) combined trepeno-trabeculectomy with extraction of cataract.

Donoghue (1972) combined the removal of cataract with inclusion of a flap of iris.

In a hinged sclerotomy opening behind the cataract incision. He presented a series of 21 cases. Results were better and complications were less in case of open angle glaucoma than closed angle and secondary glaucoma. Average reduction of pressure was 13 mm of Hg.

Shmeleva (1972) of Russia combined cataract extraction with trabeculectomy. In all cases, there was good hypotensive effect.

Hilsdorf (1974) stated that the complications with trabeculo-cataract surgery were few and results were favourable in a series of 37 eyes.
Vancea and Schwartzzenberg (1974) combined with trabeculectomy in 36 eyes and followed for 6 to 30 months. Tension was normal in 17 eyes. While success in 94.45% eyes with medications, the mean I.C.P. being 14.77 mm of Hg.

Stewart and Loftis (1976) performed two types of combined extraction and compared them. 43 eyes of both chronic narrow angle and open angle glaucoma were operated.

In combined extraction with trabeculectomy 74% eyes improved in visual acuity. 91% had normal I.O.P. without medications. While 31% had transient hyphaema post-operatively in combined extraction with thermal sclerotomy, vision improved in 61%. 61% had normal tension while 17% had hyphaema but they could not analyse the higher success in trabeculectomy group.

Jerndal and Lundstrom (1976) combined trabeculectomy with cataract extraction. The pre-operative tension ranged between 20 - 60 mm of Hg. (average 33 mm of Hg.). There was 50% average decrease in the intraocular pressure. The post-operative tension varied between 10 - 26 mm of Hg. The average being 16 mm of Hg. Visual acuity improved in 14 eyes, remaining unchanged in 2 eyes and deteriorated in
one eye. The follow up period varied between 6 - 20 months. As far as complications are concerned, the hyphaema was the main complication. Two patient had choroidal detachment. One with flat chamber and iris prolapse. Filtering bleb was presented in 7 cases only 3 eyes required post-operative medications for the control of pressure.

Witmer and Rohen (1976) combined trabeculectomy cataract extraction in a series of 100 cases. The ocular tension normalised in 94 eyes. Only 6 eyes, it was failure. 14 eyes, however, needed additional medication to control the tension satisfactorily. In 20% of the cases, the tension remained high during the first four weeks, but dropped to normal after about 3 months.

Mackenson and Orsoni (1978) combined cataract extraction with trabeculectomy in 56 eyes after the follow up of 6 months. 63% had normal intra-ocular tension. While 34% required medications. No serious complication was observed. Gordon et al (1974) combined the cataract extraction with trabeculectomy in 37 eyes of various type of glaucoma. The average follow up duration was 23.7 months. The average pre-operative intra-ocular pressure was 23.5 mm and the average post-operative intra-ocular pressure was
15.2 mm of Hg. visual acuity improved 54.9% cases and without improvements in others. 59.5% did not require any medications at all. No greater incidence of complications in combined procedures from that expected cataract extraction alone except flat chamber and hyphaema in 4 eyes each.

Singh et al (1979) combined pre trabecular filtration with cataract extraction in 70 cases (62 lens induced and 8 primary open angle glaucoma). Average follow up period was 195 days. The tension in 57 (81.6%) cases was below 20 mm. 9 (12.8%) cases between 21 - 30 mm and in 4 (5.6%) cases above 30 mm of Hg. The pressure was controlled by 2% pilocarpine in 9 cases in which tension varied between 21 - 30 mm of Hg. So overall success in 94.4% cases.

Wechsler and Robinson (1980) combined with trabeculectomy with 91% success in 70 cases. Spaeth (1980) combined extraction of lens with trabeculectomy partial punch sclerectomy, iridencleisis and cyclodialysis, but did not find a single combination suitable for all type of cases.

Edwards (1980) extracted 59 cataracts with trabeculectomy and follow up period was varying between 6 months to two years. Visual outcome was better in chronic simple and narrow angle than secondary glaucoma.
Manjoor et al (1981), reported trabeculectomy with cataract extraction in 20 cases. In 19 (95%) eyes the tension was controlled between 10 - 24 mm of Hg. Only one needed medical therapy visual acuity increased in 17 eyes. The only complication was hyphaema. The follow up period varied from 2 to 10 months.

Romem et al (1982) combined cataract extraction with trabeculectomy in 46 eyes (38 open angle and 8 narrow angle glaucoma). Average follow up period was 27 months. Tension turned normal in 33 (71.74%) eyes without drugs. While 12 (26.09%) required medications and one uncontrolled required further surgery.

Klemetti and Kalima (1982) extracted 94 cataract with trabeculectomy (59 open angle while 35 capsular glaucoma). Follow up period was 1 to 9 years. Average being 3.4 years. 61 (65%) eyes had tension below 21 mm without medications. 31 eyes required additional medical therapy, while 2 needed further surgery.

Complications: The hypotony was in 37% and hyphaema in 30%. The success rate were 76% after one year follow up, 63% after 2 years and 45 to 66% after 3 - 8 years follow up.
Khurana and Ahluwalia (1988) reported trabeculectomy vs Conio punch - combined with cataract extraction in 50 patients. In 42 (84%) eyes the tension was controlled (less than 21 mm of Hg.). Out of this 42 cases 5 had pressure less than 10 mm of Hg.; in remaining eyes, it ranged between 11 and 21 mm of Hg. and 8 eyes require medical therapy. And out of these 8 eyes in 3 cases pressure was controlled after further surgery, while in one case it remained uncontrolled even after repeated surgery.

Prasad et al (1988) combined trabeculectomy and cataract extraction in 96 eyes having senile cataract and associated open angle glaucoma at B.R.D. Medical College, Gorakhpur. The preoperative tension ranged between 29 to 69.3 mm of Hg. (Average 48.72 mm of Hg.). The post-operative tension varied between 11.2 to 29 mm of Hg. The average being 17.93 mm of Hg.

Out of a total 96 operated cases in 88 eyes (91.67%), the intraocular tension was well controlled and in 8 eyes, it was not controlled inspite of medical treatment. The vision improved in 87.5% cases.
DRUG REVIEW:

Various drugs are used to reduce the intraocular pressure.

**Acetazolamide**: It is a carbonic anhydrase inhibitor. It reduces the production of aqueous by about 50% (Backer and Hay, 1958). Draeger et al. (1963) it is given orally in the dose of 125 - 500 mg one to four times a day and after single dose its action is apparent in 60 - 90 minute reach a maximum in 3 - 5 hours and wearoff in about 12 hours. Sustained action capsule of the drug have a more prolong effect did not given more than twice a day (Stepanic, 1967).

**Osmotic agent**: These substances raised the osmolarity of the plasma, so that fluid with drawn from the eye resulting in fall of intraocular pressure.

- Various indication for use of osmotic agent;
- Angle closure glaucoma;
- Secondary glaucoma; and
- Pre-operative.

**Urea**: First used osmotic agent (Alder, 1933) it induces marked hypotony (Aizawa, 1962).
Mannitol: According to Galin et al (1963), it has less side effect than urea and it is more potent hypotensive agent than urea. Seager and Lewis (1962), it is used intravenously. Different osmotic agent used are given in table with their route of administration and doses.

**Table**

Shows the different osmotic agent with their route of administration and doses

<table>
<thead>
<tr>
<th>Name</th>
<th>Route of administration</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycerol</td>
<td>Oral</td>
<td>1-1.5 gm/kg</td>
</tr>
<tr>
<td>Ethylalcohol</td>
<td>Oral</td>
<td>0.1-1.5 gm/kg</td>
</tr>
<tr>
<td>Isorbide</td>
<td>Oral</td>
<td>1 gm / kg</td>
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**Side effects**: Dehydration of body cause headache, pain in the back, mental confusion, disorientation, (Tarter and Linn, 1961; Becker, 1967). Diuresis is enhanced markedly with mannitol and they must be used with caution in patient with the cardiac renal and hepatic diseases.
Betablockers: As early as 1967 Philips, C.L.; Howitt, G. and Howland, D.J. introduce propranolol into glaucoma therapy. However, because of its mild anaesthetic properties have made many investigators reluctant to use it as a topical medication for glaucoma. Hall et al (1970) describe a new beta-adrenergic blocking agent timolol. It blocks both beta 1 and beta 2 receptors. Timolol has neither sympathomimetic effect nor anaesthetic properties. Hall, R.A. et al (1970); Scriabine, A. (1973) it is proved that it has 5 - 6 times greater activity than propranolol.