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## A cross sectional study of clinical spectrum and management of glaucoma in Pseudoexfoliation syndrome

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### Abstract

**Background:** Pseudoexfoliation is the common identifiable cause of secondary glaucoma. It is noted to be more aggressive with a high mean progression rate leading to full field blindness within 10 years.

**Aim of study:** The aim of this study is to assess the demographic aspects, magnitude, clinical spectrum and response to treatment of glaucoma in pseudoexfoliation syndrome.

**Materials and Methods:** All patients with pseudoexfoliation syndrome who attended Ophthalmology department, Trichy SRM medical college hospital and research centre, Trichy were selected for this study. This is a cross sectional study done over a period from July 2018 to September 2020 in patients who fulfilled the inclusion criteria.

All patients have undergone complete ocular examination including visual acuity, slit lamp examination, ophthalmoscopic examination, IOP measurement, gonioscopy, pachymetry and visual field examination and these patients were advised to follow up at regular intervals.

**Observation and Results:** In this study of 96 patients, males with age group of 61-70 years are commonly affected. Pseudoexfoliation syndrome is unilateral on presentation but eventually becomes bilateral. The IOP is fluctuating and produce severe optic nerve damage. The course is aggressive and recalcitrant to treatment needs definitive surgical therapy.

**Conclusion:** Pseudoexfoliation is a common identifiable cause of secondary glaucoma producing ocular morbidity. Due to its fluctuating IOP, aggressive course and difficulty in managing with medical treatment it stands as a distinct enigmatic clinical entity. Pseudoexfoliation needs early detection, regular follow up and definitive therapy.

**Keywords:** Pseudoexfoliation, Glaucoma, Intra ocular pressure, Trabeculectomy

### Introduction

Glaucoma is one of the leading causes of irreversible blindness worldwide. Pseudoexfoliation is one of the common causes of secondary open angle glaucoma worldwide. It is noted to be a more aggressive disease with a mean progression rate higher than primary open angle glaucoma.

Pseudoexfoliation syndrome is a systemic micro fibrilopathy which targets ocular tissues through gradual deposition of proteinaceous material. This fibrillar material is produced by cells in the anterior segment in response to oxidative stress. Clumps of fibrillar material released into extracellular spaces gets deposited into corneal endothelium, ciliary epithelium, trabecular meshwork, iris, anterior capsule of lens, zonules, anterior vitreous face and conjunctiva. Clinically these appear as greyish white flakes. This pseudoexfoliative material gets accumulated in the trabecular meshwork and leads to elevated intra ocular pressure which leads to glaucoma.

### Aim of the study

- 1) To study the frequency of glaucoma in patients with pseudoexfoliation syndrome.
- 2) To study the clinical spectrum of glaucoma in pseudoexfoliation syndrome and treatment response in pseudoexfoliation glaucoma

### Inclusion Criteria

- a) All patients diagnosed as pseudoexfoliation syndrome with age group of 40-80 years.
- b) Both males and females were included.
- c) Unilateral and bilateral pseudoexfoliation cases were included.

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**Exclusion criteria**

- a) Patients with less than 40 years of age.
- b) Patient with previous history of uveitis or ocular trauma
- c) Patients with history of exposure to intense infrared lights i.e. glass blowing.
- d) Patient with known cases of POAG and angle closure glaucoma who were on medication.

**Materials and Methods**

A total of 96 patients with pseudoexfoliation who attended the outpatient department of ophthalmology, Trichy SRM medical college hospital and Research centre, Trichy from July 2018 to September 2020 were investigated. The study protocol was approved by the institutional ethical committee.

Demographic details of all patients were noted. Patients were subjected to detailed clinical history and complete ocular examination. Case sheet proforma were drawn up and details of each patient were recorded.

Pseudoexfoliation glaucoma was diagnosed on the basis of pseudoexfoliative material on slit lamp examination, IOP>21 mm Hg, glaucomatous cupping on fundus examination, pigmentation of trabecular meshwork on gonioscopy, glaucomatous field defects on perimetry.

**Observation and Results**

This study includes 96 patients with pseudoexfoliation who came to the Department of Ophthalmology, Trichy SRM Medical College from July 2018 to September 2020. Out of 96 patients 55 patients were male and 41 patients were

females.

**Table 1:** Glaucoma association

Age in years	Total No of pseudoexfoliation	Patients with glaucoma		Patients without glaucoma	
		NO	%	NO	%
41-50	6	0		6	100
51-60	34	12	35	22	65
61-70	47	19	40	28	60
71-80	9	4	44	5	56

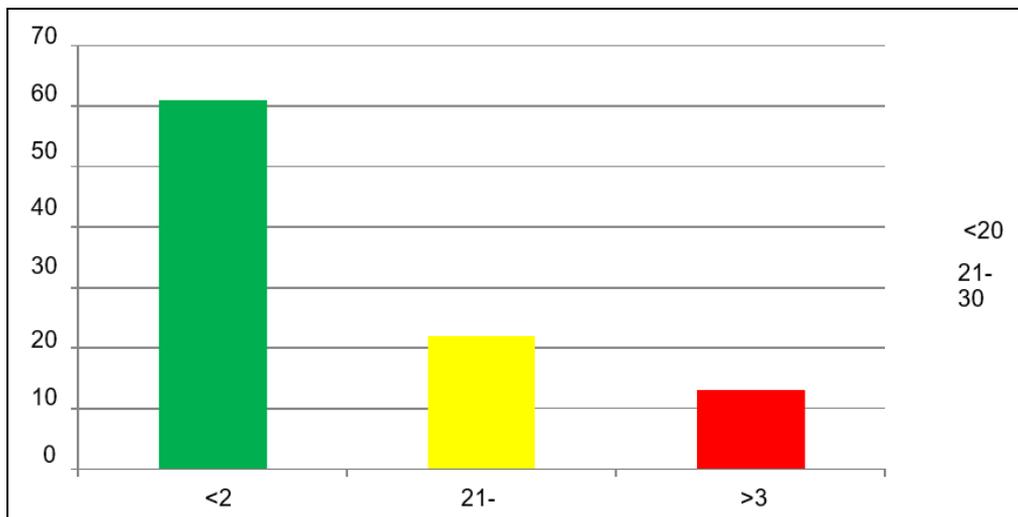
In this study out of 96 patients, glaucoma was seen in 35 patients. The incidence of glaucoma according to this study was 36%.

**Table 2:** Intra ocular pressure

IOP (mmHg)	No of patients	Percentage (%)
<20	61	63.5
21-30	22	22.9
>30	13	13.6
Total	96	100

In our study of 96 patients, 61 patients had an intra ocular pressure less than 20 mmHg, 22 patients had an intra ocular pressure 21- 30 mmHg and 13 patients had an intra ocular pressure more than 30 mmHg.

According to our study the raised intra ocular pressure was found in 35 patients.



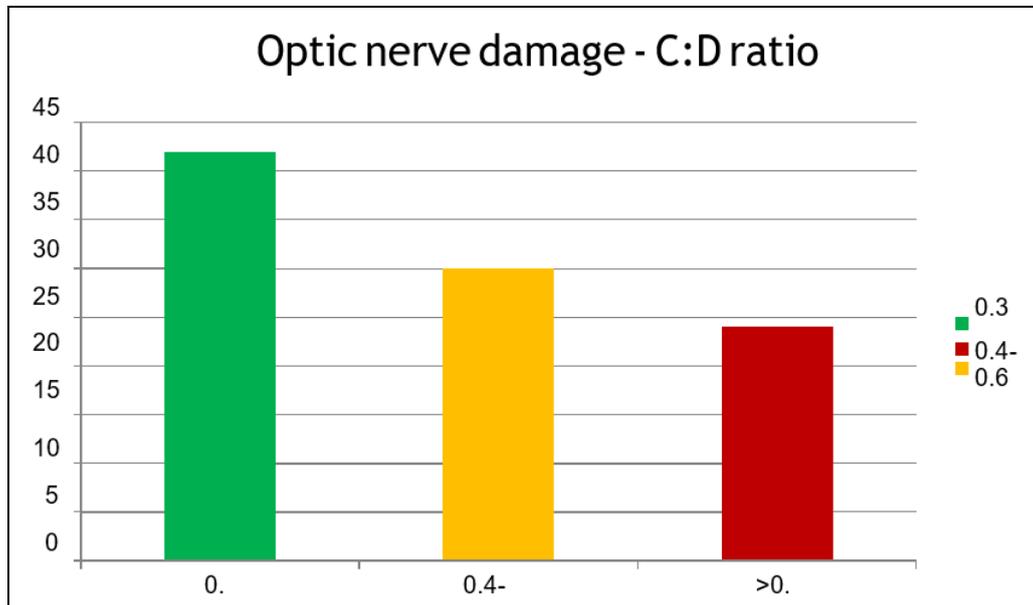
**Fig 1:** Intraocular pressure

**Table 3:** Optic nerve damage

CD ratio	No of patients	Percentage (%)
0.3	42	43.8
0.4-0.6	30	31.2
>0.6	24	25.0
Total	96	100

In our study of 96 patients 42 patients had cup disc ratio of 0.3, 30 patients had cup disc ratio of 0.4 -0.6 and 24 patients

had cup disc ratio of more than 0.6.

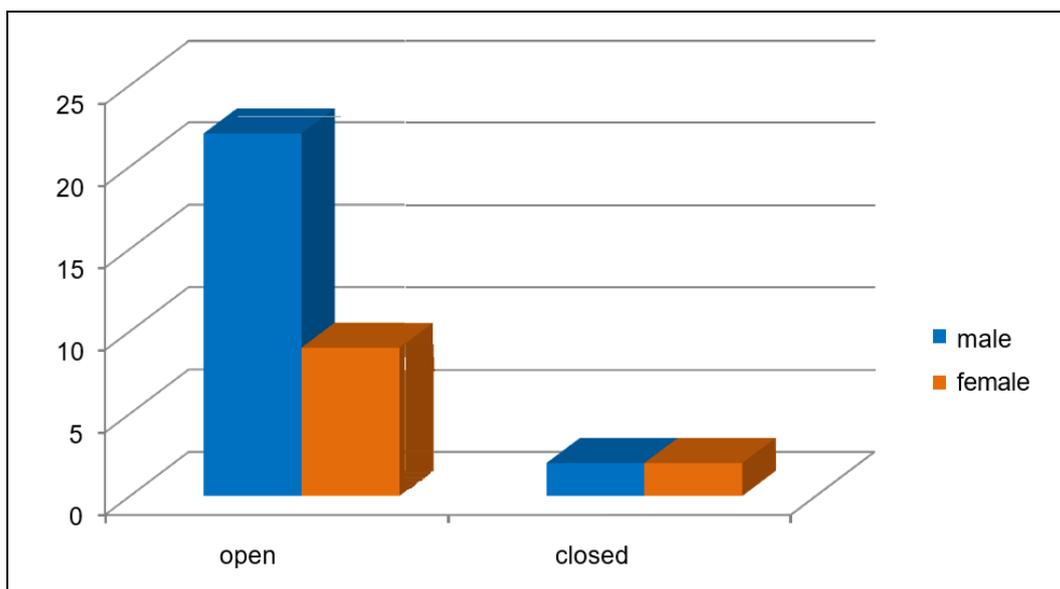


**Fig 2:** Optic nerve damage:

According to our study the severe damage to optic disc (>0.6) was seen in 25% which is higher than the non pseudoexfoliation patient (15%). Hence pseudoexfoliation causes severe damage to the optic nerve and visual loss.

**Table 4:** Type of glaucoma

Type of glaucoma	Male		Female	
	NO	%	NO	%
Open angle	22	63	9	25.6
Angle closure	2	5.7	2	5.7

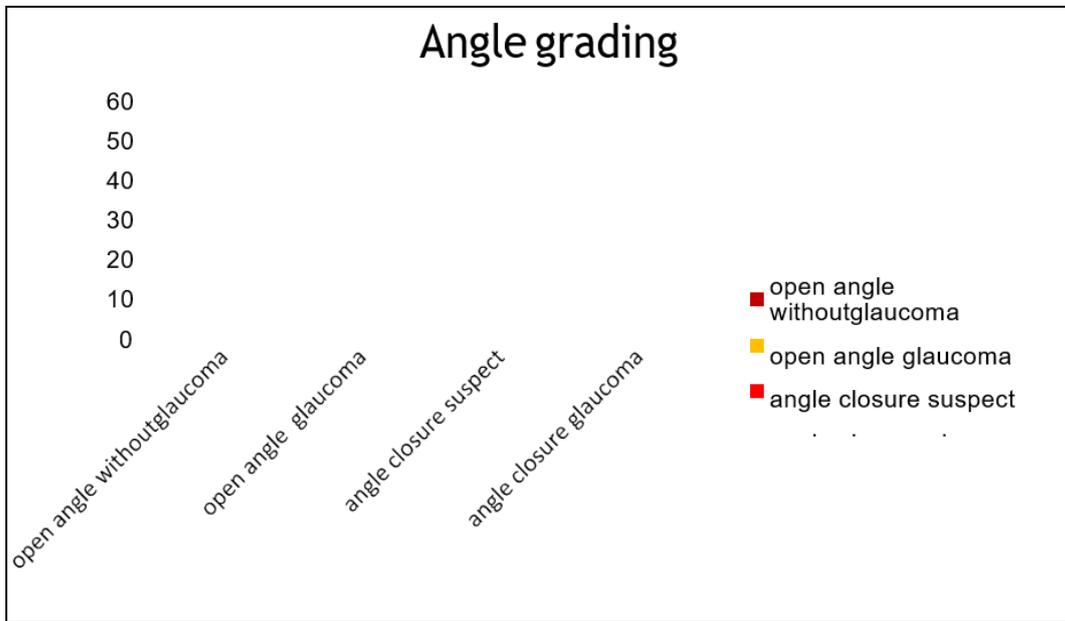


**Fig 3:** Type of glaucoma

According to our study of 96 patients 31 patients had an open angle glaucoma 4 patients had narrow angles with glaucoma. In the 31 patients of open angle glaucoma 22 patients were males and 9 patients were females. Hence pseudoexfoliation glaucoma is common among males.

**Table 5:** Type of glaucoma according to angles

Type of glaucoma	No of patients
Open angle glaucoma	31
Angle closure glaucoma	4
Angle closure suspect	8
Open angle without glaucoma	53



**Fig 4:** Type of glaucoma according to Angles:

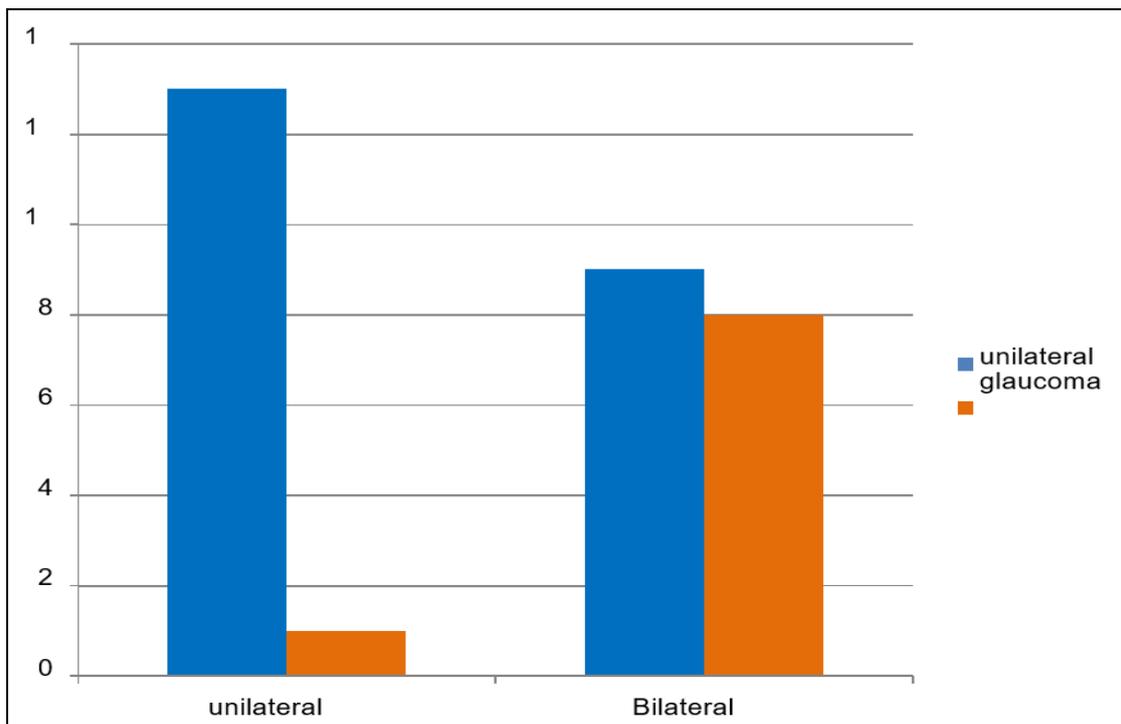
According to our study in pseudoexfoliation syndrome Open angle glaucoma is more common than the angle closure glaucoma. This is explained by the mechanism of rise in IOP in pseudoexfoliation and POAG are common.

**Table 6:** Open angle glaucoma and pseudoexfoliation

	Unilateral Glaucoma	Bilateral Glaucoma	Total
Unilateral PXF	13	1	14
Bilateral PXF	9	8	17
Total	22	9	31

Out of 22 patients with unilateral open angle glaucoma 13 patients had unilateral pseudoexfoliation and 9 patients had bilateral pseudoexfoliation. In 9 patients with bilateral

open angle glaucoma. One patient had unilateral pseudoexfoliation and 8 patients had bilateral pseudoexfoliation.



**Fig 5:** Open angle glaucoma and pseudoexfoliation:

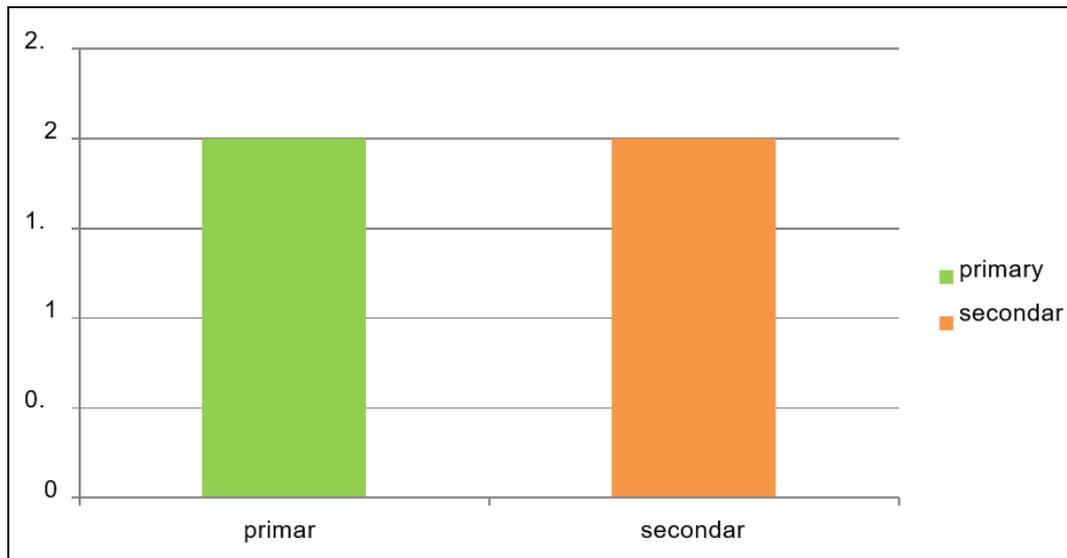
According to our study 71% of patients had unilateral pseudoexfoliation syndrome. Hence unilateral glaucoma is more common than bilateral glaucoma in

**Table 7:** Angle closure glaucoma

Angle closure glaucoma	No of patients
Secondary angle closure	2
Primary angle closure	2

had subluxated lens there was no trauma in these patient. Two patients had primary angle closure glaucoma. The possible mechanism of angle closure could be pupillary block by anterior shift of iris lens diaphragm due to weakened zonules.

Out of 4 patients with angle closure glaucoma, two patients



**Fig 6:** Angle closure glaucoma

Out of 4 patients 2 patients had bilateral pseudoexfoliation. Two patients had unilateral pseudoexfoliation with clinical

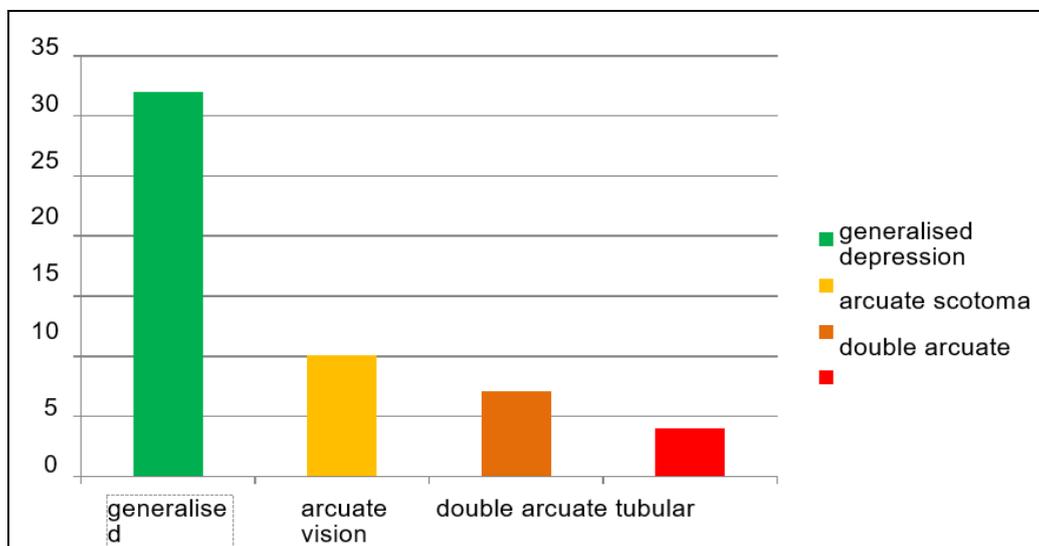
features of phacodonesis and subluxation of cataractous lens producing secondary angle closure.

**Table 8:** Field Defects

Field defects	No of patients	Percentage (%)
Generalised depression	32	33
Arcuate scotoma	10	10
Double arcuate scotoma	7	7
Tubular vision	4	4

Out of 96 patients 53 patients had field defects. Among them 32 patients had generalised depression, 10 patients had arcuate scotoma, 7 patients had double arcuate scotoma, and

4 patients had tubular vision. In the remaining 43 patients fields were normal in 38 patients and not possible in 5 patients due to poor vision.



**Fig 7:** Field defect

**Table 7:** Central corneal thickness

Central corneal thickness(CCT)	Value
Maximum CCT	0.580 mm
Minimum CCT	0.511mm
Mean CCT	0.539mm

In our study mean CCT value in patients with pseudoexfoliation was 0.539mm.

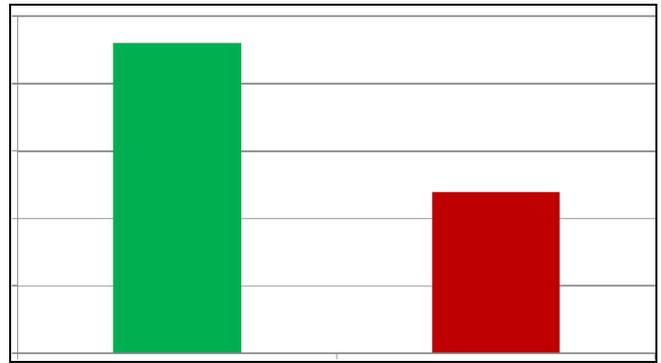
**Systemic association**

Out of 96 patients 6 patients had diabetes mellitus, 4 patients had hypertension and 2 patients were associated with cardiovascular disease.

**Table 8:** Treatment

Treatment	No of patients
Medical	23
Surgical	12

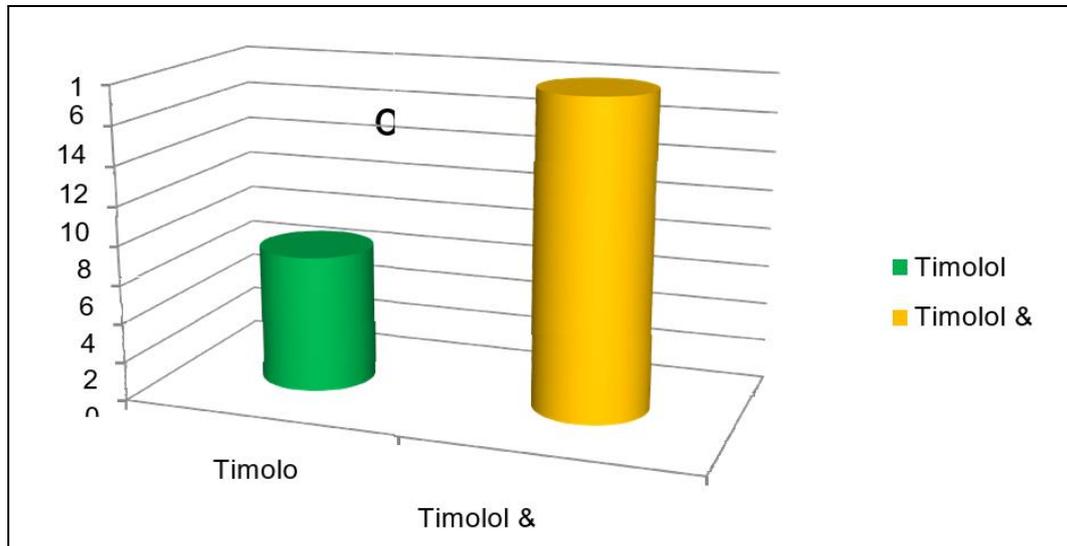
In the study two patients had phacodonesis, treated with cataract extraction & sclera fixation IOL during post operative follow up IOP is well controlled with medical treatment and glaucoma is non progressing.



**Fig 8:** Types of glaucoma patients

In this study 35 glaucoma patients were started with 0.5% timolol eye drops two times per day. At the end of 2 months the patients were assessed regarding visual acuity, control of intra ocular pressure, glaucoma progression assessment by field and fundus examination.

After 2 months, among the 35 patients 7 patients (20%) had reduction in intra ocular pressure and non-progression of glaucoma during follow up with single drug.

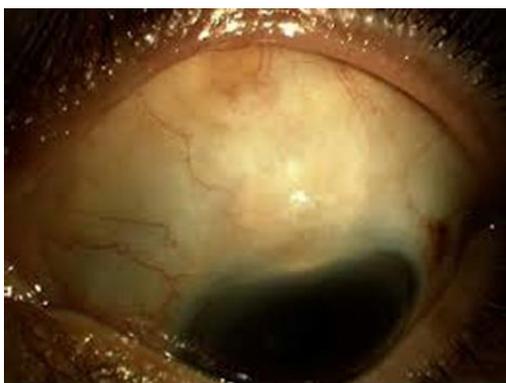


**Fig 9:** Comparison of single drug with combination of timolol and brimonidine

Rest of the 28 patients had been started with combination of 0.5% timolol and 0.2% brimonidine eye drops. The intra ocular pressure was well controlled among 16 patients (46%) and during the follow up patients showed non progression of visits these glaucoma.

Among the 35 patients, 12 patients (34%) had poor response to medical treatment either due to poor compliance of the patient or due to poor economic status to buy medicines. In these patients medical treatment was not sufficient to control the intra ocular pressure. The intraocular pressure was controlled with filtering surgeries.

In these 12 patients combined surgery (trabeculectomy extraction with IOL implantation) was done. During the follow & cataract up period diffuse cystic filtering bleb was formed and intra ocular pressure was well controlled.



**Fig 10:** Post trabeculectomy with cystic bleb

**Discussion**

Glaucoma is the silent thief of sight, because vision loss occurs gradually over a period of time, symptoms occur only when disease is advanced, early detection is the best protection.

In this study of 96 patients with pseudoexfoliation who presented to our institute, all were subjected for detailed evaluation and analysis regarding the age at presentation, gender, laterality, glaucoma association, type of glaucoma

and response to treatment.

In our study unilateral cases are having higher incidence than bilateral presentation, comparable to Henry *et al.* study. The unilateral cases have to be followed up due to possibility of becoming bilateral later in due course.

In our study glaucoma association was found to be 36%, the incidence of glaucoma increases with age which is similar to Lamba & Giridhar *et al.* study.

According to our study 88.5% had open angle glaucoma and 11.5% had angle closure glaucoma, thus open angle glaucoma is common in pseudoexfoliation syndrome.

In our study unilateral glaucoma is more common than bilateral glaucoma. Hence pseudoexfoliation is the commonest cause of unilateral secondary open angle glaucoma.

In our study the cup disc ratio more than 0.6 was seen in 25% of patients. Hence the optic nerve damage is more in pseudoexfoliation as compared to POAG.

In our study 61 patients had an IOP less than 20 mmHg, 22 patients had an IOP between 21-30mmHg and the rest of 13 patients had an intra ocular pressure more than 30mm Hg.

In our study the mean value of CCT in patients was 0.539mm, the highest CCT was 0.580 mm and lowest was 0.511mm which is similar to Hepsen *et al.* study.

In our study, angles were wide open in 59.4%. 28.1% of patients had grade 3 angle 8.3% of them had grade 2 angle and 4.2% had closed angles.

In our study, 60% of glaucoma patients had field defects out of which four patients had tubular vision.

In our study, out of 35 patients who have been diagnosed to have glaucoma, 23 patients responded to medical treatment and 12 patients IOP needed surgical treatment for IOP control. Out of 35 patients 20% had control of IOP with single drug, 46% had control of IOP with combination drugs and 34% patients responded well to surgical treatment.

Considering the poor economic status, poor compliance of the patients and average response to medical treatment surgical treatment is one of the best modes of treatment in pseudoexfoliation glaucoma.

## Conclusion

To conclude the study, it was found that the prevalence of pseudoexfoliation increases as the age advances and pseudoexfoliation is most often unilateral at the time of presentation but eventually becomes bilateral, hence the unilateral cases needs periodic follow up. The incidence of glaucoma is more in pseudoexfoliation and most of them have open angles. The glaucoma is more common in bilateral pseudoexfoliation than unilateral pseudoexfoliation. The unilateral glaucoma is commoner than the bilateral glaucoma. The intraocular pressure is having rapid rise, aggressive course and recalcitrant to treatment. The severity of optic nerve damage is more as compared to the primary open angle glaucoma and having advanced field defects. The pseudoexfoliation glaucoma has better response to combination drugs as compared to single drug. The need of surgical therapy to reduce intraocular pressure is high in pseudoexfoliation glaucoma. All patients with pseudoexfoliation should undergo complete glaucoma evaluation and early detection of glaucoma. The patients should be frequently followed up. The intra ocular pressure should be rechecked every 3-6 weeks in patients with pseudoexfoliation glaucoma. Pseudoexfoliation syndrome with no evidence of glaucoma patients should be followed

every 6 months as they are having increased risk of developing glaucoma. Pseudoexfoliation is an important cause of secondary open angle glaucoma. It is an important cause for ocular morbidity, because of high intra ocular pressure and difficult medical management it stands out and enigmatic clinical entity. In view of the high prevalence of glaucoma, severe damage to optic nerve increased need of surgical therapy and high risk of operative complications related to pseudoexfoliation Ophthalmologists should focus on the detection of pseudoexfoliation.

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