IMPACT OF PHACOEMULSIFICATION ON INTRAOCULAR PRESSURE IN PSEUDOEXFOLIATION NON GLAUCOMATOUS EYES VERSUS HEALTHY EYES

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ABSTRACT

Purpose: The aim of this study was to find out the impact of phacoemulsification on IOP in subjects with and without pseudoexfoliation.

Method: A prospective longitudinal study design was conducted at Munawar Memorial Hospital & college of optometry chakwal. A convenient sample of 100 subjects with age 40 to 65 years old with best corrected visual acuity of <6/12 were recruited. Subjects were divided into two groups based on presence and absence of PXF. A baseline IOP of all subjects was measure by Goldmann Applanation Tonometer. All subjects underwent cataract surgery by phacoemulsification. After surgery, subjects were follow up and after 1st and 6th week, IOP rechecked in both groups. The baseline IOP values of both groups were compare with 1st and 6th week IOP postoperative value.

Results: The mean difference between baseline and 1st week post operated IOP of PXF group was 2.120+0.849 and 1.600+1.355 in control group with p value < 0.05. The mean difference between baseline and 6th week post operated IOP of PXF group was 2.620+2.125 and 2.460+1.265 in control group with p value < 0.05. The comparative analysis between two groups showed that the mean difference between baseline IOP of PXF and control group was 1.360+3.832 with p value 0.015. Similarly, the mean difference of IOP of 6th week post-operative IOP between PXF and control group was 1.200+0.444 with p value 0.009, which was less than 0.05 with CI of 95%.

Conclusion: Patients with PXF exhibited a more reduction in IOP after phacoemulsification as compared to controls. Higher preoperative IOP were associated with more IOP reduction which was found in PXF group.

Key words: Pseudo exfoliation, intraocular pressure, Phacoemulsification

1. INTRODUCTION

The accumulation of white or grey material that resembles extrafibrillar material in the body's tissues is a systemic disease known as pseudo exfoliation. Both extraocular and ocular tissue produces PXF material persistently and progressively of the eye because of excessive synthesis and reduced breakdown of elastic microfibrillar components. The anterior lens capsule forms a typical pathological ring pattern because of this substance, which is insoluble inside the eye. The PXF material floats in the aqueous humour before depositing on the zonulae, lens, and iris. Pseudo exfoliation has also been related to a number of systemic illnesses, including Alzheimer's disease, hearing loss, high blood pressure, and heart disease. Systemic illness usually emerge with pseudo exfoliation because extrafibrillar material accumulates and breaks down inappropriately in body organs and circulation. Environmental risk factors for pseudo exfoliation consist of advanced age, Women's gender, ethnic background, elevation, sun exposure, and dietary factors like caffeine consumption and low levels of folate. Pseudo exfoliation is more common in adults over the age of 40. Twelve patients under the age of forty have been identify as having pseudo exfoliation. Pseudo exfoliation has been reported to occur up to 25% of the time in some Icelandic communities of people over 60.Pseudo exfoliation has been linked to primary open-angle glaucoma in persons worldwide 60 years of age and older. A population from the Democratic Republic of the Congo had a prevalence rate of 1.73%, a population from Singapore had a rate of 2.8%, and a population from the blue mountain eye study had a rate of 2.3%. A population of Navajo American Indians had a rate of 38%, a population from Peru had a rate of 4.4%, and a population of native Greenlanders had no cases reported (1).

It may be difficult to estimate the prevalence overall since PXF frequently goes unnoticed during assessment, especially in patients who have just undergone cataract surgery. Cataract surgery usually performed on patients older than 60 years because the elimination of a significant a front lens capsule and anterior chamber contains PXF material. Females living in the same countries or regions as men can have less access to PXF diagnostic tools, which could lead to increased PXF-related morbidity. Along with environmental risk, variables and population risk factors has been link in earlier studies to PXF. Spending more time outdoors, residing in higher-elevation places and being expose to the sun are a few of these. A higher risk of PXF has been link to eating many fish, drinking a lot of coffee, and obtaining insufficient amounts of folate (1).

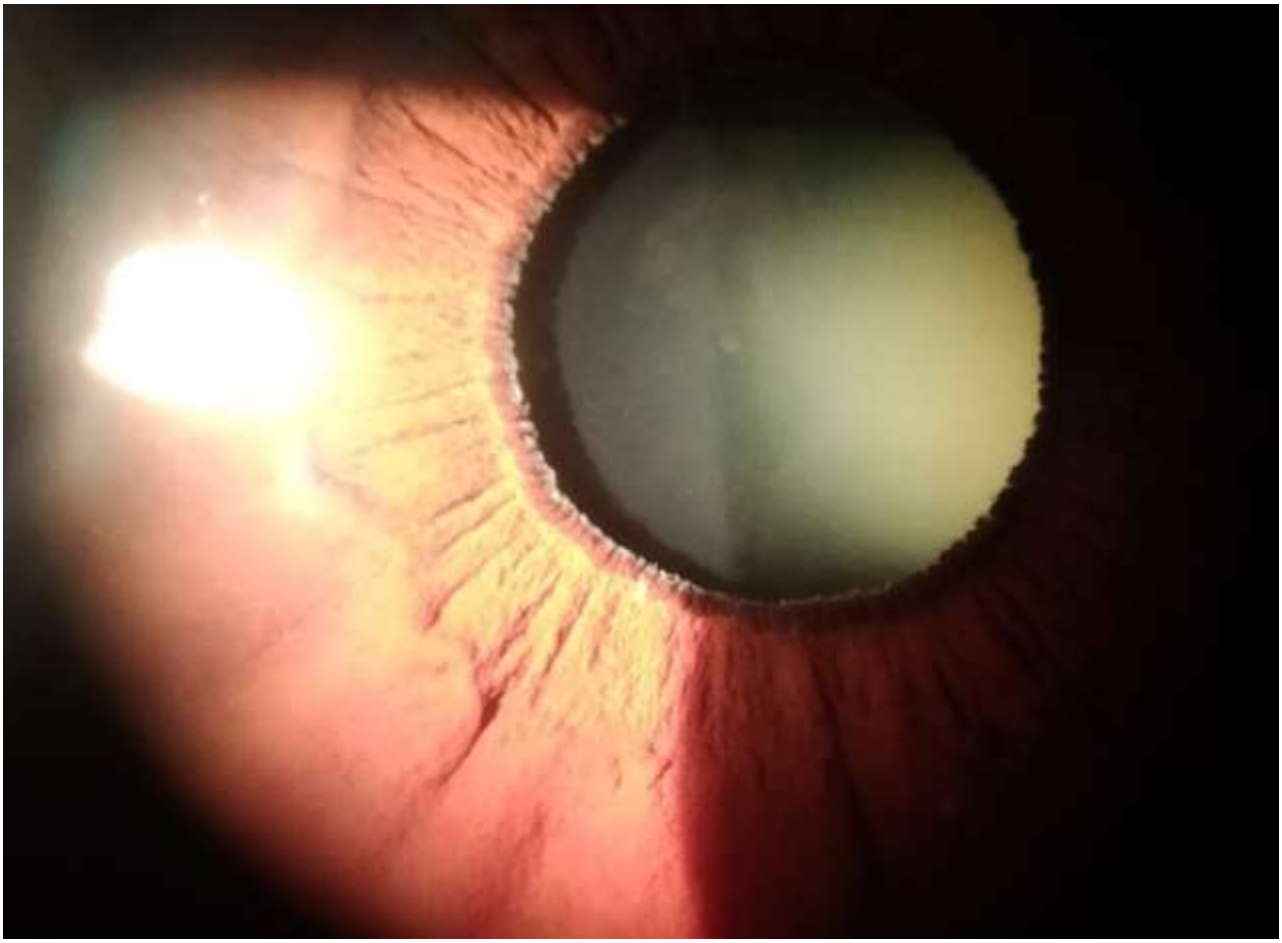

Figure 1.1: Picture has taken through slit lamp at Munawar Memorial hospital and college of optometry chakwal demonstrating Pseudoexfoliation.

Cataracts can blur vision because they cloud the eye's lens. In the world's ageing population, about 95 million people have cataracts. The most common reason for blindness in both middle-income and low-income nations is cataracts. Additionally, diseases like diabetes and glaucoma may cause them. The cataract procedure involves removing the lens. People who live with geographic limitations, societal, and financial difficulties may have an impact of cataract, which causes blurred vision, experience haloes in the path of vision, photophobia, requiring more illumination at near and performing other jobs, and rapidly changes in eyeglass prescriptions. The diagnosis of cataracts made by a qualified eye care professional. Even though many cataract instances do not impair vision, they must treated over time to protect vision (1).

PXF frequently affects older persons. Numerous epidemiological studies have shown that the condition is almost completely absent in the population between the ages of forty-nine and fifty-four in all populations and that its prevalence increases dramatically with age. Despite the fact that PXF has been observe in all racial and ethnic groups, incidence and frequency vary greatly between countries and locations. Nations in the Nordic region, especially those in Scandinavia affected by PXF. Despite the fact that the exact origin of PXF is still unknown, it is widely accepted that a number of elements, including genetic, regional, and environmental factors, are involved in the disease's pathophysiology, which accounts for the disease's variable prevalence around the world. The form of stress-induced elastosis is the PXF fibrotic matrix process. Numerous investigations have found that the pathobiology of PXF is significantly influence by cellular stress conditions (oxidative, ischemia/hypoxia). Inadequate cross-linking generation and excessive production of elastic micro fibrils result in fibrillary PXF aggregates. This fibrotic process may be brought on by a variety of elements, such as high levels of transforming growth factor beta 1 (TGF-1) and its activity, an imbalance between matrix metallo-proteinases and their tissue inhibitors, high levels of oxidative stress, anterior chamber hypoxia, and low-grade inflammatory processes. Additionally, because LOXL1 mutations are present in almost all PXF patients worldwide, new genetic studies have demonstrated high associations between these variants and PXF. The cross-linking enzyme LOXL1 is necessary for the extracellular matrix's ability to produce and maintain elastic fibers. LOXL1 risk variants are consider the major risk factor for the emergence of the PXF phenotype. PXF material's precise origins remain not known, however it may have developed in the trabecular meshwork, ciliary body, lens epithelium, or iris (2).

Free radical-induced inflammation and oxidative damage have shown to be involved in the etiology of PXF. Through increased oxidative stress and impaired cellular defense, it was assume that the proteasome system plays a significant role in the pathogenesis of PXF. On samples of iris tissue from PXF patients, an electron microscope can used to look at PXF material deposits and damage to the iris arteries. Furthermore, histological examination of tissue samples from PXF patients with aortic aneurysms revealed focal accumulation of PXF material, substantial fibrosis, and tunica intima elastosis in the adventitial and sub endothelial tissue. Genetic studies have recently identified five distinct loci connected to PXF susceptibility, and one of these locus's risk

ratios was location-dependent. A clinical condition called PXF is more common in adults over 50 years old (3).

Intraocular pressure used an alternative assessment because due to its link to glaucoma and the availability of inexpensive tools. A medical professional can measure IOP indirectly by using a portable Applanation tonometer, which flattens a central portion of cornea with air, which calculates the intraocular pressure. The practitioner's experience and the patient's corneal thickness have an impact on this measurement's accuracy. Although the intraocular pressure can be measured Applanation tonometry, developed nations normally do not employ this technique because it is simple to obtain Applanation tonometry. However, by adopting this technique, IOP monitoring can available in remote areas where ocular specialized services might not be available. Indentation tonometry usually understates intraocular pressure with comparison other tonometer's. Aqueous humour circulation problems, which cause increased intraocular pressure, are pronounced glaucoma danger elements. A gradual, irreversible eye disorder can eventually result in blindness and a loss of vision. The condition's abnormal increase in IOP is what causes it. Visual loss occurs when the IOP remains constant for an extended period between 25 and 30 mmHg; the normal range is 12 to 20 mmHg. In some cases of glaucoma, the increased production of aqueous humour plays a role, but the greater resistance to aqueous outflow is typically to blame for the elevated intraocular pressure. Although it is obvious that high IOP causes glaucoma, other factors contribute to this category of visual neuropathies as well. A rise in intraocular pressure causes compression of the vision carrying nerve. When the cytoplasm fails to supply the nutrition to the optic nerve needs, it becomes injured, which causes loss of vision and eventual blindness (4).

POAG is prevalent variety of glaucoma, while there are various subtypes of the disease. Early-onset POAG affects people under the age of 40 while adult-onset POAG affects people from the time they are 3 years old until they are in their early 20s. It has shown that primary open angle glaucoma is an autosomal dominant illness, and that a high IOP is a common clinical symptom. A clinical sign of primary open angle glaucoma is an open iridocorneal angle. In primary open angle glaucoma, the optic nerve is damage, leading to the cupping of the optic disc, the loss of retinal ganglion cells, and finally the development of visual field abnormalities. Primary open angle glaucoma has a number of risk factors, including high IOP, a good family history, advanced age, a high cup-disc ratio, CDR asymmetry, disc haemorrhage, and corticosteroid use (5).

PXF is currently believed to be typical visible cause of OAG with the proportion of those who also have glaucoma among those with PXF varies. Secondary open angle glaucoma associated with PXF may be more common than the primary form of the disease. Pseudo exfoliation glaucoma, a more serious and advanced form of POAG, is the typical disease of blindness worldwide. The clinical traits of pseudo exfoliation glaucoma, such as those frequently associated with increased intraocular pressure, more pronounced IOP shifts during the day, and characteristic IOP fluctuations, may contribute to PXF glaucoma's worse prognosis. Glaucoma is not a common complication of PXF in any group. The development of PXF glaucoma and sustained elevations in IOP, however, may be the result of trabecular obstruction and localized damage. PXF material prevents the trabecular meshwork gaps from closing, which promotes the accumulation of debris and pigment and obstructs the pathways through which water normally flows into the canal of Schlemm. This association brought about by pigment liberation from peripupillary iris-pigment epithelium and its buildup in the anterior-chamber angle. The prevention of the emergence of glaucoma in patients with PXF and normal-range of IOP do not currently prove which require further monitoring or care. Furthermore, LOXL1 genetic testing could not predict the onset of glaucoma in PXF individuals. When monitoring and assessing IOP, it is crucial to keep in mind that, it fluctuates more in PXF situations. Because of this, in PXF scenarios, a single IOP measurement might not be a reliable indicator of their IOP levels. The prevalence of glaucoma and ocular hypertension was significantly higher in PXF individuals compared to non-PXF participants. PXF individuals showed a two to threefold increase in endanger of developing glaucoma-contrasted subjects without PXF (6).

Prostaglandin analogues, selective 2-agonists, a series of systemic and topical carbonic anhydrase inhibitors of these often used employed as primary treatment for PXF glaucoma despite its severe and frequently refractory nature. The majority of the existing medications, according to a review of the literature, are often effective at decreasing IOP in people with PXF glaucoma. Even if topical drugs work well in the early stages of medical treatment, PXF is often resistant to glaucoma medical treatment, necessitating additional treatment options for PXF glaucoma patients. Furthermore, it has shown that the corneal endothelium experiences PXF material deposition. PXF related endotheliopathy is a progressive corneal endothelium disease that is typically bilateral but asymmetrical. According to the study, corneal endotheliopathy linked with PXF is cause by matrix

outside of cells. Despite only slight increases in IOP, ocular endotheliopathy raises the risk of endothelial decompensation and corneal edema. Corneal clearing typically follows a drop in IOP. Endothelial decompensation might be more difficult to reverse in more severe cases of PXF-linked endotheliopathy. This syndrome has the potential to lead to severe bullous keratopathy, a disorder that threatens eyesight and leads to early decompression of ocular endothelial cells. Knowing when the endothelium of the cornea is compromise can help surgeons avoid major perioperative injury, the postoperative failure of the cornea and endothelial cell loss. Phacoemulsification is one of the safest and most dependable surgical methods now used to remove intraocular lenses, and is the most common. The cloudy lens divided into smaller pieces with the aid of ultrasound, and the fractured parts were remove. Replacing the removed lens is an implanted lens with carefully selected optical properties. The benefit for speedy patient recovery and vision restoration results contributed to phacoemulsification's current, well-deserved prominence in cataract surgery. Proparacaine drops commonly used to numb the surface of the eye during phacoemulsification cataract surgery. Four phases can be distinguished in the operation, one of which being a corneal incision. Small, astigmatically neutral, and suture-free incisions are the best (6).

The limbal vascular arcade is in front of the transparent corneal incision, which enables implantation of a foldable IOL. It is the one that ophthalmologists employ the most. Capsuloxis is common name for second type. It is a method used to separate the tissue made of crystals. Energy is transmitted using ultrasound using a probe with a steel or titanium tip. This results in a vibration that enables the probe to vibrate and respond swiftly to the lens capsule. Radial capsulotomy identified as emulsification procedure that is used the most frequently. The third type called phacosculpture. The lens is emulsified in this method using ultrasonic, and the aspirated lens is remove with the same tools. The most often used technique for removing lenses is first dividing them into four quadrants, and then aspirating each one separately. The first step in this procedure, which normally entails four basic processes, entails deeply sculpting the nucleus until just the extremely nucleus' thin posterior region is left. To fracture the posterior region of the nucleus and its nuclear margin, pressure must applied with a probe and a spatula. The same process is use to extract a wedge-shaped portion of the emulsion core after rotating core 90 degrees. To complete the square, each piece is emulsified. The final method involves implanting an intraocular lens to replace the clouded lens after phacoemulsification. The acrylic lens, which has a greater refractive

index and preserves the majority of patients get benefits of the PMMA lens' physical characteristics, is most often used lens. The insertion tool for IOL implantation is either an injector or a pair of specially made forceps. The newly developed multifocal IOL, which incorporates refractive power correction, enables retinal viewing of both close-up and distant objects. Because of this, people who undergo cataract surgery can see a significant improvement in their eyesight without the use of glasses (6).

OBJECTIVES

- To demonstrate the impact of Phacoemulsification on intraocular pressure in Pseudo exfoliation non-glaucomatous eyes.
- To assess the impact of phacoemulsification on intraocular pressure in subjects without pseudo exfoliation.
- To compare the effect of phacoemulsification on intraocular pressure between two groups with and without Pseudo exfoliation.

2. METHODOLOGY

It was a prospective longitudinal study design. This study was conducted at Munawar Memorial Hospital Chakwal, Punjab, Pakistan. This study was conducted during Sep 2022-May 2023. Total 100 subjects were included in study, which divided into two groups, 50 subjects with PXF and 50 subjects without PXF. Non-probability convenient sampling technique was used.

Inclusion criteria of this study consist of age above 40 to 65 years, patients having cataract of Cortical, Nuclear, Posterior polar, posterior sub capsular and mature cataract with Pseudoexfoliation and normal cup disc ratio, Cataract patient without Pseudoexfoliation and normal cup disc ratio, Best corrected visual acuity <6/12 with all types of refractive errors, IOP < 30mmHg without glaucomatous damage and subjects having Diabetes & Hypertension with normal fundi were included. The exclusion criteria was observed as subjects with IOP >30mmHg, Previous ocular & laser surgery, Diabetic retinopathy & hypertensive retinopathy, Glaucoma, Uveitis, Ocular trauma and History of using steroids.

The data was inputted and subjected to statistical analysis by using the SPSS version 22.0 software package. IOP levels between the PXF and Control groups were compare using the paired sample t test. The participants of the study were deliver with all information regarding the procedure that was carried during research process and data collection. To ensure that the included subjects had

understand well, verbal and written consent was taken after being fully briefed about the aims and design of the study.

DATA COLLECTION PROCEDURE

Study was carried out at eye department of Munawar Memorial Hospital and College of Optometry Chakwal. Subjects were classify into two groups. Informed consent was taken from all subjects. All cataract subjects divided into two groups one with and one without PXF. Visual acuity was assessed using Log MAR visual acuity chart. All subjects underwent detailed ocular examination including anterior and posterior segments. A slit lamp examination was done to diagnose the PXF material at pupillary margin and all types of cataract including nuclear, cortical and posterior polar, posterior sub capsular and mature. The IOP was calculated using a Goldmann Applanation tonometer with 0.5%, proparacaine eye drops were instilled to subjects' eyes as topical anesthesia and 1% fluorescein to stain the tear film. Subjects with ocular hypertension without glaucomatous damage were also included in study. The baseline IOP value compared with 1^{st} week and 6^{th} week post operated IOP value between control group and PXF group. Other types of glaucoma were rule out and excluded from the study. Fundus examination was carried out by using volk 78 Diopters lens to examine the cup disc ratio and neuroretinal rim.1% Tropicamide was used to dilate the pupil. All quadrants of retina were examine to exclude diabetic retinopathy and hypertensive retinopathy and other retinal pathologies. Patients with abnormal cup disc ratio >0.5 was excluded from study. The ophthalmologist confirmed these findings.

Goldman Applanation tonometer (Holyavision)

The force required to flatten a 3.06mm diameter corneal region measured by the Goldmann Applanation tonometer. The capillary attraction of the tear film meniscus to the tonometer head balances out the cornea's resistance to flattening at this diameter. To make the tear film more visible, fluorescein dye instilled into the patient's eye. The image of the tear meniscus split into a superior and an inferior arc using a split-image prism. When these circles positioned so that their inner circles of mires barely touch, the intraocular pressure is measured. The central corneal thickness affects the readings of Applanation tonometry. In order to balance the opposing pressures of surface tension and corneal rigidity and enable indentation, Goldmann Applanation tonometer calculated that the average corneal thickness would be 520 microns.

3. DATA COLLECTION INSTRUMENTS

These instruments were used in this research study

- Log MAR (Brien Holden)
- Auto refractometer (Topcon)
- Trial box
- Slit lamp bio microscope (Topcon)
- Goldman Applanation tonometer (Holya vision)
- 78Ds lens (Volk)

RESEARCH TOOL

- Data was collected through specially designed Performa.

Log MAR

Log MAR is the acronym of logarithm of minimum angle of resolution. It is more accurate and more reliable than Snellen visual acuity chart. Patient's Vision was assess at distance of 4 meters and visual acuity was noted according to standard protocol. In log MAR each line carries 5 optotypes and has logarithmic value of 0.1 log MAR. Logarithmic value of each letter is 0.02 log MAR. Positive values show poor vision while negative values indicate better vision.

Trial box

Patient's visual assessment and subjective refraction was carried out using trial box.

Auto refractor (Topcon)

Patient's objective refraction was carried out by means of Auto refractor (Topcon).

Slit lamp Bio microscope (Topcon)

The most frequent element of ophthalmic equipment used by ophthalmologists in regular clinical practice is a slit lamp. It is a vital tool in the arsenal of an ophthalmologist. Slit lamp not only offers a magnified view of intraocular structures (anterior and posterior segment), but also aids in qualitative and quantitative analysis of various parameters, including corneal endothelial cell count, corneal thickness, anterior chamber cells, flare assessment, depth of anterior chamber, pupil size, grading of cataract, slit lamp photography, etc. Since the slit lamp is the only one part of equipment that provide slit apertures, the term "slit lamp" is inadequate. A slit lamp is a device comprised of an illuminating system, an observation system, and a mechanical support. The many

slit lamp illumination techniques covered in this activity used to identify a number of ocular disorders. To evaluate the anterior and posterior chamber, a slit lamp employed.

78 Ds lens

A Volk 78 D lens was used to examine retina. After dilation, the patient pupil with the help of dilating eye drops mydracil (tropicamide), the cup disc ratio and neuroretinal rim of patient was examine. All four quadrants of retina and macula was examine in detail to exclude pathology of retina. Patient was seated on a comfortable chair with chin and head rested against slit lamp.

4. RESULTS

There were 100 subjects in our study. Subjects were divided into two groups, group I was having cataract with PXF and group II was having cataract without PXF. After phacoemulsification of both groups, they were follow up and IOP was checked at 1st and 6th week postoperatively.

4.1: Age Distribution of PXF group

Minimum age was 40 years while maximum age was 65 years. Overall there were (24)48% participants who had their age among 51-60 years of age and (16)32% belong to the age group 61-65 years of age. While (10)20% participants had age their age among 40-50 years of age.

Table 4.1: Frequency of Age distribution of PXF group

Age Groups	Frequency	Percentage	Valid Percentage	Cumulative Percent
40-50years	10	20.0	20.0	20.0
51-60 years	24	48.0	48.0	68.0
61-65 years	16	32.0	32.0	100.0
Total	50	100.0	100.0	

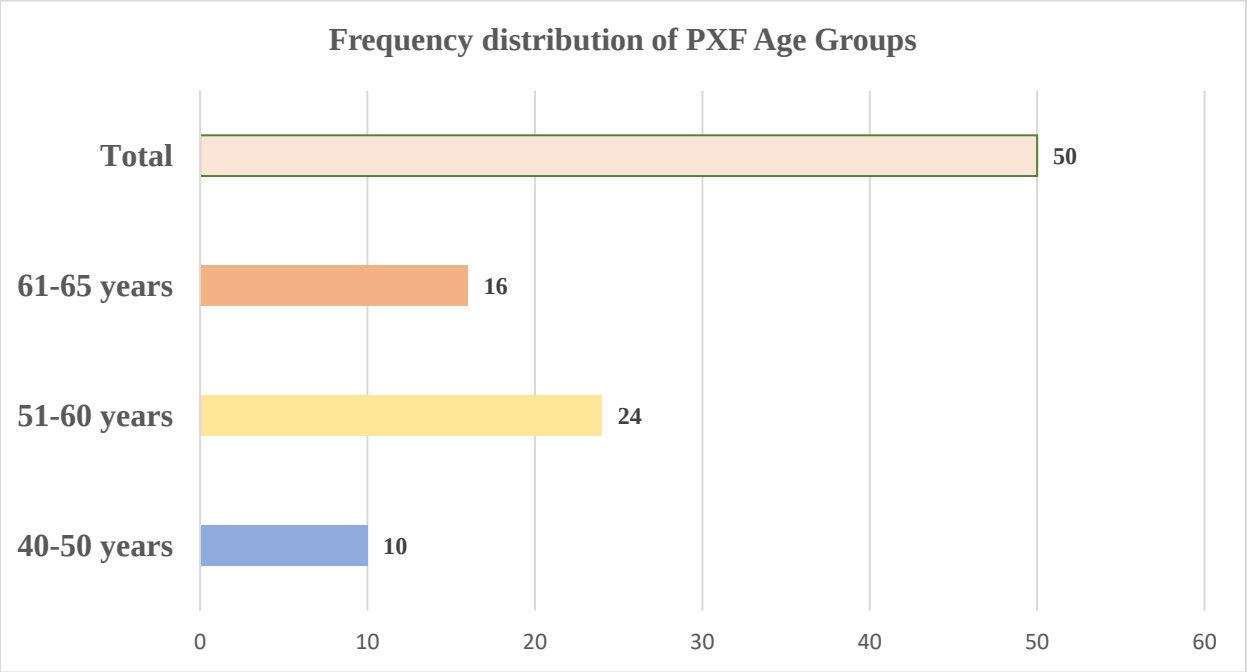

Figure 4.1: Chart of Age distribution of PXF subjects

4.2: Frequency of Age distribution of Control Group

Minimum age was 40 years while maximum age was 65 years. Overall there were (17)34% participants who had their age among 51-60 years of age and (15)30% belong to the age group 61-65 years of age. While (18)36% participants had age their age among 40-50 years of age.

Age Groups	Frequency	Percentage	Valid Percentage	Cumulative Percent
40-50years	18	36.0	36.0	36.0
51-60 years	17	34.0	34.0	70.0
61-65 years	15	30.0	30.0	100.0
Total	50	100.0	100.0	

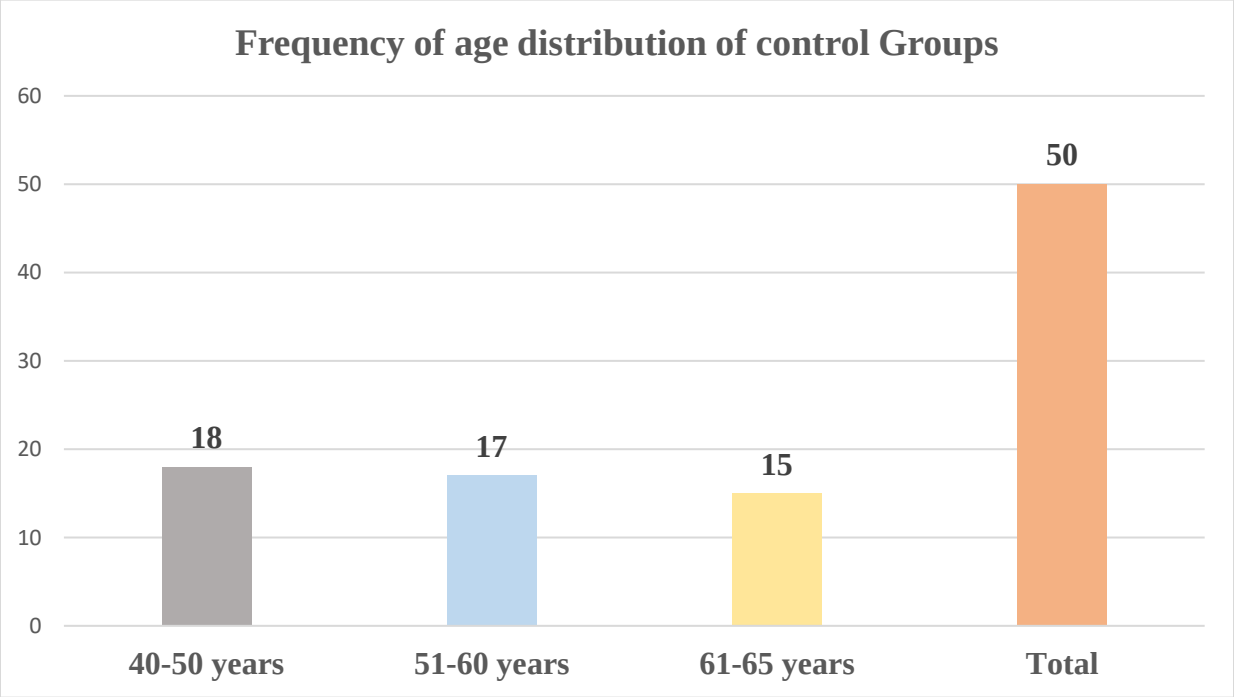

Figure 4.2: Chart of Age distribution of control subjects

Table 4.3. Frequency distribution of different types of cataract

Subjects was having nuclear sclerotic was found to be cataract was found to be 32%, posterior subcapsular 47% and post polar was 62%,cortical was 69% and mature cataract was 31%.

Cataract type	Frequency	Percent	Valid Percent	Cumulative Percent
Nuclear sclerosis	32	32	32	32
Posterior sub capsular	15	15	15	47
Post Polar	15	15	15	62
Cortical	7	7	7	69
Mature	31	31	31	100
Total	100	100	100	

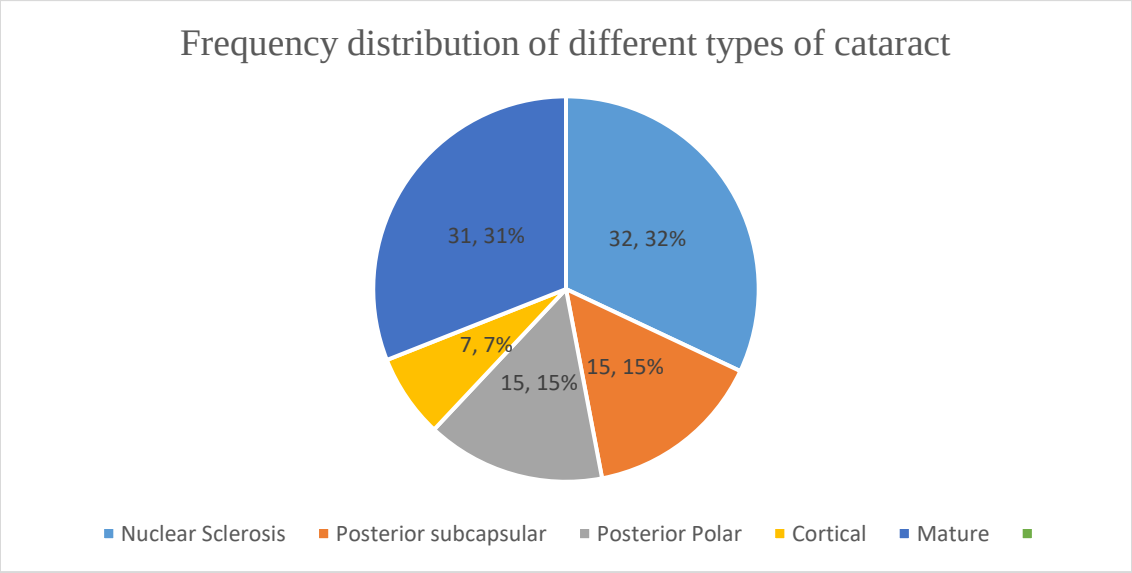

Figure 4.3: Frequency distribution of different types of cataract

Table 4.4: Frequency Distribution of baseline IOP of PXF group

The baseline IOP was found to 34%(17) of IOP range 16-20 mm Hg while 32% (17) subjects having IOP range of 10-12mm Hg. Moreover, 28% (17) subjects had IOP rage of 13-15 mm Hg and 6% (3) subjects had IOP range of 21-24 mm Hg.

Baseline IOP	Frequency	Percent	Valid Percent	Cumulative Percent
10-12	16	32.0	32.0	32.0
13-15	14	28.0	28.0	60.0
16-20	17	34.0	34.0	94.0
21-24	3	6.0	6.0	100.0
Total	50	100.0	100.0	

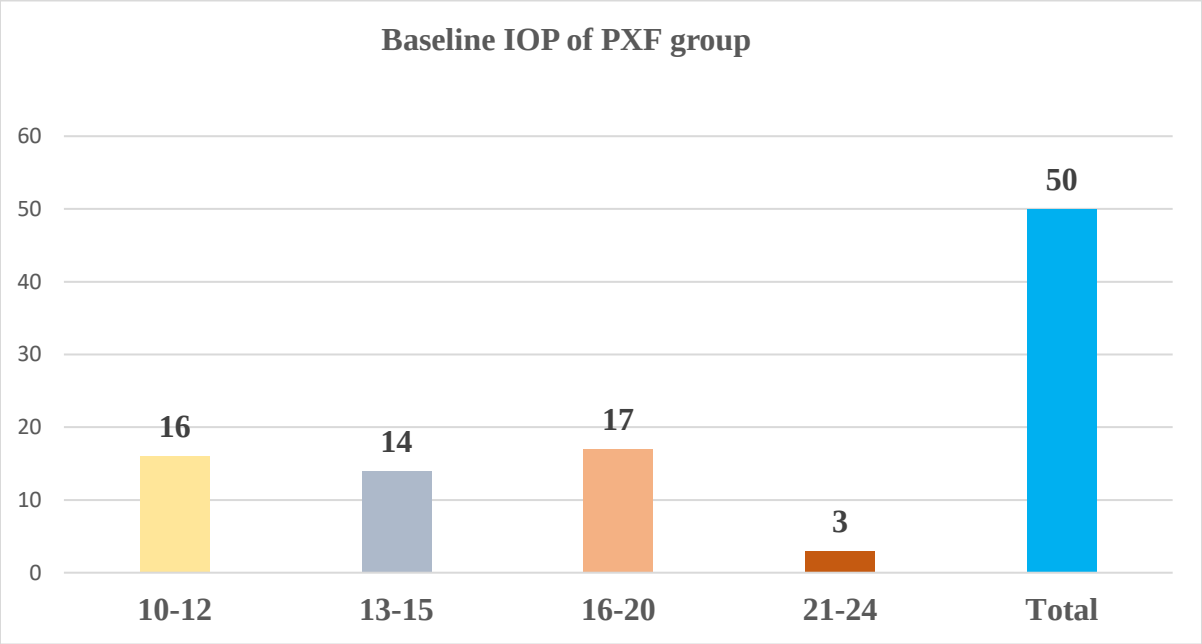

Figure 4.4: Frequency Distribution of baseline IOP of PXF group

Table 4.5 Frequency Distribution of baseline IOP of Control group

The baseline IOP was found to 44%(22) of IOP range 13-15 mm Hg while 40% (20) subjects having IOP range of 10-12mm Hg. Moreover, 12% (6) subjects had IOP rage of 16-18 mm Hg and 4% (2) subjects had IOP range of 19-22 mm Hg.

Baseline IOP	Frequency	Percent	Valid Percent	Cumulative Percent
10-12	20	40.0	40.0	40.0
13-15	22	44.0	44.0	84.0
16-18	6	12.0	12.0	96.0
19-22	2	4.0	4.0	100.0
Total	50	100.0	100.0	

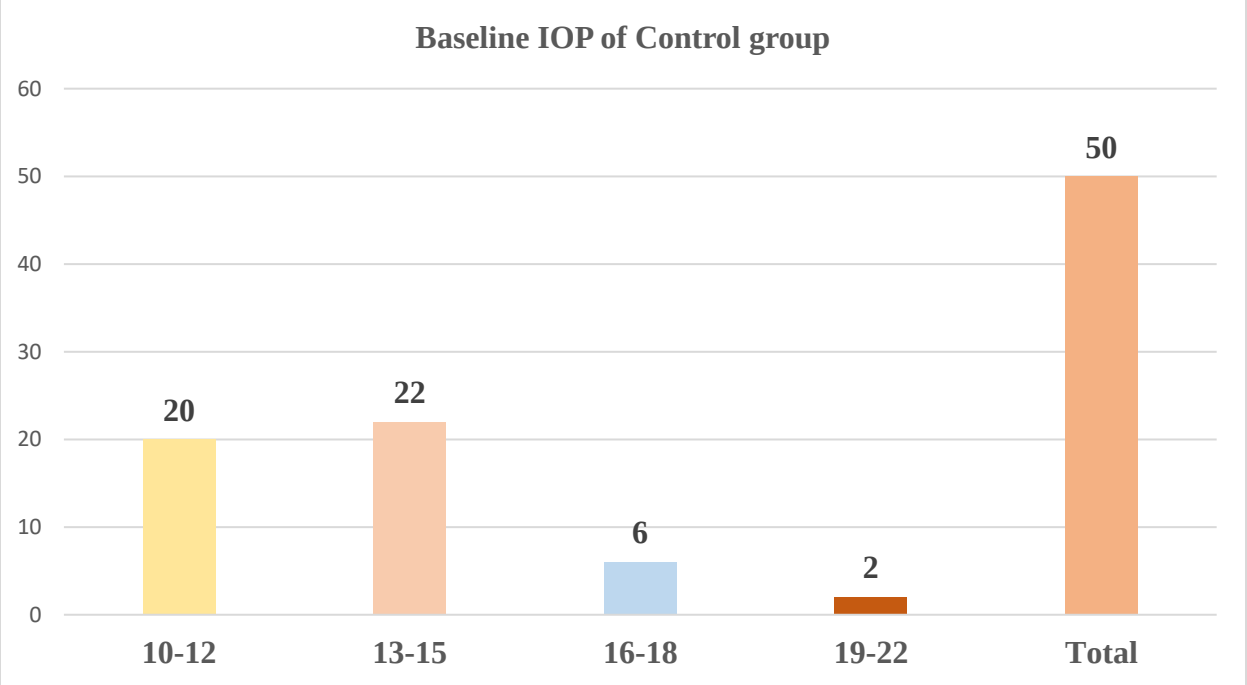

Figure 4.5: Frequency Distribution of baseline IOP of control group

Table 4.6 Comparative analysis of baseline and 1st week postoperative IOP between PXF and control group

A comparative analysis of PXF and control group was done between baseline IOP and after 1st week of surgery with p value of <0.05 by using confidence interval of 95%. The mean difference between baseline and 1st week post operative IOP of PXF group was 2.120+0.849 with p value less than 0.05 which was highly significant. Similarly, The mean difference between baseline and 1st week post operative IOP of control group was 1.600+1.355 with p value of less than 0.05 which was highly significant

Group	Baseline IOP mmHg	1st week IOP mmHg	Mean Difference	P value
PXF group	14.82+3.231	12.36+2.776	2.120+0.849	**<0.05**
Control Group	13.46+2.401	11.58+2.100	1.600+1.355	**<0.05**

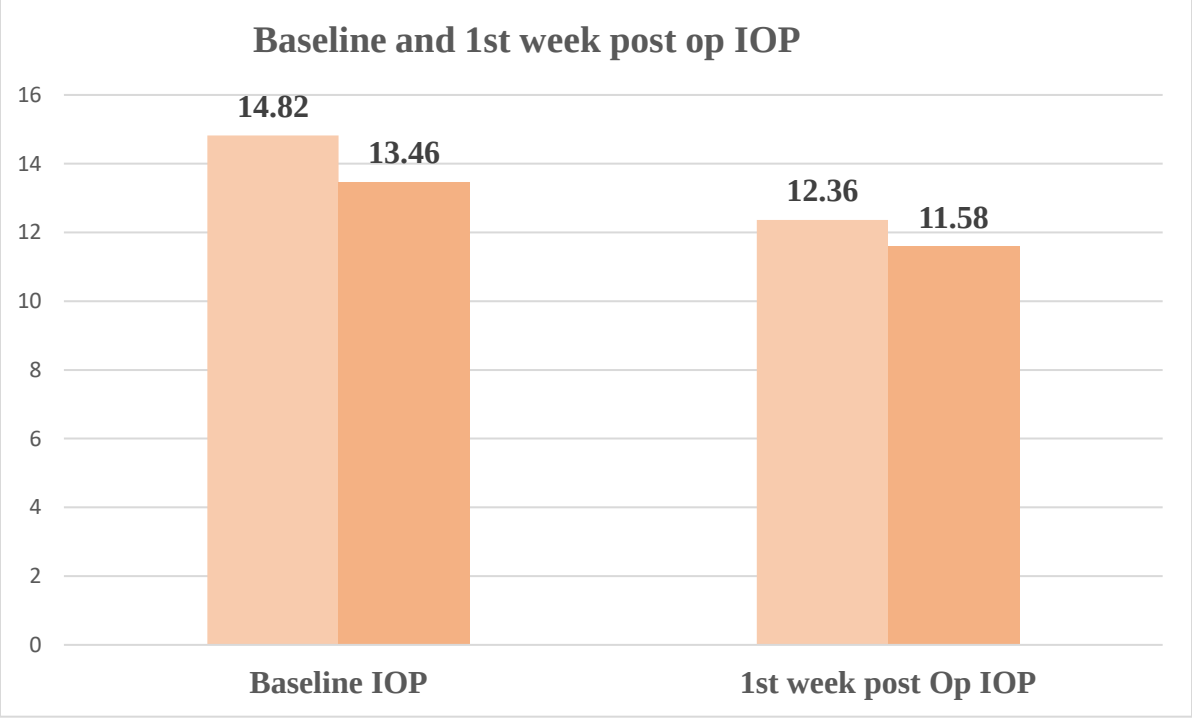

Figure 4.6: Comparative analysis of baseline and 1st week postoperative IOP between PXF and control group

Table 4.7: Comparative analysis of baseline and 6th week postoperative IOP between PXF and control group

A comparative analysis of PXF and control group was done between baseline IOP and after 6th week of surgery with p value of <0.05 by using confidence interval of 95%. The mean difference between baseline and 6th week post operative IOP of PXF group was 2.620+2.125 with p value less than 0.05 which was highly significant. Similarly, The mean difference between baseline and 6th[t] week post operative IOP of control group was 2.460+1.265 with p value of less than 0.05 which was highly significant.

Group	Baseline IOP	6th week IOP	Mean difference	P value
PXF group	14.82+3.231	11.36+2.266	2.620+2.125	**<0.05**
Control Group	13.46+2.401	10.80+1.841	2.460+1.265	**<0.05**

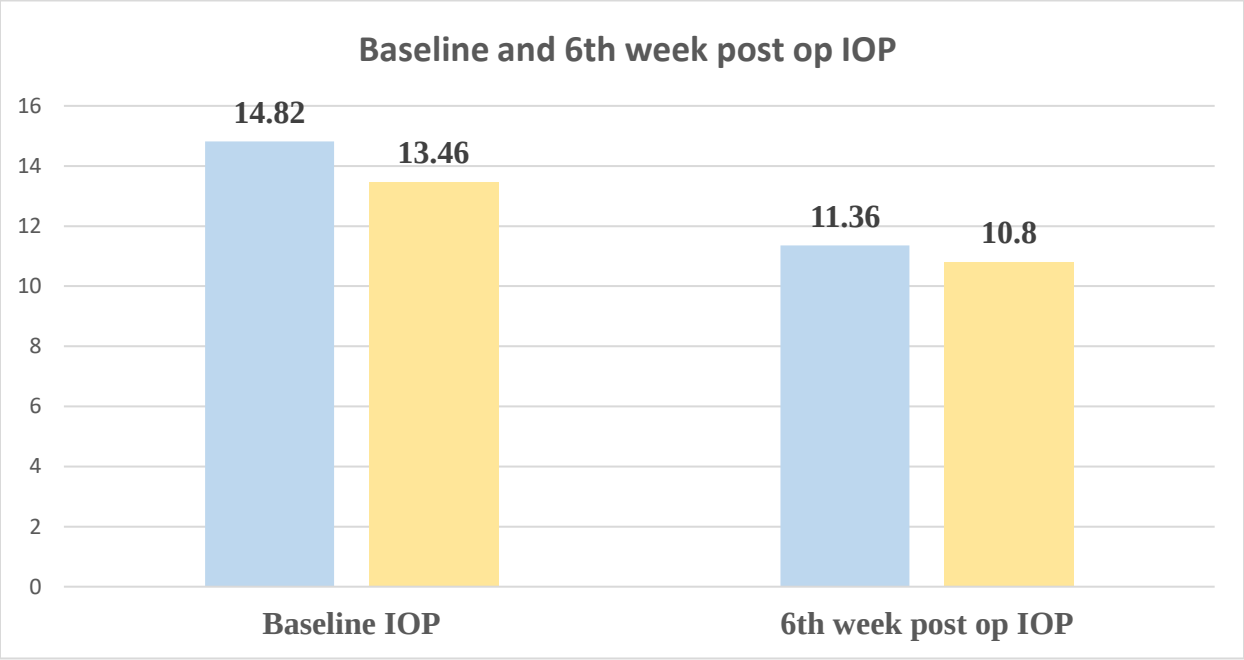

Figure 4.7: Comparative analysis between baseline and 6th week postoperative IOP of PXF and control group

Table 4.8: Comparative analysis of Baseline, 1st week and 6th week post operated IOP between PXF and Control Group

A comparative analysis between two groups was done. The mean difference between baseline IOP of PXF and control group was 1.360+3.832 with p value 0.015, which was less than 0.05. Similarly, the mean difference of IOP of 6th week post-operative IOP between PXF and control group was 1.200+0.444 with p value 0.009 which was less than 0.05 and highly significant.

IOP (mmHg)	PXF group	Control Group	Mean Difference	P value
Baseline IOP	14.82+3.231	13.46+2.401	1.360+3.832	**0.015**
1st week	12.36+2.776	11.58+2.100	0.840+3.909	0.135
6th week	11.36+2.266	10.80+1.841	1.200+0.444	**0.009**

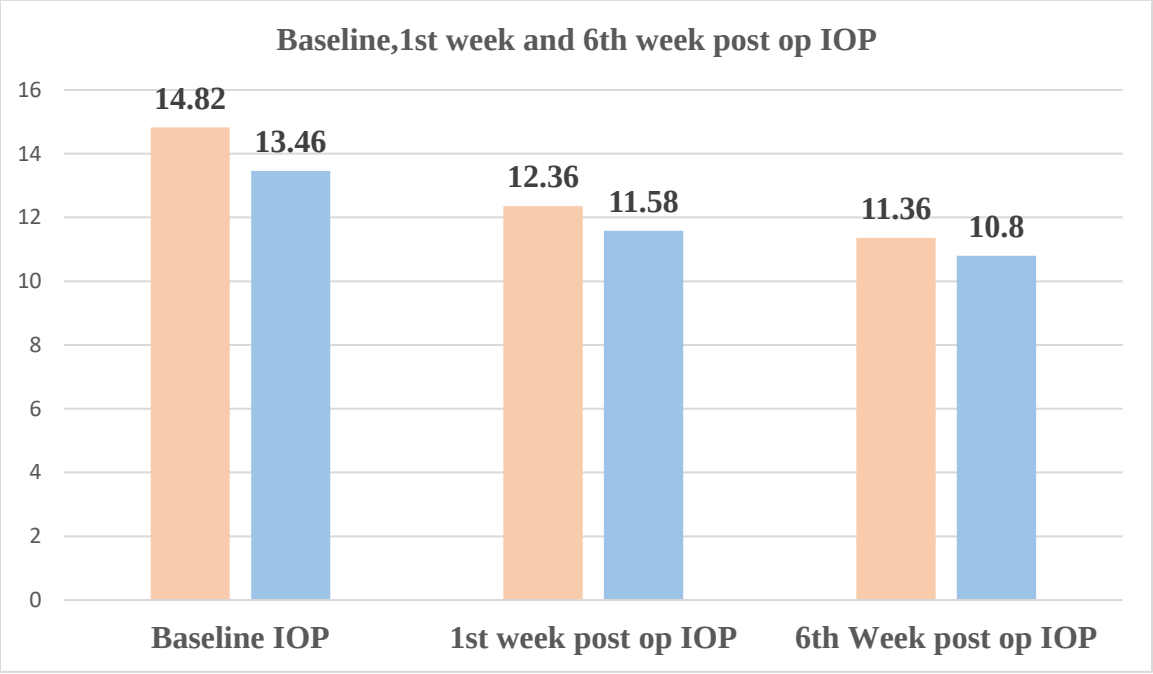

Figure 4.8: Comparative analysis of Baseline, 1st week and 6th week IOP between PXF and Control Group

5. DISCUSSION

The purpose of this research was to find out the impact of phacoemulsification on intraocular pressure in both PXF group and control group. Prospective longitudinal Comparative cross sectional study design followed. Subjects were divided into two groups based on presence and absence of Pseudo exfoliation. Both groups were matched almost similar in age and gender.

In our study, we found that the Preoperative IOP was greater in PXF subjects than subjects without PXF. IOP was decreased by phacoemulsification in all groups, although the PXF group observed a noticeably higher reduction. In another study, the mean pre-operative IOP was, respectively, 14.70 + 2.42 mm Hg in the PXF group and 12.87 + 2.66 mm Hg in the control group. These outcomes are comparable to those of our trial, in which the mean preoperative IOP in the PXF group was 14.82 + 3.231 mm Hg and 13.46 + 2.401 mm Hg of control subjects (7). The average intraocular pressure of the PXF group was 13.27+ 2.95 mm Hg and 12.84 +2.58 mm Hg in the control group. The average variations of intraocular pressure at the sixth postoperative week was 11.36 + 2.266 mm Hg in PXF and 10.80 + 1.841 mm Hg of control subjects. PXF patients with higher preoperative IOPs can experience greater IOP reductions than individuals with lower preoperative IOP (8).In a different group, 65 individuals were scheduled to undergo cataract surgery. The two participant groups were patients with PXF and controls without PXF. IOP was measured before cataract surgery and again a month later. They discovered a difference in post-operative IOP between PXF and the control group of IOP >2mmHg. Nevertheless, they discovered that the PXF group's IOP drop was larger than the controls'. The average preoperative IOP was 15.93+2.93 mm Hg in the control group and 16.03+3.46 mm Hg in the PXF group. In the current investigation, the mean reduction in IOP from baseline to the first week after surgery was 2.120 + 0.849 mm Hg in the PXF group and 1.600 + 1.355 mm Hg in the control group (9).

In a study done in Geneva, the average intraocular pressure reduced by 2.5 mmHg because of phacoemulsification. Eyes with a preoperative IOP of less than 21 mmHg experienced a greater postoperative IOP reduction. In the current investigation, we discovered that phacoemulsification considerably lowers intraocular pressure in the pseudo exfoliation group compared to the control group. Following cataract surgery, the intraocular pressure considerably decreased in the PXF group compared to the control group at the sixth week of follow-up. The more dramatic a decrease in intraocular pressure that phacoemulsification generated in participants, the higher the intraocular pressure was. Additionally, the maximum frequency of intraocular pressure in the PXF

group was 16-20 mm Hg in 34% of patients, compared to 13-15 mm Hg in 44% of the control group, which was significantly less than the PXF group (10).

In this study, the frequency distribution of women was higher than that of men in both the PXF group and the Control group. Another study found that women made up 63% of participants, while men made up 30%. Age frequency distribution was also discovered to be 65.21+7.41, which is similar to the current study. In non-glaucomatous individuals, the study showed that pre-operative IOP is an independent and reliable predictor of IOP reduction after phacoemulsification surgery. In the previous study, diabetes mellitus was found to be present in 23.5% of patients and absent in 76.5% of subjects, however in the current study, diabetes mellitus was present in 38% of subjects and absent in 62% of subjects. Additionally, 49.4% of people had hypertension, compared to 50.6% who did not. In the current study, hypertension was present in 34% of participants but not in 66%. The frequency distribution of nuclear sclerotic cataract was 32% in the current study, followed by posterior sub capsular and posterior polar cataracts at 15% each, cortical at 7%, and mature cataracts at 31% (11).A significant risk factor for pseudoexfoliation is age. In the current investigation, it was discovered that patients over 50 were more likely to experience pseudoexfoliation. Patients between the ages of 51 and 60 had a pseudoexfoliation frequency of 48%, which was higher than that of other age groups. These findings are consistent with earlier research where age significantly correlates with post-operative intraocular pressure. PXF was more common among older people and individuals with advanced cataracts (12). In a recent study, the frequency distribution of IOP 10-12 mm Hg was found to be 32.0% in the PXF group and 94.0% for IOP 16-20 mm Hg. These findings are comparable to those of a study in which the frequency of IOP 11.1-21.0mm Hg was 77.95% in the PXF group (13).

CONCLUSION

Phacoemulsification reduces IOP more significantly in pseudo exfoliation subjects than controls. The pre operated intraocular pressure values higher in PXF group than control group, so phacoemulsification decreases IOP more progressively in PXF group than controls. The higher pre-operative IOP associated with greater reduction of IOP after cataract surgery. Therefore, phacoemulsification prevents the risk of developing secondary glaucoma in pseudo exfoliation subjects.

LIMITATIONS

- This study can be conducted at larger sample size.
- Long-term follow up will be required to assess IOP reductions more efficiently.
- Despite of IOP, other parameters like anterior chamber depth and axial length of Pseudoexfoliation subjects can be evaluated at follow up periods.
- This study can be conducted in pseudoexfoliative glaucoma subjects.
- Patient Compliance: It was very difficult to ensure the visits of the patient at the follow-ups. Some patient discontinue after two follow-up, which make it difficult completion of data. It also grant more extra time for completion of data.

RECOMMENDATIONS

- This study recommend that the cataract surgery by phacoemulsification in pseudoexfoliation subjects lead to reduction of intraocular pressure.
- This will prevent the PXF subjects from risk of developing secondary glaucoma and visual impairment.
- This study improves quality of life of pseudo exfoliation population.
- This study increases the awareness among population that early cataract surgery decreases the need of antiglaucoma medication in PXF subjects.
- This study recommend that all health care professional should treat cataract as soon as possible to prevent the risk of developing higher IOP which will eventually damages the ocular structure and leads to loss of visual functions.

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