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Original Article

Comparative Study of Latanoprost (0.005%) and Bimatoprost (0.03%) in Primary Open Angle Glaucoma

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ABSTRACT

Introduction: Glaucoma can cause vision loss by damaging the optic nerve and increased intraocular pressure is one of the primary risk factors.

Materials and methods: This was a hospital based, prospective, comparative, single masked (observer masked) study conducted on patients attending glaucoma department of Nepal Eye Hospital within a period of 1 year from February 2020 to January 2021. The sample size was 50. Specially designed proforma was used to collect the patient. Patients falling are divided in group A and group B randomly, patients using latanoprost were placed in group A and patients using bimatoprost were placed in group B. The examination procedure included history taking, Snellen visual acuity, refraction, gonioscopy, IOP measurement, slit lamp biomicroscopy and fundoscopy with 90 diopter lens.

Results: Among fifty patients 33 (66%) were males and 17 (34 %) were females, 35 (70%) belonged to urban and 15 (30%) from rural population. Maximum number of patients were in the age group of 16-30 years i.e. 15 (30%), second highest group was 61-75 years of age group i.e. 14 (28%) , 11 i.e. 22% of patients were of 46-60 years of age group. Nine (18%) of patients were 31-45 years of age group and 1 i.e. 2% was above 75 years of age. Twenty percent presented with hypertension, 14 % with diabetes mellitus and 66% with no systemic history. Ten percent had family history of glaucoma and 90% patients had no family history . Twenty-eight percent of patients had a family history of smoking and 72% had no history. The mean IOP of group A (0.005% latanoprost) patients initially before the start of the treatment was 27.16 mm Hg, at sixth month IOP was 17.24 mm Hg, mean difference was 9.92 mm Hg and p value was < 0.001. The mean IOP of group B (0.03% bimatoprost) patients initially before the start of the treatment was 26.88 mm Hg , at the sixth month the IOP was 15.88 mm Hg , and the mean difference was 11.00 mm Hg and p value was < 0.001. There was a significant difference in IOP at first visit and 6 months in both groups, p<0.001. (The t-test is used.) However, the mean difference of group B, 11.00, is greater than group A, 9.92.

Conclusion: Male gender, increasing age, urban population, hypertension, diabetes mellitus, and high intraocular pressure were the most prevalent risk factors. The most important factor is early detection of signs and symptoms and measurement of diurnal intraocular pressure.

Key words: Bimatoprost, Intraocular pressure, Latanoprost, Primary open angle glaucoma.

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INTRODUCTION

Glaucoma is a group of diseases that can cause vision loss and blindness by damaging the optic nerve. Increased intraocular pressure (IOP) is one of the primary risk factors of glaucoma. IOP is raised by increased resistance to aqueous humor outflow. By definition primary glaucoma is not associated with ocular disorder that causes increased resistance to aqueous outflow or angle closure. The primary glaucoma usually affects both eyes. One of the leading causes of irreversible blindness in the world is glaucoma. Glaucoma occurs in all segments of population with significant health and economic consequences, making it a major health problem. Those with low vision confront visual disability in daily and social life (Stamper RL et al, 1999).

Primary open angle glaucoma has characteristically an adult onset and is bilateral and symmetrical disease and it occurs in the elderly and tends to run in families. Inheritance is said to be multifactorial and polygenic. Diabetes and myopia also occurs more frequently in persons with glaucoma than in the general population (Stamper RL et al, 1999).

Worldwide 37 million people are blind, with 12.3% (4.4) million attributed to glaucoma. The commonest type of glaucoma in Caucasians and Africans is POAG and it also constitutes about half of the primary glaucoma seen in Asians and Eskimos (George A. Cioffi et al, 2008).

Figures for developing world, where approximately 90% of world blind live and expected to increase significantly during the last decade as world population ages (Jack J Kanski, 2008).

Glaucoma can manifest in various patterns, many are asymptomatic until advanced stage. Some may manifest as acute rise of intraocular pressure, while others may be congenital or secondary to trauma or secondary to various systemic and ocular diseases. As there is irreversible damage to the optic nerve head and visual field loss is the cause of glaucoma leading to blindness, much emphasis is given for early diagnosis. Glaucoma is also the major cause of blindness in Nepal. According to the National blindness survey (NBS), it is the 4th major cause of bilateral blindness in Nepal (Neupane MP, 1996).

Latanoprost is a prostaglandin analog and is a potent intraocular pressure lowering medication available today and has become one of the most useful anti glaucoma agents. Latanoprost is supplied in 0.005% concentration which is administered in a single dose daily. Latanoprost increases the outflow of aqueous through the uveoscleral pathways. It decreases the intraocular pressure (IOP) by 25-32%. After administration it goes to peak at 10-14 hours, its wash out time is 4-6 weeks and maximum intraocular pressure lowering effect may take up to 6 weeks to occur. Ocular side effects of Latanoprost are increased pigmentation of eyelashes and iris, hypertrichosis, blurring of vision, keratitis, cystoid macular edema, anterior uveitis, hyperemia of conjunctiva, reactivation

of herpes keratitis, foreign body sensation, eye ache and irritation in eyes. Systematically its side effects are flu like symptoms, joint pain, muscle pain and headache. Latanoprost has a method of action that appears to be both pressure dependent and pressure independent. It has been shown that Latanoprost results in increased spaces between the muscle fascicles within the ciliary body, presumably increasing aqueous flow and uveoscleral flow. Latanoprost penetrates the cornea after being hydrolyzed by corneal esterase.

Bimatoprost is a prostaglandin analog and increases the outflow of aqueous fluid and lowers intraocular pressure. Bimatoprost is absorbed through the cornea. It lowers intraocular pressure after four hours and lasts for 24 hours. A peak blood plasma concentrations is reached in 10 minutes and plasma protein binding is 88%. The biological half-life of bimatoprost is 45 minutes. Drug excreted thru kidney is 67% and thru feces is 25%.

The side effects of bimatoprost is conjunctival hyperemia, burning sensation, discomfort and permanent darkening of the iris.

MATERIALS AND METHODS

This was a hospital based, prospective, comparative, single masked (Observer Masked) study on the patients attending glaucoma department of Nepal Eye Hospital, Kathmandu, Nepal. Patients who were given 0.005% latanoprost and patients who were given 0.03% bimatoprost, were randomly selected and study duration was one year. Fifty cases of which % (25 cases were given 0.005% latanoprost and 25 cases were given 0.03% bimatoprost).

Inclusion criteria: Diagnosed cases of primary open angle glaucoma, ocular hypertension with IOP >24 mm Hg and up to 35 mm Hg and patients above 16 years of age.

Exclusion criteria: Patients with IOP greater than 35 mm Hg, patients with normal intraocular pressure, patients with physiological cups, patients of congenital glaucoma , angle closure glaucoma, secondary glaucoma and who underwent filtering surgery were excluded.

RESULTS

There was a significant difference in IOP at first visit and 6 months in both groups, $p<0.001$. (The t-test was used). However the mean difference of group B, 11.00 greater than group A, 9.92.

On the basis of geographical distribution, out of fifty patients in this study 35 (70%) are urban and 15 (30%) are from rural populations.

Out of 50 patients, maximum numbers of patients were within the 16-30 years of age group i.e. 15 (30%), second highest group was 61—75 years of age groups it comprise 14 (28%) of patients, 11(22%) of patients are of 46—60 years of age groups, 9 (18%) of patients are from 31—45 years of age group and only 1(2%) patient were from more than 75 years of age groups.

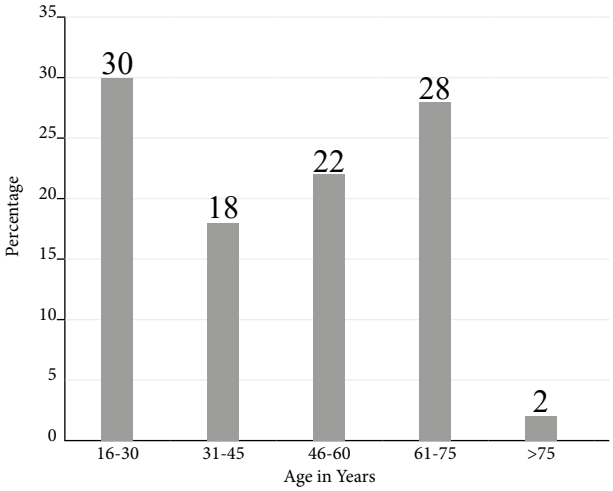


Figure 1: Age distribution of patients.

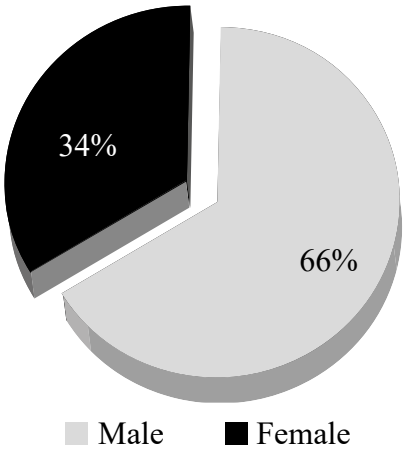


Figure 2: Sex distribution of patients.

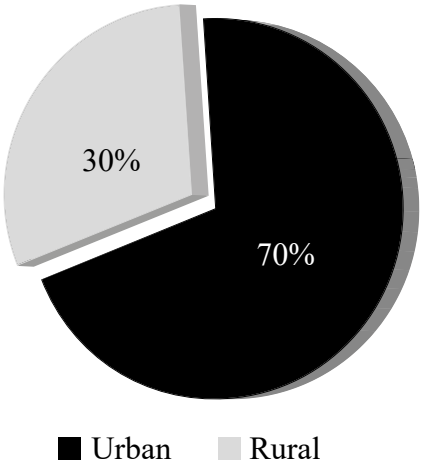


Figure 3: Geographical distribution of patients.

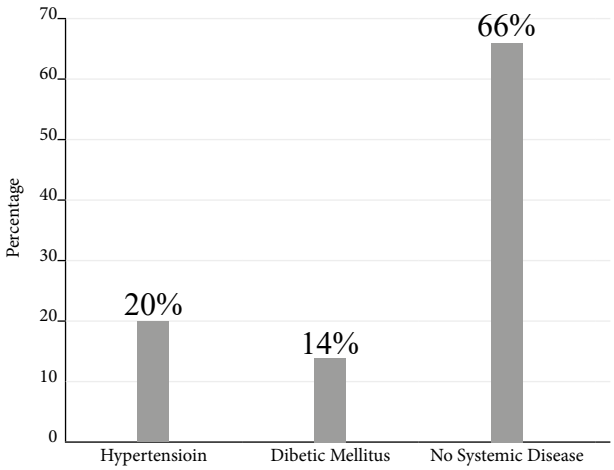
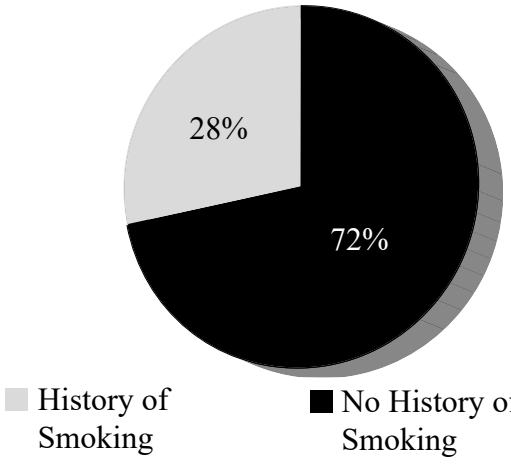


Figure 4: Systemic disease in patients.



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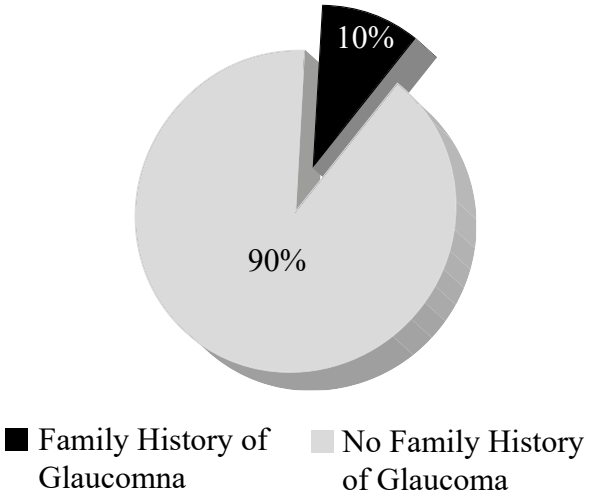

Figure 4: Systemic disease in patients.

Table 1: IOP at first visit and six month visit.

	Mean IOP at First Visit	Mean IOP at 6 Month	Mean Difference	P Value
Group A	27.16	17.24	9.92	<0.001
Group B	26.88	15.88	11.00	<0.001

Among fifty POAG patients, 33 (66%) are males and 17 (34 %) are females, shows the result of this study. A study done at BP Koirala Lions Center for Ophthalmic studies on patients of Glaucoma, among the primary open angle glaucoma patients 55.33% were males and 44.64% were females (Neupane MP, 1996).

In a Framingham and Barbados eye study males had a higher rate of primary open angle glaucoma (Boldi FC, 1998).

Out of 50 (20 %) patients presented with hypertension, 7 (14 %) patients presented with diabetes mellitus and 33 (66 %) patients presented with no systemic history. Study done at B P Koirala Lions Centre for Ophthalmic Studies on association of primary open angle glaucoma with diabetes mellitus, out of 49 primary open angle glaucoma cases 5 had diabetes mellitus accounting for 10.2%. Hence this study showed quite a large difference comparatively (Khatri BB, 1999).

Among 50 patients 5 (10%) patients have a family history of glaucoma and 45 (90%) patients have no family history of glaucoma. It has been reported that 2.5 % of patients with primary open angle glaucoma are hereditary (Dunbar HH et al, 1998).

Konavera et al suggested there is no association of family history, sex, hypertension, diabetes and refraction with POAG and also shows disease has an early onset in cases with positive family history of glaucoma (Konareva-Kostianeva M, 1998).

Of 50 patients, 14 (28%) of patients have a history of smoking and 36 (72 %) of patients have no history of smoking. S Bonovas, K Filioussi, A Tsantes and V Peponis' study shows epidemiological association between cigarette smoking and primary open-angle glaucoma, a results suggest that current smokers are at significantly increased risk of developing POAG.[10]

Out of 50 patients 20 i.e. 40% of patients presents with complain of headache, 27 i.e. 54% of patients presents with complain of blurring of vision, 2 i.e. 4% of patients presents with complain of eye ache and 1 i.e. 2% of patients presents with complain of watering (Bonovas S et al, 2004).

DISCUSSION

Recent data from several studies show the clinical relevance of patients achieving specific low target pressures. According to Advanced Glaucoma Intervention Study (Agis), glaucoma

is an optic neuropathy which is associated with retinal ganglion cell death and results in visual field loss. Increased intraocular pressure is a primary risk factor for the glaucoma and is a prime target for therapy. Recently, a large, randomized clinical trial demonstrated that the risk of progression of glaucomatous visual field loss is reduced at lower IOPs (Agis Investigators, 2000).

In addition, results from the Ocular Hypertension Treatment Study (Kass M.A. et al, 2002) showed that a 20% IOP reduction from baseline decreased the risk of developing optic disk cupping and/or visual field loss in ocular hypertensive patients from 9.5% to 4.4%.

Both bimatoprost and latanoprost have been shown to be effective IOP-lowering agents in double-masked clinical comparisons with timolol (Brandt J.D. et al, 2001; Sherwood M et al, 2001; Alm A et al, 1995; Camras CB et al 1996; Watson P et al 1996).

Two short-term, randomized, clinical comparisons of bimatoprost and latanoprost suggest, however, that bimatoprost provides better IOP control than latanoprost (The Latanoprost Study Group, 1996; Dubiner H et al, 2001).

It is also important to assess the differences observed between the treatment groups in a clinical trial. The clinical significance of the greater IOP lowering achieved with bimatoprost can be analyzed by the number of patients reaching specific target pressures. Clinicians define a desired IOP range as a goal of glaucoma therapy (Gandolfi S et al, 2001).

Glaucoma patients with IOPs consistently below 18 mm Hg had no discernible additional visual field loss over a 6-year follow-up period. Similarly, a study by Mao and associates (Singh K et al, 2000) found that all eyes with a mean IOP of 16 mm Hg remained stable, and eyes with higher IOPs showed an increasing risk of disease progression.

Glaucoma patients with IOPs consistently lower than 18 mm Hg had no additional visual field loss over a 6-year follow-up period. Similarly, a study by Mao and associates (Mao LK et al, 1991) found that all eyes with a mean IOP of 16 mm Hg remained stable, whereas eyes with higher IOPs showed an increasing risk of disease progression.

CONCLUSION

Male gender, increasing age, urban population, hypertension, diabetes mellitus, and high intraocular pressure were the most prevalent risk factors for primary open angle glaucoma. The most important factor is early detection of signs and symptoms of POAG and measurement of diurnal intraocular pressure. The study shows that bimatoprost (0.03%) provides better IOP control compared to latonoprost (0.005)..

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