

Research Article

**Analysis of effect of blood pressure on intraocular pressure
in primary open angle glaucoma patients**

**Arif Hussain, M. Faheem Siddiqui
and Tariq Enwer**

¹Associate Professor, Head Department of Ophthalmology,
Pak Red Crescent Medical and Dental College Dina Nath District Kasur, Pakistan

²Assistant Professor, Department of Biochemistry,
Pak Red Crescent Medical and Dental College Dina Nath District Kasur, Pakistan

³Associate Professor, Department of ENT,
Pak Red Crescent Medical and Dental College Dina Nath District Kasur, Pakistan.

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ABSTRACT

Introduction: Glaucoma is commonly defined as optic neuropathy characterized by progressive loss of retinal ganglion cells (RGCs) which is associated with characteristic structural damage to the optic nerve and visual field loss. **Aims and objectives:** The main objective of the study is to analyze the effect of blood pressure on intraocular pressure in primary open angle glaucoma patients. **Material and methods:** This cross section study was conducted in Department of Ophthalmology, Pak Red Crescent Medical and Dental College Dina Nath District Kasur, Pakistan during January 2018 to October 2018. This study was done with the permission of ethical committee of hospital. The age group for this study were 40 to 80 years. For every eligible patient, clinical evaluation was conducted were recorded in a database. Information collected includes the subject's age, sex, refraction, IOP, and central corneal thickness. **Results:** There were total of 220 cases which were included in this study. There were 106 male and 114 female patients which were included in this study. In this study, there were 81 (36%) participants with HTN, 21 (9.5%) with DM, and 15 (6.8%) with HTN. We analyzed these groups differently as a single and combined risk factor for severity, comparing it with the patients with POAG without either of the conditions. **Conclusion:** It is concluded that patients with HTN had a more severe form of POAG when compared with the participants without these risk factors. Patients with these risk factors could represent "high-risk patients" and should be identified and be explained about the condition.

Key words: Glaucoma, Optic, Neuropathy

INTRODUCTION

Glaucoma is commonly defined as optic neuropathy characterized by progressive loss of retinal ganglion cells (RGCs) which is associated with characteristic structural damage to the optic nerve and visual field loss. Risk factors related to

glaucoma include intraocular pressure (IOP), age, family history, clinical appearance of the optic nerve, race, and potential vascular disease¹. Although the mechanism of RGC death is not fully understood, elevated IOP is considered

the most important risk factor². Several large randomized clinical trials showed a relationship between IOP and glaucoma development and progression. Besides the mechanical effect of raised IOP on the optic nerve head (ONH), several vascular factors have also been identified as risk factors³. Such factors can lead to hypoperfusion of the ONH and may thus play an important role in the pathogenesis and progression of primary open-angle glaucoma (POAG)⁴. Glaucoma is the second most common cause of blindness worldwide⁵. It is a major global issue, causing significant ocular morbidity and disability due to its progressive nature resulting in an irreversible visual loss. Due to its chronicity, it is often also dubbed as a “silent killer” of the eye. Patients are usually asymptomatic until very advanced stage, making visual loss irrecoverable by the time they present to an ophthalmologist⁶. One of its variant and the most common form primary open-angle glaucoma (POAG) is a chronic, progressive, and anterior optic neuropathy that is associated with characteristic cupping and atrophy of the optic disc, visual field loss, open angles, and no obvious causative ocular or systemic conditions⁷. POAG accounts for nearly three-quarters (74%) of all glaucoma cases⁸.

Aims and objectives

The main objective of the study is to analyze the effect of blood pressure on intraocular pressure in primary open angle glaucoma patients.

MATERIAL AND METHODS

This cross section study was conducted in Department of Ophthalmology, Pak Red Crescent Medical and Dental College Dina Nath District Kasur, Pakistan during January 2018 to October 2018. This study was done with the permission of ethical committee of hospital. The age group for this study were 40 to 80 years. Patients having a narrow angle in either eye or with PACG or any history of intraocular surgery (eg, vitreo-retinal procedures, glaucoma filtration surgeries), with secondary open-angle-closure glaucoma,

inflammatory glaucoma, acute congestive glaucoma, and optic disc anomalies were included in this study.

Data collection

For every eligible patient, clinical evaluation was conducted were recorded in a database. Information collected includes the subject’s age, sex, refraction, IOP, and central corneal thickness. Furthermore, the medical, ocular, surgical, and medication histories of the subjects were obtained from patient files and recorded. Medical conditions were confirmed usually via correspondence from general practitioners, optometrist, or previous treating ophthalmologists.

Statistical analysis

Data were analyzed using SPSS 20 software (USA) after matching age, sex, and duration of the POAG among the participants.

RESULTS

There were total of 220 cases which were included in this study. There were 106 male and 114 female patients which were included in this study. In this study, there were 81 (36%) participants with HTN, 21 (9.5%) with DM, and 15 (6.8%) with HTN. We analyzed these groups differently as a single and combined risk factor for severity, comparing it with the patients with POAG without either of the conditions.

Table 1: Age and sex distribution of POAG

Age, years	Sex		Total (%)
	Male	Female	
41–50	14	21	35 (15.8)
51–60	31	22	53 (23.9)
61–70	25	26	51 (23.1)
71–80	15	22	37 (16.7)
81–90	0	1	1 (0.4)
Total (%)	106 (48.1)	114 (51.9)	221 (100)

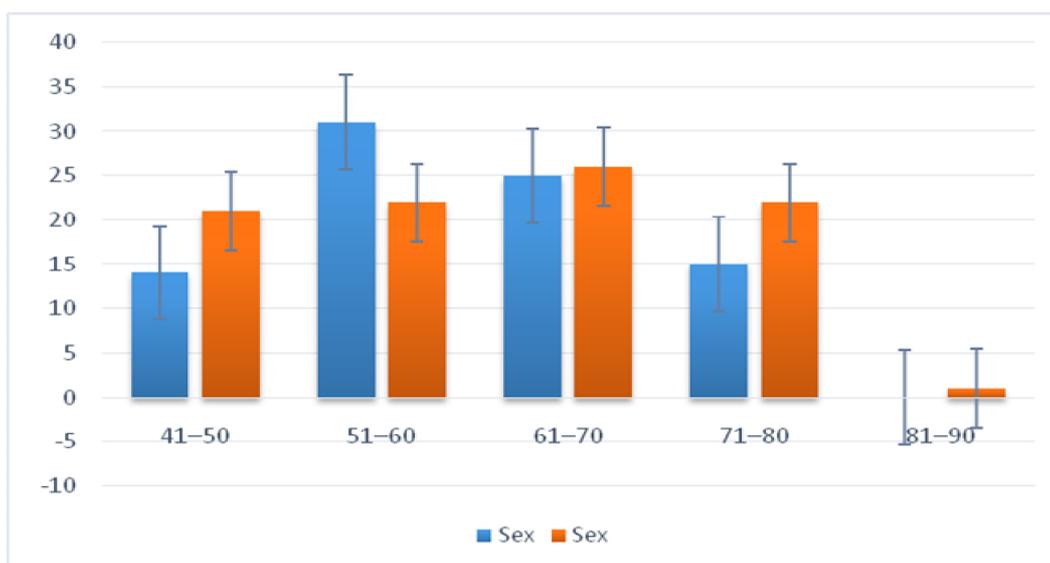


Figure 01: Distribution of patients according to age and gender

The mean IOP at CI of 95% was comparable while the mean visual field defect (VFD) (Table 2) of the participants with HTN had tendency of being categorized under moderate VFD, in contrast, to mean VFD among participants without HTN, which has tendency of categorizing them under mild VFD. The CDR of the patients with HTN was also comparatively larger than the participants without HTN at CI of 95%.

Table 2: Ocular findings of patients of POAG with and without HTN

		Patients with HTN	Patients without HTN
IOP	Mean	15.0	15.7
	95% CI for mean, $p < 0.05$	14.2 to 15.9	14.9 to 16.5
HVFA	Mean	-8.39	-4.85
	95% CI for mean $p < 0.05$	-11.1 to -5.64	-5.83 to -3.86
POAG	Mean	0.71	0.61
	95% CI for mean $p < 0.05$	0.62 to 0.81	0.58 to 0.65

DISCUSSION

We have found that change in IOP is directly and significantly associated with changes in systemic blood pressures. This would suggest that treatment of blood pressure might have an effect on risk of developing glaucoma, as IOP is probably the most

important risk factor for glaucoma in general populations⁸. We have previously shown that those with higher IOP at baseline were more likely to have larger cup:disc ratio 5 years later⁹. While our findings do not directly indicate a beneficial effect of reduced blood pressure on the risk of glaucoma, they are compatible with that possibility.

Among vascular factors, it has been long postulated that systemic HTN may cause increases in IOP mainly via overproduction from ciliary body or impaired outflow of aqueous humor¹⁰. However, this relationship remains inconclusive and under debate. While some studies highlight that systemic HTN is a risk factor for glaucoma, other studies indicate that low systemic BP is more dangerous and poses a serious risk for the development and progression of glaucoma. In this study, 81 (36%) participants had HTN¹¹.

The inclusion criteria for our participants were diagnosed case for HTN for at least 5 years and under medication¹². Earlier it was hypothesized that elevated BP might be protective against POAG, but He et al reported that it was only an acute BP elevation, which makes retinal function and blood flow less susceptible to IOP. The improved ocular perfusion pressure to compensate

for the acute rise in IOP is compromised after 4 weeks of HTN¹³. Chan et al also reported that patients with cardiovascular disease were 2.33 times more likely to develop rapidly progressive glaucoma disease despite significantly lower mean and baseline IOPs¹⁴.

CONCLUSION

It is concluded that patients with HTN had a more severe form of POAG when compared with the participants without these risk factors. Patients with these risk factors could represent “high-risk patients” and should be identified and be explained about the condition.

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