FREQUENCY OF RAISED BLOOD PRESSURE / RAISED MEAN ARTERIAL PRESSURE ABNORMALITIES IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA

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ABSTRACT

Objectives: To find out the frequency of raised blood pressure and raised mean arterial pressure in patients presenting with primary open-angle glaucoma

Material and Methods: This cross-sectional descriptive study was conducted in Khyber Teaching Hospital Peshawar from July 2020 to December 2020. All patients having primary open-angle glaucoma were included. Those having high blood pressure (BP) on admission or history of high blood pressure or using anti-hypertensive drugs, were admitted to the Ophthalmology ward of Khyber Teaching Hospital. Blood Pressure/ Mean Arterial Pressure and Intraocular pressure (IOP) phasing were done and Mean Arterial Pressure, MOPP, and peak IOP were determined. Patients having secondary types of glaucoma, primary angle-closure glaucoma, and those patients who declined consent were excluded. Data was collected on a proforma and analyzed by SPSS-23.

Results: A total of 375 patients were diagnosed to have Primary open-angle glaucoma (POAG), out of which 200 (65%) patients had impaired blood pressure. The rest of 70 (35%) patients had Normal-Tension Glaucoma (NTG). Out of 200 cases with primary open-angle glaucoma, 175 patients (87.5%) had hypertension, while 25 patients (12.5%) had low blood pressure (normal BP or low BP). Amongst the hypertensive patients, the mean arterial pressure (MAP) was raised in 70 (35%) patients, while the Mean Ocular Perfusion Pressure (MOPP) was raised in 15 patients i.e. 7.5%.

Conclusion: Amongst 65% of our patients with primary open-angle glaucoma, 87.5% of patients had high blood pressure, While the rest of 35% had

Keywords: Primary open-angle glaucoma (POAG), Impaired Blood Pressure, Impaired Mean Arterial Pressure.

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INTRODUCTION

Glaucoma is the leading cause of irreversible blindness or visual impairment. Approximately 60 million people worldwide are suffering from glaucoma[1]. Primary open-angle glaucoma (POAG) is an ocular disease characterized by optic neuropathy, changes in the optic disc and retinal nerve fiber layer (RNFL), and visual field defect with etiology still not properly evident. Though currently Intraocular pressure (IOP) is not included in its definition but is still considered the most important risk factor. If POAG is associated with elevated IOP of more than 21 mmHg, is labeled as high-pressure glaucoma, but if the IOP is normal, the POAG is labeled as Normal-Tension Glaucoma (NTG)[2].

Mean arterial pressure (MAP) is the average arterial pressure throughout each cardiac cycle, systole, and diastole. Normal MAP is 93 mmHg, ranging from 70 to 100 mmHg. Though ophthalmodynamometry is the classical method to measure the MAP in the central retinal artery (CRA)[3,4,5]. As it is not a very convenient method, so an alternative method based on mean Brachial artery blood pressure (MAP) is used[6], by applying a formula in which the Diastolic blood pressure is doubled, added to systolic blood pressure, and the composite is divided by 3. As variabilities in blood pressure and mean arterial pressure impairs the perfusion in the retina, and ultimately leading to primary open-angle glaucoma, so we wanted to determine this effect in our patients who presented to us with primary open-angle glaucoma.

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MATERIAL AND METHODS

This cross-sectional descriptive study was conducted in Khyber Teaching Hospital, Peshawar from July 2020 to December 2020, after approval from the ethical committee of Khyber Teaching Hospital, Peshawar. All patients having primary open-angle glaucoma were included. Consecutive sampling was done from patients attending the outpatients' department of the hospital and having POAG in one or both eyes. Those having high blood pressure (BP) on admission or history of high blood pressure or using anti-hypertensive drugs, were admitted to the ophthalmology ward of Khyber Teaching Hospital. Blood Pressure/ Mean Arterial Pressure and Intra Ocular Pressures (IOP) phasing was done. Mean Arterial Pressure, MOPP, and peak IOP were determined. Patients are known to have secondary types of glaucoma, primary closed-angle glaucoma, and those patients who declined consent were excluded. Data was collected on an already prepared standard proforma and was analyzed by SPSS 23.

RESULTS

A total of 375 patients were diagnosed to have Primary open-angle glaucoma (POAG), out of which 200 (65%) patients had a history of raised blood pressure, while the rest of 70 (35%) patients had Normal-Tension Glaucoma (NTG).

Out of 200 cases with primary open-angle glaucoma, 95 patients (47.5%) had a history of hypertension and were using antihypertensive drugs, 80 patients (40%) were newly diagnosed as hypertensive in the ward after admission, while 25 patients (12.5%) had normal blood pressure (Table 1). Amongst the hypertensive patients, the mean arterial pressure is given in Table-2.

Table 1: Abnormal blood pressure in patients with POAG.

B.P. anomaly	Frequency	Percentage
Hypertensives	95	47.5
Newly diagnosed hypertension.	80	40
Normotensive	25	12.5

Table 2: Mean Arterial Pressure in patients with hypertension with POAG

MAP	Frequency	Percentage
110 mm Hg plus	30	15
100 to 109 mmHg	40	20
99 to 90 mmHg	50	25
89 to 80 mmHg	55	27.5
< 80mmHg	25	12.5

DISCUSSION

Just like hypertension which is the silent killer of life, POAG is the silent killer of vision. In both of the diseases, the vasculature of organs is affected. POAG is the disease of the optic nerve and retina. If the vascular supply to the optic nerve is disturbed due to ischemia or raised IOP, it leads to optic neuropathy with typical glaucomatous visual field defect. Thus there is an association between perfusion, BP/MAP, and IOP. In hypertension, the IOP is elevated, as the aqueous humor secretion is increased due to increased hydrostatic pressure in capillaries of the ciliary body while aqueous humor outflow is decreased due to increased venous pressure in episcleral veins[7], while hypotension causes ischemic damage leading to NTG[8]. Of our patients, out of 375 patients with POAG, 200 (53.30%) had abnormal BP/MAP. As far as the general population is concerned hypertension has been recorded in 26.73% in the urban and adult population in 21.03% in rural adult population[9]. It means there must be a positive relationship between abnormal blood pressure and POAG, as compared to people with no primary open-angle glaucoma. Dave A et al from India have reported the frequency BP abnormalities in 47.03% of patients with primary open-angle glaucoma[10]. So the frequency was almost the same in both the neighboring countries. On the other hand, the frequency of POAG incidence was 2% in hypertensive patients as compared to the normal population at 1.7%[11]. In hypertensive patients, the incidence of POAG is higher when systolic BP is more than 140 mmhg[11]. Treatment with an appropriate dose of antihypertensive medication delays the onset of POAG[12], while uncontrolled hypertension was found a major risk factor for POAG as hypertension causes microvascular damage of the optic nerve and RNFL[13-16]. Pakharel S et al from Nepal have reported a strong positive correlation of POAG with increasing age, male gender, and low diastolic pressure[17]. Fasih et al have also reported that high systolic BP, diastolic blood pressure, and raised IOP in patients with POAG[18]. Increased intraocular pressure and high blood pressure were also reported by Sadiqullah et al[19] and several other international studies [20-24]. A famous epidemiological study conducted from 1990 to 2019 and comprising of fifty thousand patients by Grzybowski A et al. concluded that hypertension and blood pressure dipping were important risk factors for glaucomatous optic neuropathy and its progression[25].

CONCLUSION

Sixty-five percent of our patients with primary open-angle glaucoma had impaired blood pressure, out of which 87.5% of patients had high blood pressure and the rest had normal blood pressure. So we recommend that patients with hypertension must be screened for POAG and vice versa.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Khan BS: Concept/ Idea, Literature, review, Drafting & Final Review

Iqbal S: Concept/ Idea, Analysis & Interpretation of Data, References

Khan T: Manuscript Writing, Literature review, Analysis & Interpretation of Data

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.