

Prevalence and Factors Related to Raised Intraocular Pressure: In a Tertiary Hospital in Bangladesh during Pandemic situation

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Abstract

Original Research Article

Background: Raised Intraocular pressure (IOP) is proven to be the most important risk factor for developing glaucoma, around the world. Hypertensive patients with IOP are more prone to develop Open Angle Glaucoma (OAG) which is one of the major causes of blindness globally. **Method:** This study was a hospital-based cross-sectional study, conducted in community ophthalmology in BSMMU Hospital during the period of July 2021 to June 2022. The total sample size for this study was 153. **Result:** Most of the respondents 42(27.5%) were in the age group 41-50 years. The Mean \pm SD age was 37.15 \pm 17.14. 64(41.8%) were male and most 89(58.2%) were female. Refractive Error was found in 11(7.2%) cases and followed by NTG e-ps in 17(11.1%), PACG in 16(10.5%), NTG in 3(2%), (B/E) 1(0.7%). There were 3(4.3%) patients in 20-29 years age group with the most frequent (IOP)A(mmHg) range 12-12 and followed by 29(42%) were 30-50 years with (IOP)A(mmHg) range 18-22 and 37(53.6%) were >50 years with (IOP)A(mmHg) range 22-36. There were 1(1.7%) patients in 20-29 years age group with the most frequent (IOP)A(mmHg) range 10-12 and followed by 22(37.3%) were 30-50 years with (IOP)A(mmHg) range 18-20 and 36(61%) were >50 years with (IOP)A(mmHg) range 20-40. There were 1(1.6%) patients in 20-29 years age group with the most frequent (IOP)A(mmHg) range 10-10 and followed by 25(39.7%) were 30-50 years with (IOP)A(mmHg) range 18-18 and 37(58.7%) were >50 years with (IOP)A(mmHg) range 20-36. **Conclusion:** Glaucoma is proved to be second commonest cause of blindness globally which is accounting for 8% of world blindness. Raised intraocular pressure (IOP) is an important risk factor for the incidence and progression of glaucoma.

Keywords: Raised Intraocular Pressure, Glaucoma, and Pandemic Situation.

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BACKGROUND

Raised Intraocular pressure (IOP) is proven to be the most important risk factor for developing glaucoma, around the world. Hypertensive patients with IOP are more prone to develop Open Angle Glaucoma (OAG) which is one of the major causes of blindness globally [1]. Glaucoma is not a single complication rather it refers to a group of diseases having common characteristics of optic neuropathy in relation with visual function loss. Although studies have found elevated intraocular pressure (IOP) as one of the primary risk factors for developing glaucoma but in reality, its presence or absence has less impact on the development of the disease [2]. Age and genetic predispositions are the leading risk factors for developing glaucoma and further progression of the disease but they have a little interventional potential

hence, IOP is left as the only parameter subject to treatment procedure [3]. Studies have claimed glaucoma as the second common cause of blindness around the world specially after cataracts and hypertension is supposed to increase the risk of glaucoma development and progression [4-7]. The risk factors for high ocular pressure are aging, sex, African race, hypertension, pulse rate, diabetes, obesity, alcohol use, smoking, myopia, colorblind, nuclear sclerosis and a family history of glaucoma [8-15]. Hypertension and other cardiovascular risk factors can affect many patients who have other comorbidities like ophthalmic disorders which led to rise of intraocular pressure. A study conducted in Africa reported that glaucoma is responsible for 15% blindness and the region is found with the highest prevalence of blindness relative to other places in the world [4]. Another study also

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claimed that Open Angle Glaucoma (OAG) is more predominant among Africans than Europeans comparing to other regions [16]. Systemic hypertension has already affected more than 25% of the adult population globally and it is estimated that by 2025 more than 1.5 billion individuals will be affected globally [17, 18]. A community-based survey conducted in Uganda reported the prevalence of hypertension at 7% of patients with IOP [19]. Besides, several population-based studies had also found a positive correlation between IOP and systemic blood pressure [20, 21]. Although raised IOP can easily be treated, its prevalence among hypertensive patients is still unknown. Because of the asymptomatic nature of Open Angle Glaucoma, most of the patients remain unknown about it until and hence they can develop irreversible complications. Therefore, the aim of this study was to investigate the prevalence of raised IOP and associated factors among hypertensive patients.

Objective of the Study

The objective of this study was to investigate the prevalence of raised IOP and associated factors among the patients with hypertension and diabetes & aged people.

MATERIALS AND METHODOLOGY

This study was a hospital-based cross-sectional study, conducted in Ophthalmology of BSMMU Hospital during the period of June 2021 to July 2022. The total sample size for this study was 153.

Inclusion Criteria

- All hypertensive, diabetic and cardiac patients who attended the Hospital during the study period were included in this study.

Exclusion Criteria

- Patients with known allergies to eye drops used in the study like local anesthetic drops such as tetracaine and mydriatic eye drops like tropicamide.
- Patients with corneal irregularities that could affect the IOP readings e.g., in anterior segment pathology like corneal opacities and ulcers, collagen disorders like keratoconus, Endothelial-based corneal dystrophies (e.g., Fuchs), Previous corneal surgery involving Central cornea, Previous cornea trauma/injury, Previous refractive surgery, Corneal edema, Corneal astigmatism (≥ 3.00 D), Contact lens wear with induced corneal edema.

After the admission the blood pressure (B.P) of all patients was measured using a manual sphygmomanometer and when systolic blood pressure was > 130 mm Hg or a diastolic blood pressure > 80 mm Hg the blood pressure was considered to be raised or high. The sugar level of every patient was also measured. The Intraocular Pressure (IOP) was assessed with the i-care tonometer after applying tetracaine Hcl 0.1%. Three consecutive readings were taken and the average recorded as the measured IOP in mmHg. The IOP measurements were taken from 9 am to 12 noon by the principal investigator to avoid diurnal variation. IOP levels between 10 and 21 mmHg were considered normal. Values higher than 21 mmHg were considered raised IOP and below 10 mmHg were considered as ocular hypotension. Statistical Analysis was done using the SPSS version 21 software to establish the relationship between the dependent variable (IOP) and each independent variable.

RESULT

Table I: Age Distribution of the Respondents

Age	N=153	Percentage (%)
0-10	8	5.2
11-20	20	13.1
21-30	25	16.3
31-40	21	13.7
41-50	42	27.5
51-60	24	15.7
61-70	9	5.9
71-80	4	2.6
Mean \pmSD	37.15\pm17.14	

Table 1 shows the age distribution of the respondents. Most of the respondents 42(27.5%) were in the age group 41-50 years and followed by 8(5.2%) in 0-10 years, 20(13.1%) in 11-20, 25(16.3%) in 21-30,

21(13.7%) in 31-40, 24(15.7%) in 51-60, 9(5.9%) in 61-70, 4(2.6%) in 71-80 years. The Mean \pm SD age was 37.15 \pm 17.14.

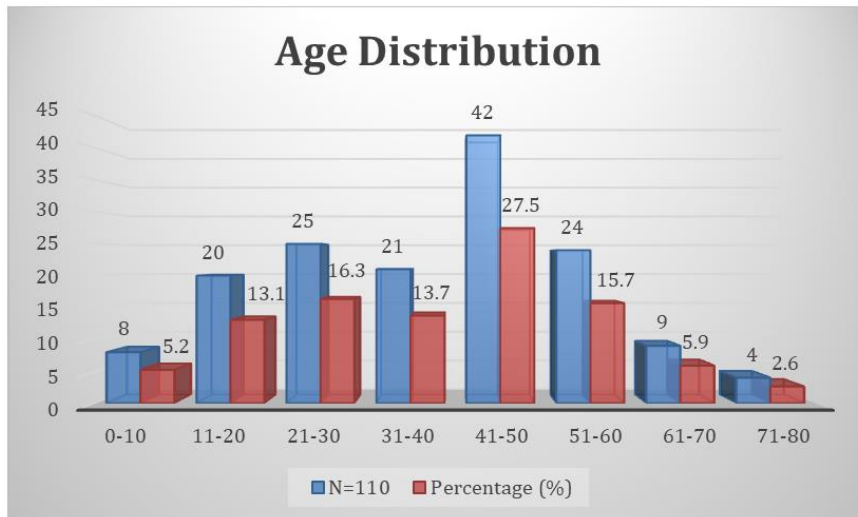


Figure 1: Age Distribution of the Respondents

Table II: Gender Distribution

Gender	N=110	Percentage (%)
Male	64	41.8
Female	89	58.2

Table II shows the gender distribution of the study patients where 64(41.8%) were male and most 89(58.2%) were female.

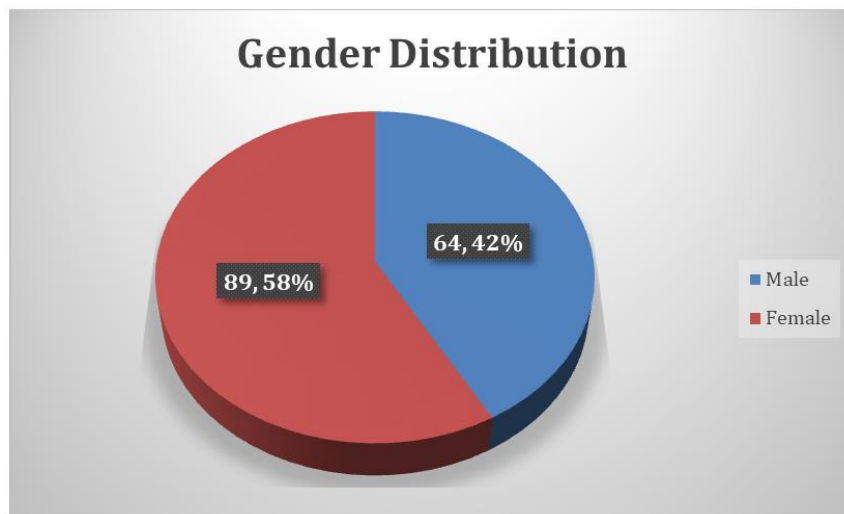


Figure 2: Gender Distribution

Table III: Diagnosis

DX	N=110	Percentage (%)
Refractive Error	11	7.2
NTG e-ps	17	11.1
PACG c-Catarect	16	10.5
ONTG	3	2.0
(S/P) Trab	1	0.7

Table III shows the diagnosis done among the study patients. Refractive Error was found in 11(7.2%) cases and followed by NTG e-ps in 17(11.1%), PACG

c-Cataract in 16(10.5%), ONTG in 3(2%), (S/P) 1(0.7%).

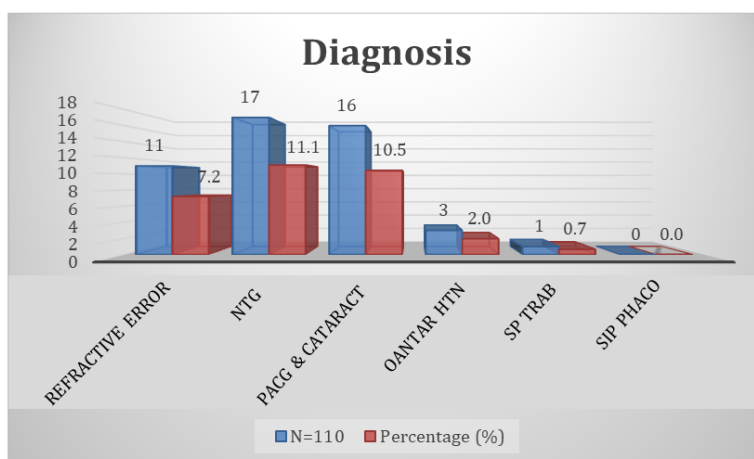


Figure 3: Diagnosis

Table IV: IOP Range

(IOP) (MHg)	N=153	Percentage (%)
8-14	21	13.7
12-20	9	5.9
14-36	7	4.6
15-16	5	3.3
16-20	19	12.4
17-18	6	3.9
18-48	27	17.6
20-22	9	5.9
21-22	6	3.9
22-36	8	5.2
24-40	8	5.2
25-23	4	2.6
26-18	3	2.0
Others	21	13.7

Table IV shows the (IOP) (MHg) in different ranges. Most of the study patient's (IOP)(MHg) 27(17.6%) was ranged between 18-48 and followed by 21(13.7%) was 8-14, 9(5.9%) was 12-20, 7(4.6%) was 14-36, 5(3.3%) was 15-16, 19(12.4%) was 16-20,

6(3.9%) was 17-18, 9(5.9%) was 20-22, 6(3.9%) was 21-22, 8(5.2%) was 22-36, 8(5.2%) was 24-40, 4(2.6%) was 25-23, 3(2%) was 26-18 and 21(13.7%) ranged others.

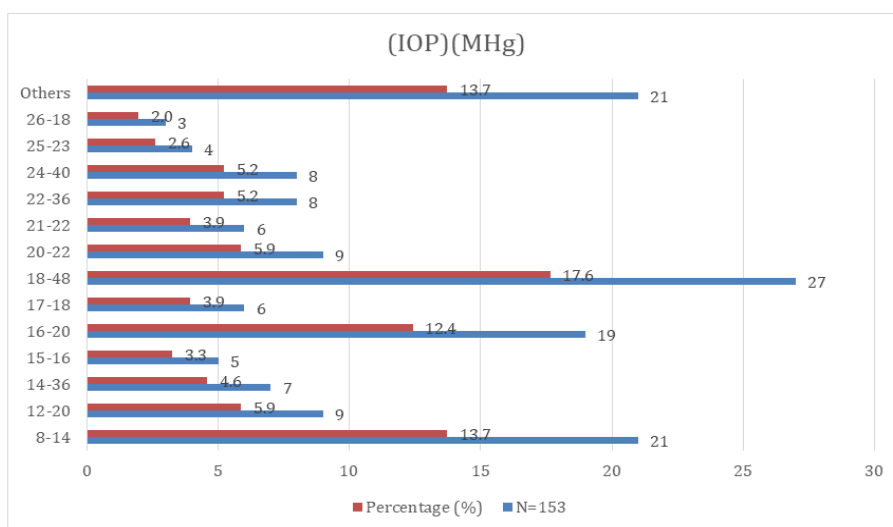


Figure IV: IOP Range

Table V: Most Frequent (IOP) (MHg) Range in Diabetic Patients in Relation to Age

Age Group in Years	Diabetic Patients		Most Frequent (IOP)A(MHg) Range
	N=69	Percentage (%)	
20-29	3	4.3	12-12
30-50	29	42.0	18-22
>50	37	53.6	22-36

Table V shows the most frequent (IOP)(mmHg) range in diabetic patients in relation to age. There were 3(4.3%) patients in 20-29 years age group with the most frequent (IOP)(mmHg) range 12-

12 and followed by 29(42%) were 30-50 years with (IOP)(mmHg) range 18-22 and 37(53.6%) were >50 years with (IOP)(mmHg) range 22-36.

Table VI: Most Frequent (IOP)(mmHg) Range in HTN Patients in Relation to Age

Age Group in Years	Hbp Patients		Most Frequent (IOP)(MHg) Range
	N=59	Percentage (%)	
20-29	1	1.7	10-12
30-50	22	37.3	18-20
>50	36	61.0	20-40

Table VI represents the most frequent (IOP)A(mmHg) range in HTN patients in relation to age. There were 1(1.7%) patients in 20-29 years age group with the most frequent (IOP)A(mmHg) range 10-

12 and followed by 22(37.3%) were 30-50 years with (IOP)A(mmHg) range 18-20 and 36(61%) were >50 years with (IOP)A(mmHg) range 20-40.

Table VII: Most Frequent (IOP)(mmHg) Range in Cardiac Patients in Relation to Age

Age Group in Years	Cardiac Patients		Most Frequent (IOP)(mmHg) Range
	N=63	Percentage (%)	
20-29	1	1.6	10-10
30-50	25	39.7	18-18
>50	37	58.7	20-36

Table VII denotes the most frequent (IOP)(mmHg) range in cardiac patients in relation to age. There were 1(1.6%) patients in 20-29 years age group with the most frequent (IOP)(mmHg) range 10-10 and followed by 25(39.7%) were 30-50 years with (IOP)(mmHg) range 18-18 and 37(58.7%) were >50 years with (IOP)(mmHg) range 20-36.

DISCUSSION

Studies had reported IOP as a good predictor for the onset of POAG, and proved that topical ocular hypotensive medication was effective in delaying or preventing the onset of POAG in individuals with elevated IOP [22, 23]. Several studies reported that the glaucoma prevalence rate increased with age [24-29]. Most of the respondents 27.5% were in the age group 41-50 years and followed by 5.2% in 0-10 years, 13.1% in 11-20, 16.3% in 21-30, 13.7% in 31-40, 15.7% in 51-60, 5.9% in 61-70, 2.6% in 71-80 years. The Mean \pm SD age was 37.15 ± 17.14 (table I). The study of Alpha Madu reported that most of the respondents 53.9% were more than 60 years and followed by 1.6% were >20, 6.7% in 20-40, 37.8% in 41-60 years [30]. Most of the respondents 64(41.8%) were male and most 89(58.2%) were female (table II) He *et al.*, in their study found 42.25% were male and most 57.75% were female [31]. Refractive Error was found in 7.2% cases and followed

by NTG e-ps in 11.1%, PACG c-Cataract in 10.5%, NTG in 2%, (B\|E) 0.7% (table III). Most of the study patient's (IOP)(mmHg) 17.6% was ranged between 18-48 and followed by 13.7% was 8-14, 5.9% was 12-20, 4.6% was 14-36, 3.3% was 15-16, 12.4% was 16-20, 3.9% was 17-18, 5.9% was 20-22, 3.9% was 21-22, 5.2% was 22-36, 5.2% was 24-40, 2.6% was 25-23, 2% was 26-18 and 13.7% ranged others (table IV). This study was showed statistically significant correlation among the patient with diabetics, HTN and cardiac diseases with raised IOP. There were 4.3% diabetic patients in 20-29 years age group with the most frequent (IOP)(mmHg) range 12-12 and followed by 42% were 30-50 years with (IOP)(mmHg) range 18-22 and 53.6% were >50 years with (IOP)(mmHg) range 22-36 (table V). There were 1.7% HTN patient in 20-29 years age group with the most frequent (IOP)(mmHg) range 10-12 and followed by 37.3% were 30-50 years with (IOP)(mmHg) range 18-20 and 61% were >50 years with (IOP)(mmHg) range 20-40 (table VI). There were 1.6% cardiac patient in 20-29 years age group with the most frequent (IOP)(mmHg) range 10-10 and followed by 39.7% were 30-50 years with (IOP)(mmHg) range 18-18 and 58.7% were >50 years with (IOP)(mmHg) range 20-36 (table VII).

CONCLUSION

Glaucoma is proved to be second commonest cause of blindness globally which is accounting for 8 % of worldwide blindness. Raised intraocular pressure (IOP) is an important risk factor for the incidence and progression of glaucoma. Hypertensive patients are at a risk of developing and progression of primary Open Angle Glaucoma (OAG) which can be a leading cause of blindness. Besides, the patients with diabetics and cardiac disease are also at high risk of developing glaucoma. Hence, hypertension, diabetics and cardiac disease is considered to be the alarming global health problems because of their chronic effects, devastating nature and cost of management among the patients with IOP. Although studies had shown an association between these diseases with IOP but there is no specific evidence yet of a causative link among them.

RECOMMENDATION

Routine screening and monitoring of intraocular pressure in patients with diabetics, HTN and cardiac diseases are required for the early recognition of raised IOP and early measurement of prevention of Glaucoma-associated with blindness.

Limitation

Study period is very short. The longer study period and larger sample size which would give appropriate result. Due to pandemic period during COVID-19 season patient sample size was short for this reason nationwide study was not possible.

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