

Prevalence Of Primary Open Angle Glaucoma in Diabetic Patients

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Abstract:

Background: Primary open angle glaucoma is the commonest form of glaucoma accounting for at least half of all the glaucomas. It is also known as chronic open angle glaucoma and chronic simple glaucoma. It is typically asymptomatic until significant visual field loss has occurred. Patients usually present with significant visual field loss in one eye and advanced disease in the other. Diabetes Mellitus is one of the risk factors for POAG.

Objectives: • To study the hospital based prevalence of POAG among the diabetic patients attending Tertiary Eye Hospital camp.

- To screen all diabetics for glaucoma.

Methods: Four hundred diabetic patients, both insulin dependent and non insulin dependent, above forty years of age, attending Tertiary Eye Hospital, who came to Department of Ophthalmology through camp, between September 2016 and May 2017, were screened for the detection of Primary Open Angle Glaucoma.

Results: The results of the study show a clear evidence of an excess of POAG in diabetic population, which was 7.53 % .The prevalence among males was slightly more (4.41 %) as compared to females (3.12%). At present study, the mean age of POAG among males was 54.5 yrs and 50.0 yrs among females. This study show that the prevalence of POAG and the duration of DM was proportional and that the mean blood glucose level was higher in diabetics with POAG.

Keywords : Primary open angle glaucoma; Diabetes Mellitus; Prevalence.

I. Introduction

The suggestion of an association between diabetes and Primary Open Angle Glaucoma (POAG) is not new. In 1971, Becker stated "Diabetes Mellitus occurs more often in patients with primary open angle glaucoma than in non-glaucomatous populations. Similarly, Glaucoma is more prevalent in diabetic than in non-diabetic population". Diabetes Mellitus has been suggested as one of the risk factors of POAG along with other risk factors.

Armstrong et al have reported a prevalence of POAG of 4.1% in the diabetic patients. The prevalence of diabetes in POAG was 1.7%. Many studies have shown a higher prevalence of elevated mean intraocular pressure (IOP) and POAG among persons with diabetes compared to those without, and a higher prevalence of individuals with abnormal glucose metabolism among glaucoma patients than among the general population. Case-control studies have supported an association between diabetes and POAG. It is tempting to accept diabetes as a definite risk factor for chronic open angle glaucoma, since diabetes is a disease of microangiopathy, and compromise of microcirculation of the optic disc is a possible contributing mechanism in the pathogenesis of glaucoma.

However, a number of studies including population-based investigations have not found an association between diabetes and open angle glaucoma. Population based prevalence data on association of glaucoma and diabetes among Asians are limited in number and of variable quality. Hence, our aim is to study the relation between the two in our region.

II. Objectives Of The Study

- To study the hospital based prevalence of POAG among the diabetic patients attending Tertiary Eye Hospital camp side.
- To screen all diabetics for glaucoma.

III. Methodology

Four hundred diabetic patients, both insulin dependent and non insulin dependent, above forty years of age, attending Tertiary Eye Hospital camp side between September 2016 and May 2017, were screened for the detection of Primary Open Angle Glaucoma. Patients who satisfied any one of the inclusion criteria were selected. Inclusion criteria were IOP > 21 mmHg (by Goldman applanation tonometry) with visual field defects, IOP > 21 mmHg (by Goldman applanation tonometry) with optic nerve head changes, Optic nerve head changes

with visual field defects and Normal IOP with no visual field defects or optic nerve head changes, with asymmetry of IOP in both eyes of > 5 mmHg. Patients with Closed angle on gonioscopy and Drug induced (corticosteroids) were excluded from the study. The diabetic patients above 40 years of age were briefly explained about the study and the tests they would have to undergo. These patients were subjected to detailed eye examination.

The patients were subjected to testing Visual acuity, Slit lamp examination, Tonometry with Goldman applanation tonometer, Ophthalmoscopy, Gonioscopy and Visual field testing using Automated perimeter (Octopus/Humphrey). Patients with significant disc cupping (and other signs of glaucomatous disc changes) and field defects, regardless of IOP were suspected as having POAG. IOP was recorded to allow distinction between POAG with elevated pressure and Normal Tension Glaucoma. Criteria for diagnosis of ocular hypertension were pressure greater than 21 mmHg, with no disc changes, and in the absence of field defect. The results were averaged (mean \pm standard deviation) for continuous data, and number and percentage for dichotomous data are presented in Table and Figure. The data was analysed using One way Analysis of Variance (ANOVA), Chi square test (with Yates correction if required) and Student "t" test. In all the above tests, p values less than 0.05 were taken to be statistically significant. The data was analyzed using SPSS package.

IV. Results

400 diabetic patients including 128 (32.0%) females and 272 (68.0%) males were included in the study. All the subjects were studied in terms of age, IOP, duration of diabetics and blood glucose level. The observations were made in both eyes of all the subjects. The study population consists of 272 (68.0%) males and 128(32.0%) females in the age range from 40-73 years with mean age of 53.1 ± 8.28 years. The total number of diabetic patients observed in 40 to 49 years were 120 (30.0%), 50 to 59 years 188 (47.0%), 60-69 years 80 (20.0%) and >70 years 12 (3.0%). Table 1 shows that majority of diabetic patients in the study are above 50 years (70%). The difference observed was statistically significant ($p > 0.05$). Table 2 shows Sex-wise distribution of patients with POAG. Overall proportion of POAG cases observed was 4.0% (40 out of 400), NTG observed in 2.0% (8 out of 400) and 1.0% OH cases were observed remaining 93% were normal as represented in Table 3. Among the males 4.41% (12 out of 272) and females 3.12% (4 out of 128) POAG cases were diagnosed. The proportion of POAG cases diagnosed between males and females was not statistically significant ($p > 0.05$).

Those patients with IOP ≤ 21 mmHg with glaucomatous disc damage, visual field loss and open angle on gonioscopy were suspected to have normal tension glaucoma. Those patients with IOP > 21 mmHg with no disc changes and no visual field defects were suspected to have ocular hypertension(OH). Table 4 shows the mean IOP values of study population according to diagnosis. The Mean Right eye IOP values of Normal were 16.46 ± 2.43 ranging from 12.60 to 22.4. The mean IOP values of NTG were 14.60 ± 0.65 ranging from 14.6 to 14.7. The mean IOP values of POAG were 28.12 ± 3.99 ranging from 23.1 to 31.8. The mean IOP values of OH were 27.2. The difference observed in mean IOP values among the group was statistically significant ($p < 0.05$). The further analysis of comparison of mean IOP between the groups (initial diagnosis) revealed that the NTG patients had statistically significant lower IOP than POAG and OH patients ($p < 0.05$) but no significant difference is seen between NTG and Normal ($p > 0.05$). The POAG patients had statistically significant higher IOP than Normal. The Mean Left eye IOP values of Normal were 17.79 ± 2.55 ranging from 12.60 to 24.4. The mean IOP values of NTG were 16.9 ± 0.57 ranging from 16.5 to 17.3. The mean IOP values of POAG were 26.25 ± 1.56 ranging from 22.4 to 25.1. The mean IOP values of OH were 25.1. The difference observed in mean IOP values among the group was statistically significant ($p < 0.05$). Further analysis of comparison of mean IOP between the groups (initial diagnosis) revealed that the NTG patients had statistically significant lower IOP than POAG and OH patients ($p < 0.05$) but no significant difference is seen between NTG and Normal ($p > 0.05$). The POAG patients had statistically significant higher IOP than Normal.

It was observed that 75%(12 out of 16) were suffering from diabetes since 5 to 10 years and 25% (4 out of 16) were suffering from diabetes for <5 years. It is represented in Fig 1. The mean blood glucose level (FBS) was 200.25 among POAG and 115.51 among other patients. The mean difference observed was statistically significant ($p = 0.05$). The PPBS level among POAG was 305.75 and among others was 198.41. The difference observed was statistically significant ($p < 0.05$). The mean blood glucose level is higher in diabetics with POAG than others the values are represented in Fig 2 and Table 5.

V. Figures And Tables

Table 1 : Age and sex distribution of diabetics in the study group

Age group	Sex		Total
	Female	Male	
40-49	40	80	120
50-59	60	128	188
60-69	20	60	80
>=70	8	4	12
Total	128	272	400
Statistic	DF	Value	Prob
Chi-Square	3	2.1319	0.5455

Table 2 : Sex-wise distribution of patients with POAG

Sex	Total No. of patients	Diagnosed			
		POAG	NTG	OH	Normal
Males	272	12(4.4)	8 (2.9)	0	252 (92.7)
Females	128	4 (3.1)	0	4 (3.1)	120 (93.8)
Total	400	16 (4.00)	8 (2.0)	4 (1.0)	372(93.0)
Percentage		Statistic	DF	Value	Prob
		Chi-Square	3	3.16	0.3677

Table 3: Mean IOP among patients with POAG

Age	IOP (mmHg)	
	RE	LE
40-49	31.8	25.1
50-59	23.8	22.4
60-69	25.1	22.4
>=70	23.1	25.1

Table 4: Comparison of mean intraocular pressure among normal patients and those Diagnosed

	POAG	NTG	OH	Normal	F value	p value
Right Eye	28.12±3.99	14.6±0.65	27.2	16.46±2.43	19.76	<0.0001
Left Eye	26.25±1.56	16.9±0.57	25.1	17.79±2.55	10.73	<0.001

Fig 1: Distribution of POAG cases according to duration of DM

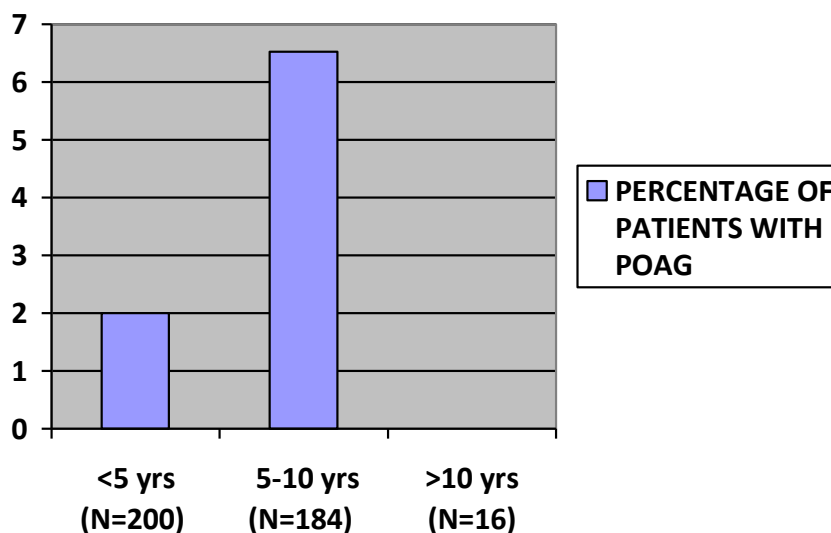
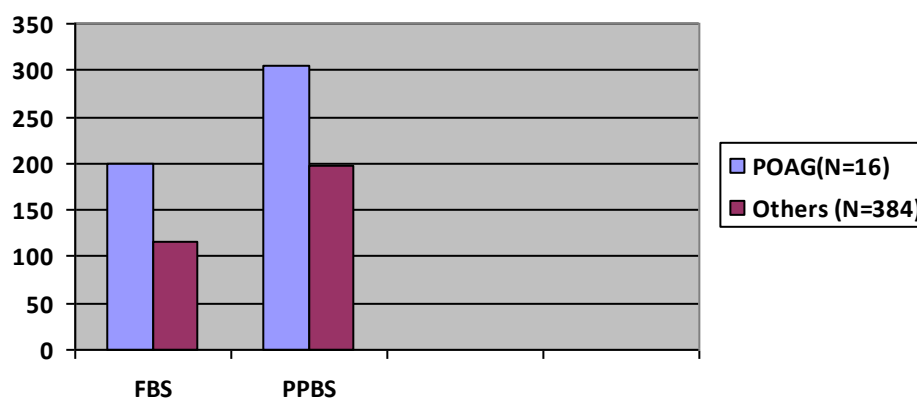


Table 5: Comparison of mean blood glucose level among diabetics with POAG and without POAG

Mean blood glucose level	Diagnosis		t value	p value
	POAG	Others		
FBS	200.25	115.51	4.21	<0.01
PPBS	305.75	198.41	3.65	0.0004

Fig 2: Comparison of mean blood glucose level among diabetics with POAG and without POAG



VI. Discussion

The discussion of an association between Diabetes and POAG is not new. In 1971 Becker stated “Diabetes Mellitus occurs more often in patients with Primary Open Angle Glaucoma than in non-glaucomatous populations. Similarly, Glaucoma is more prevalent in diabetic than in non-diabetic population”.¹ Considerable controversy exists in literature. While several studies show an association between the two diseases, several others fail to show any significant association. Most of these studies were comparatively small, used differing definitions of glaucoma and were clinical, rather than community based.^{2,3,4} A prevalence of 3.11 from Rotterdam⁵, 1.84 from Wisconsin⁶ and 2.12 from Australia⁷ have been reported. Armstrong et al have reported a prevalence of POAG of 4.1 % in diabetic patients. The prevalence of diabetes in POAG is 1.7 %.^{8,9,10,11} A community based study conducted in Vellore, South India showed a prevalence of POAG of 4.1% in diabetics.¹²

Our study shows a clear evidence of an excess of POAG in diabetic population, which is 7.53 % .The prevalence among males, is slightly more (4.41 %) as compared to females (3.12%). In our study, the mean age of POAG among males was 54.5 yrs and 50.0 yrs among females. Our study show that the prevalence of POAG and the duration of DM is proportional and that the mean blood glucose level is higher in diabetics with POAG.

VII. Conclusion

Primary Open Angle glaucoma is typically asymptomatic until significant visual field loss has occurred. Patients usually present with significant visual field loss in one eye and advanced disease in the other. It is associated with irreversible blindness. Thus, the public health importance of detecting undiagnosed and treatable glaucoma is important, as blindness has economic and societal consequences for the rest of an individual’s life. Several studies have shown an association between POAG and diabetes. From our study, we come to a conclusion that there is an excess of POAG in diabetic population, which is 7.53% (as compared to 2.1% in normal population), thereby showing an association between primary open angle glaucoma and diabetes.

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