

To Study the Association between Primary Open Angle Glaucoma in Patients with Diabetes Mellitus

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Abstract

Introduction- Glaucoma is a major public health problem, causes irreversible visual impairment and is the most frequent cause of blindness in the world, second only to cataract. Patients present with significant visual field loss in one eye and also advanced disease in the other eye. Thus Diabetes Mellitus is one of the risk factors for POAG.

Aim- 1. To study the prevalence of primary open angle glaucoma in patients with diabetes mellitus . 2. To screen all the patients with diabetes.

Material and methods- A hospital based study, carried out in department of Ophthalmology from August 2018 to January 2019 and screening of total 300 diabetics were done for primary open glaucoma.

Results- There were 105 cases out of 300 having primary open angle glaucoma. The prevalence among males was slightly more as compared to females. In the present study, the mean age of POAG was 62. This study shows that the prevalence of POAG and the duration of DM was proportional and the blood glucose level was higher in diabetics with POAG.

Conclusion- The significant association between diabetes and glaucoma was found in our study, suggests that there is a real association between these two diseases.

Key words- Glaucoma, diabetes, Ocular hypertension, cataract, blindness, risk factor

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I. Introduction

Glaucoma, second only to cataract, is the most frequent cause of blindness in the world.¹

It is a 'silent killer' as most of the time, it is asymptomatic up to the very advanced stage and thus at the time of presentation, the visual loss is often irrecoverable.^{2,3} Primary Open Angle Glaucoma (POAG) is defined as 'a progressive, chronic optic neuropathy where intraocular pressure (IOP) and other currently unknown factors contribute to damage and in which, in the absence of other identifiable causes, there is characteristic acquired atrophy of the optic nerve and loss of retinal ganglion cells and their axons.

Worldwide, over 2 million people develop POAG every year.⁴

Elevated intraocular pressure (IOP) or ocular hypertension (OHT) is the only well-established modifiable risk factor for primary open-angle glaucoma (POAG). Thus, there is considerable interest in identifying potentially modifiable risk factors for glaucoma to develop interventions that may reduce the incidence of the disease.

Armstrong et al have reported a prevalence of POAG of 4.1% in the diabetic patients.

Diabetes mellitus has been suggested to cause microvascular damage and vascular dysregulation of the retina and the optic disc, increasing the susceptibility of the optic nerve head to damage in glaucoma.⁵⁻⁷ Diabetes also may result in elevated IOP and increased risk of POAG by disrupting the trabecular meshwork function.⁸ Diabetes has been proposed as a risk factor for elevated IOP and POAG.

The potential association between diabetes and primary open-angle glaucoma has been studied and most studies support an association between the two diseases with higher incidence of primary open-angle glaucoma in diabetic patients as compared to nondiabetic patients. In the present study, we have studied the relationship between glaucoma and diabetic patients.

Aim

1. To study the prevalence of primary open angle glaucoma in patients with diabetes mellitus
2. To screen all the patients with diabetes

II. Material and methods

It was a hospital based study, carried out in department of Ophthalmology from August 2018 to January 2019. 300 diabetic patients, both insulin dependent and non insulin dependent, above 40 years of age till 80 years were screened for the detection of Primary Open Angle Glaucoma.

Inclusion criteria:

1. IOP > 21 mmHg (by Goldman applanation tonometry) with visual field defects,
2. IOP > 21 mmHg (by Goldman applanation tonometry) with optic nerve head changes,
3. 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 in the range 40-80 years of age were briefly explained about the study and informed consent was taking. 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 (Humphrey). Patients with significant disc cupping and other glaucomatous disc changes and field defects, regardless of IOP were suspected as having POAG. Criteria for diagnosis of ocular hypertension were pressure greater than 21 mmHg, with no disc changes, and in the absence of field defect. The data was analysed using One way Analysis of Variance (ANOVA), Chi square test. In all the abovetests, p values less than 0.05 were taken to be statistically significant. The data was analyzed using SPSSpackage.

III. Results

300 cases of diabetic patients were enrolled in the study.

Out of 300 cases, 120 (40%) were females and 180 (60%) were males. (Table 1)

Table 1: Gender wise distribution

GENDER	TOTAL	PERCENTAGE
MALE	180	60
FEMALE	120	40

All the subjects were studied in terms of age, IOP, duration of diabetics and blood glucose level.

The total number of diabetic patients observed in 40 to 49 years were 9 (3%), 50 to 59 years 102 (34%), 60-69 years 165 (55%) and 70-80 years 24 (8%). (Table 2) The mean age was 62.1 ± 7.28 years.

Table 2: Age wise distribution

AGE	TOTAL	PERCENTAGE
40-49	9	3
50-59	102	34
60-69	165	55
70-80	24	8

Table 2 shows that majority of diabetic patients in the study are above 60 years 63%. The difference observed was statistically significant ($p > 0.05$).

Those patients with IOP \leq 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).

Overall number of POAG cases observed was 105 (35%), NTG observed in 35 (11.7%) and 19 (6.3%) OH cases were observed. 141 (47%) were normal subjects having normal findings.(Table 3)

Table 3: Distribution of cases according to diagnosis

DIAGNOSIS	TOTAL	PERCENTAGE
Primary open angle glaucoma	105	35
Ocular hypertension	19	6.3
Normal tension Glaucoma	35	11.7
Normal	141	47

Thus showing that diabetes is a risk factor for normal tension glaucoma and ocular hypertension.

There were 65 (62%) cases among males and 40 (38%)cases among females having POAG which was not statistically significant ($p > 0.05$).

The mean IOP values of POAG were 26.12 ± 2.99 ranging from 24.1 to 32.4. The mean IOP values of Normal were 15.64 ± 2.13 , of NTG were 14.60 ± 0.65 . The mean IOP values of OH was 26.2 ± 2.65 . The difference in mean IOP values observed among the group was statistically significant ($p < 0.05$).

It was observed that 60 cases (58%) were suffering from diabetes since more than 10 years and 45 cases (42%) were suffering from diabetes for <10 years.

The mean fasting blood glucose level was 225.21 among POAG and 116.20 among other patients. The mean difference observed was statistically significant ($p=0.05$). The mean blood glucose level is higher in diabetics with POAG than others.

IV. Discussion

Association between diabetes and primary open-angle glaucoma has been evaluated in various population-based studies. Association was strongest in those with poorly-controlled diabetes as compared to those with normal. Diabetes could increase the risk of primary open-angle glaucoma indirectly through their association with high intraocular pressure.

Connection between diabetes and simple glaucoma was observed in 1924 by Grafe. Becker, in 1971 found that simple glaucoma is more common in diabetes. This may be due to a common genetic background. Diabetes cause microvascular damage and may affect vascular auto regulation of retina and optic nerve.⁹

Several reports have demonstrated a greater frequency of primary open-angle glaucoma in diabetics as compared to nondiabetics.^{10,11}

A prevalence of 3.11 from Rotterdam¹², 1.84 from Wisconsin¹³ and 2.12 from Australia¹⁴ have been reported. In our study it shows a clear evidence of an excess of POAG in diabetic population, which is 35%. The study showed that the prevalence of POAG and the duration of DM is proportional. The mean blood glucose level is higher in diabetics with POAG.

V. Conclusion

Glaucoma is associated with irreversible blindness. Thus, the public health importance of detecting undiagnosed glaucoma is important. The significant association between diabetes and glaucoma was found in our study, suggests that there is a real association between these two diseases.

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