

Prevalence of Diabetes in Patients with Primary Open Angle Glaucoma

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ABSTRACT

Background: Diabetes mellitus represents a growing international public health issue with a near quadrupling in its worldwide prevalence since 1980. Though it has many known microvascular complications, of which vision loss from diabetic retinopathy is one of the most devastating for affected individuals.

Objective: One of the risk factors for primary open angle glaucoma is diabetes mellitus (DM). This study was conducted to determine the prevalence of T2DM and investigate the connection between the diabetes and intraocular pressure (IOP) in POAG patients.

Methodology: Patients aged >40 years already diagnosed with glaucoma and using prescription medications or anti-glaucoma therapy, were included in the study. Using Goldmann tonometry, the intraocular pressure was measured. The data was analyzed.

Result: Out of 114 POAG patients, 61 men and 53 women participated in the study. Diabetes affected 27.9% of the 61 males, but only 24.5% of the 53 females. However, the study showed a negligible correlation between diabetes and IOP.

Conclusion: Any of the other clinical and diagnostic measures of POAG did not correlate with diabetes mellitus.

Key words: diabetes mellitus, open angle-glaucoma, blood pressure, intraocular pressure.

1. INTRODUCTION

Diabetes is a leading health priority, as it can cause severe systemic complications, such as retinopathy, neuropathy and nephropathy. This metabolic disorder results from either altered secretion of insulin by the pancreas (type 1 diabetes) or insulin resistance at a cellular level (type 2 diabetes). These changes produce widespread abnormalities in glucose uptake, resulting in hyperglycaemia, as well as abnormal metabolism and formation of lipids (Figure 1), which impact on neurons, blood vessels and glial cells. Indeed, this journal carries an excellent review on glial dysfunction in diabetic eyes.[1] Many clinicians will be aware of diabetic retinopathy and its classification, as laid out by the National Health and Medical Research Council Guidelines for the Management of Diabetic Retinopathy.[2] The purpose of this review is not to dwell on the specifics of diabetic retinopathy but to consider whether diabetes predisposes the eye to other disorders, in particular glaucoma.

Epidemiological and laboratory studies provide conflicting evidence of the presence of a relationship between diabetes and glaucoma. This article will review these data to consider whether autoregulation compensates to maintain normal blood flow by changing vascular

diameter. Glaucoma pathogenesis may involve abnormal autoregulation, [4–7] which produces glial cell activation and retinal ganglion cell loss due to local hypoxia.

Several studies have attempted to address directly the issue of whether diabetes influences the risk of glaucoma, by considering the effects of IOP challenge in normal and diabetic animals.

2. METHODS AND MATERIALS

This study was carried out in the Department of Ophthalmology, Santosh Medical College and Hospitals, Ghaziabad, UP after getting approval of the Institutional Ethical committee over the period from January 2019 to July 2020. Details of the procedure were explained to all the patients and written informed consent was taken. This study comprised 114 POAG-diagnosed participants who were over 40 years old.

Diabetes produces abnormalities in glucose as well as lipid metabolism. The effects of hyperglycaemia have been studied extensively, however, less attention has been paid to lipid anomalies and the potential role that this has in promoting neuronal dysfunction and a modified inflammatory status. These factors should not be thought of in isolation, as hyperglycaemia will cause glycation of lipids aggravating the diabetes induced changes.

3. RESULTS

A total of 114 patients meeting the inclusion criteria were enrolled in the study. There were all POAG patients of which 70 patients had hypertension. There were 61 males and 53 females in the study whereas the mean age was 57.74 ± 10.64 years.

Table 1 describes the demographic characteristics according to age and sex of all participants during the study period. In this study, a total of 114 cases of POAG were included. Majority of male, 20, were from 50-59 age group while higher number of female, 18, were in the age group 60-69 years.

Table 2 showed clinical characteristic of POAG patients. The mean intra ocular pressure for right and left eye was 26.16 ± 4.62 mmHg and 26.18 ± 4.57 mmHg respectively. The mean systolic blood pressure was 137.72 ± 17.348 mmHg ranging from 110-180 mmHg. Mean diastolic blood pressure observed among POAG patients was 80.53 ± 8.07 .

Table 3 shows an insignificant association between hypertension and intra ocular pressure among POAG patients.

4. DISCUSSION

According to the World Health Organization, vision impairment is 1% more common than average in India and of the assessed 8.9 million visually impaired individuals in India, 12.8% are because of glaucoma. [8] The visual handicap and irreversible visual impairment from glaucoma has critical financial effect and the issue is required to arrive at disturbing extents in a couple of years. Notwithstanding its general wellbeing essentialness, information accessible on the prevalence and conceivable danger factors for glaucoma in India is restricted. [9]

Screening for glaucoma in the populace will assist with recognizing the cases early. Be that as it may, it might be financially unviable to screen the whole populace. Recognizable proof of the danger elements will assist with choosing high danger patients for screening which thusly should prompt a general decrease in the visual impairment because

of this sickness and the morbidity related with it.

In glaucoma development many factors are responsible as per the previous studies like we all know diabetes is one of the major risk factor for the development of glaucoma. Few studies had shown that there is more male gender prevalence of glaucoma Barbados et al [9] and arriving comprehensive eye survey [4] which is similar to our study as we have higher prevalence of glaucoma in male patients. And there are few studies which are contradictory to this and they say that female has more prevalence than male patient in terms of glaucoma disease like Blue mountain eye et al and Andhra Pradesh eye disease et al which shows that female has more prevalence in glaucoma.

In our study, the total number of male subjects was 61 out of 114, which accounts for 53.5%, and 53 females out of 114 subjects, which accounts for 46.5 %. The prevalence of P.O.A.G was found to be more in men than women. In our sample, the mean IOP was 26.18 mmHg compared to the Latin eye study with IOP vary ranging. In the Egna Neumarkt [10] report, the positive relationship between the two and the linear increase of IOP in relation to blood pressure was approximately 2.5mmHg, too.

There has been controversy about the possible relationship between diabetes and POAG. Although the majority of studies support the POAG and diabetes link, few studies have reported contrary findings. The incidence of diabetes in this research population was 27.2%, unlike the results of a study performed by Vijaya et al [4] on a rural South Indian population, where none of the POAG subjects had diabetes mellitus. The correlation between diabetes and POAG showed a trend towards significance and the effect persisted even on multivariate analysis ($p=0.05$), which was similar to the findings of the Beaver dam eye study. The Blue Mountain Eye Study endorsed the link between diabetes and POAG, although no correlation was found between POAG and diabetes in the Aravind Eye Survey [4]. Even the Baltimore Eye Survey [11] indicated that it was not linked to diabetes and POAG.

In our sample, 6 out of 114 patients had myopia (5.2%) and there was no significant correlation with POAG ($p=0.62$), which is close to the results in the population-based study by Vijaya et al [4]. Myopia had a statistically significant association with POAG in the Aravind eye survey [12]. In the blue mountain eye report, myopic subjects had a double to triple increased risk of glaucoma compared with non-myopic subjects, [13] and the risk was independent of other risk factors for glaucoma and IOP.

Conclusion: This was a cross sectional study conducted among patients with primary open angle glaucoma visiting the out-patient department of Santosh medical college, Ghaziabad. During this study a total of 114 patients with primary open angle glaucoma were evaluated for concurrent presence of diabetes. A trend towards significance was shown by the correlation of diabetes mellitus and age with POAG. This research has shown that while there are many known risk factors for POAG, some of these factors have unclear associations with it, it is important to examine these correlations thoroughly because of the significance of the problem at hand and larger studies would be needed to arrive at a conclusive conclusion. The key drawback of this investigation is that it is a cross-sectional hospital-based analysis in comparison with the other similar epidemiological research that has been conducted that was fundamentally population-based. The limited example scale is another downside when applied to a large number of different studies.

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5. REFERENCES

1. Jayachandra Das, SharadBhomaj, Zia Chowdary; Profile of Glaucoma in majoreyehospitalsin northIndia.IndianjournalofOpthal;2001; 49:25-30
2. Hayreh SS, Revie IHS, Edwards 1. Vasogenic origin of visual field defects andoptic nerve changesinglaucoma.BrJOphthalmol1970;54:461-72
3. Weih LM, Nanjan M, McCarty CA, Taylor HR: Prevalence and predictors ofopen-angleglaucoma.Ophthalmology2001;108:1966-1972.
4. Vijaya L, George R, Paul PG, Baskaran M, Arvind H, Raju P et al. Prevalenceof open-angle glaucoma in a rural south Indian population. Invest OphthalmolVisSci2005;46:4461–4467
5. Rohitvarma ,Mei Ying ,Brian, Prevalence Of POAG In Latinos , The LosAngelesLatino eye study,ophthalmology2004;111:1439-1448
6. Johnsalmon,Kanskisclinicalophthalmology,12-12-19,UK,Elsevier,vol9,pg.28.
7. Jacob A, Thomas R, Koshi SP, Braganza A, Muliylil J. Prevalence of primaryglaucomainanurbansouthIndianpopulation.IndianJOphthalmol1998;46(2):81-6.
8. BruceShieldsm,textbookofglaucoma,3rdeditionchapter5,page84.
9. Leske MC, Connell AM, Wu SY, Hyman LG, Schachat A. Risk Factors forOpen-angleGlaucoma:TheBarbadosEyeStudy.ArchOphthalmol1995;113(7):918-924.
10. BonomiL,MarchiniG,MarraffaM,BernardiP,MorbioR,Varotto A etal.Vascular risk factors for primary open angle glaucoma: The Egna-NeumarktStudy.Ophthalmology2013;107:1287-1293.
11. Sommer A. Glaucoma risk factors observed in the Baltimore Eye Survey. CurrOpinOphthalmol1996;7(2):93-8.
12. BillA, the role of ciliary body flow and ultra-filtration in aqueous humor formation.exp eyeres1973;16:287-98.
13. MitchellP, LeeAJ, RohtchinaE, WangJJ. Openangleglaucomaandsystemichypertension:T heBlueMountainsEyeStudy.JGlaucoma2004;13:319-326.

Table 1: Age and sex distribution of POAG

Age	SEX		Total
	Male	Female	
40-49 years	16 (26.2%)	11 (20.8%)	27 (23.7%)
50-59 years	20 (32.8%)	16 (30.2%)	36 (31.6%)
60-69 years	16 (26.2%)	18 (34%)	34 (29.8%)
>70 years	9 (14.8%)	8 (15.1%)	17 (14.9%)
Total	61 (53.5%)	53 (46.5%)	114 (100%)

Table 2: Intraocular pressure among patients with primary open angle glaucoma

	Maximum	Minimum	Mean ± SD
IOP (R/E)	17	35	26.16 ±4.62
IOP (L/E)	17	35	26.18 ± 4.57

Table 3: Association between IOP and Diabetes among POAG patients

		Diabetes		p-value
		Yes	No	
IOP (R/E)	≤ 21 mmHg	9 (30%)	21 (25%)	0.379
	>21 mmHg	21 (70%)	63 (75%)	
IOP (L/E)	≤ 21 mmHg	9 (30%)	21 (25%)	0.379
	>21 mmHg	21 (70%)	63 (75%)	