Study of Association between Primary Open Angle Glaucoma and Type 2 Diabetes in Rural Eye Hospital

G.Sreelakshmi[1], S.Visalakshi[2], Sudha J[3], Divya Handa[4]

(Sankara Eye Hospital,krishnankoil,TamilNadu,India)
Corresponding Author: G.sreelakshmi.

Abstract

AIMS AND OBJECTIVES*: To study the association and prevalence of primary open angle glaucoma in Type 2Diabetics attending Rural eye hospital.*

MATERIALS AND METHODS*: It is a prospective study conducted on 200 type 2 diabetics who attended OPD and who came in outreach camps in Sankara eye hospital,Krishnankoil. Type 2 diabetics above 40yrs of age are selected according to Inclusion and Exclusion criteria. Detailed history was taken and they were subjected to complete ocular examination to know the incidence of POAG amongst them.*

RESULTS*: The study group consisted of 102 males and 98 females in age group of 40 to 80 yrs with mean age of 64.27±5.38yrs.Overall in 200 Type 2 diabetics, Primary open angle glaucoma was observed in 25patients[12.5%],Normal tension glaucoma was observed in 6 patients [3%],Ocular hypertension was observed in 4 patients[2%] and remaining 165 patients [82.5%] were normal. Based on statistics, no sex predisposition was present [p>0.05].Study also states that as duration of diabetes increases,,risk of prevalence of glaucoma increases .Mean IOP values of POAG was 25.75±3.56 ,mean IOP value of OHTN was 27.2 ,mean IOP value of NTG was 15.3±2.16.Mean C:D ratio of POAG and normal diabetics was 0.68 and 0.3 respectively [p<0.05].*

CONCLUSION*: This data concludes that there is excess of POAG among type 2 diabetics ,there by showing a significant correlation between type 2 diabetes and POAG. Further studies with larger study population are needed to determine its actual role in pathogenesis of glaucoma.*

KEYWORDS*: Type 2 Diabetes mellitus, POAG,Risk factors.*

I. Introduction

Glaucoma is a chronic, progressive optic neuropathy caused by group of ocular conditions with characteristic acquired atrophy of optic neuron and loss of retinal ganglion cells and their axons with loss of visual function[1]. Glaucoma is a significant cause of irreversible blindness world wide.

Multiple riskfactors are attributed to the occurrence of glaucoma.It includes increasing age,gender ,race,family history,diabetes mellitus, ocular HTN,myopia, diastolic perfusion pressure[2-5].

Many studies suggest an association between Diabetes and glaucoma[6].Diabetes mellitus is a serious and increasingly prevalent health problem worldwide due to lifestyle changes and associated with severe acute and chronic complications which affect quality of life and survival of population.Diabetics are more prone to develop glaucoma.In 1971,Becker stated that diabetes occurs more often in patients with POAG than in non glaucomatous population[7].Armstrong et al[8] reported a prevalence of POAG of 4.1% in the diabetic patients compared with 1.4% in the controls.

Diabetes is a definitive risk factor for chronic glaucoma as diabetes affect the small blood vessels supplying optic nerve,there by compromising the micro circulation of optic nerve. Davie et al[9] stated that high glucose level in aqueous humor increases fibronectin synthesis and accumulates in trabecular meshwork and depletes the trabecular meshwork cells which are important in outflow system, thus causing POAG.

Many studies have been done to find relation between POAG and diabetes.Few studies have not found any association between them. This study aims to find the association and prevalence of POAG in type 2 diabetics in rural population

II. Materials And Methods:

It was a hospital based prospective study conducted on 200 type 2 diabetics selected randomly who came to Outpatient department and outreach camps at Sankara eye hopsital,Krishnanakoil. Written informed consent was taken from all and were briefly explained about the study and tests they would have to undergo.

Patients were selected based on Inclusion criteria and exclusion critertia.Inclusion criteria included Age group of 40-80 yrs and open angle in gonioscopy.Exclusion criteria includes Patients having closed angle, uveitis, secondary glaucoma, pigment dispersion syndrome, exfoliation syndrome,History of trauma, rubeosis.

At first, preliminary details of patients were taken in the proforma.Then detailed clinical history including ophthalmic history, family history of glaucoma,duration of diabetes,treatment for diabetic retinopathy if any was recorded.Then detailed ophthalmic examination and investigations were done including Best corrected visual acuity,torch light examination of anterior segment,slitlamp examination,fundus examination with +90D lens,Applanation tonometry,gonioscopy by Goldmann 3 mirror,pachymetry,visual field testing by automated perimetry with near refractive correction.Although NTG is a variant of POAG ,not included under POAG because of varied mechanism.OHTN criteria are Intraocular pressure>21mm of Hg with no disc and field changes.

Obtained data is subjected to various statistical tests and Mean,Standard deviation,P values were calculated using SPSS package. P value <0.05 was considered as significant. Proportions were compared using Chi square test.

III. Results

Out of 200 Type 2 diabetics,102 were males and 98 were females in the age group of 40-80 years with mean age of 64.27±5.38 yrs were included in the study.They were subjected to all investigations and observations were made in both eyes.Results obtained from the study were as below,

TABLE 1: AGE AND SEX WISE DISTRIBUTION OF STUDY GROUP

AGEGROUP [YEARS]	SEX		TOTAL
	MALE	FEMALE	
41-50	4 [40%]	6 [60%]	10 [5%]
51-60	38 [44.1%]	48[55.8%]	86[43%]
61-70	48[52.1%]	42[45.6%]	92[46%]
71-80	10[83.3%]	2[16.6%]	12[6%]
TOTAL	102[51%]	98[49%]	200[100%]

Above data indicates that majority of diabetics are above 50 years of age. Difference observed was not statistically significant[p >0.05%].

TABLE 2: SEX WISE DISTRIBUTION OF POAG:

SEX	NUMBER OF PATIENTS	POAG	NTG	OHTN	NORMAL
MALE	102	15[14.7%]	4[3.9%]	2[1.9%]	81[79.4%]
FEMALE	98	10[10.2%]	2[2%]	2[2%]	84[85.7%]
TOTAL	200	25[12.5%]	6[3%]	4[2%]	165[82.5%]

This table shows the proportion of POAG, NTG, OHTN among the diabetics in the study population. In the study group ,overall proportion of POAG was 12.5%,NTG was 3%,OHTN was 2% observed and remaining 82.5% were normal. Proportion of POAG cases observed between males and females was not statistically significant[p>0.05%].

TABLE 3: AGE WISE DISTRIBUTION OF POAG

AGE GROUP	MALE	FEMALE	TOTAL
41-50	2	1	3
51-60	3	2	5
61-70	4	3	7
71-80	6	4	10
	15	10	25

TABLE 4:DURATION OF DIABETES AND PREVALENCE OF POAG

DURATION OF DM (Yrs)	Number of pts	POAG
0-3	45	5
3-6	55	7
6-9	59	6
>9	41	7
	200	25

The above table shows that as duration of diabetes increases ,there is also increase in risk of prevalence of glaucoma.

TABLE 5: LATERALITY OF INVOLVEMENT

	RE	LE	BE	TOTAL
POAG	3	1	21	25
NTG	-	-	6	6
OHTN	-	-	4	4

Among POAG patients, bilateral eye involvement seen in 21 patients, while 3 patients had only RE involvement and one patient had only LE involvement. All NTG and OHTN cases had bilateral eye involvement.

TABLE 6: MEAN IOP IN NORMAL PATIENTS AND IN THOSE DIAGNOSED

	POAG	NTG	OHTN	NORMAL
RE	25.75±3.56	15.3±2.16	27.2	16.9±1.56
LE	27.12±2.15	14.6±1.03	25.7	17.4±0.57

The difference observed in mean IOP values among group was statistically significant[$p<0.05\%$].Mean IOP values of NTG patients was lower than POAG and OHTN patients which is statistically significant. POAG patients had statistically higher IOP than normal patients.

TABLE 7: MEAN C:D RATIO IN NORMAL PATIENTS AND IN THOSE DIAGNOSED

	POAG	NTG	OHTN	NORMAL
RE	0.68	0.63	0.4	0.3
LE	0.65	0.61	0.3	0.3

Mean C:D ratio is higher in POAG and NTG patients than in OHTN and normal patients.

IV. Discussion

Glaucoma is a potentially blinding disease affecting millions of people worldwide. Early diagnosis is essential, so that treatment to halt its progression can be given.

POAG is a multifactorial disease.Multiple riskfactors are proven to be significant in the causation of POAG.The association of glaucoma and diabetes is not new.Few studies show an association between them,few fail to show significant association.Most of the studies were small and clinical rather than community based.

Mean age of patients with POAG in this study was 64.27±5.38yrs.It is consistent with other studies which depict that increasing age is a riskfactor for development of glaucoma.In Beaver Dam Eye study[10],the prevalence increases with age from 0.9%between 43-54 yrs of age to 4.7% among those of 75yrs and older.Anhchuong le et al[11] in his study noted that there was increased risk of POAG after 60yrs of life and risk increases with each subsequent decade of life.Similar trend was shown in Barbados incidence eye study[12].In present study number of diabetics in 41-50yrs age group were 10(5%),51-60yrs were 86 (43%),61-70yrs were 92(46%),71-80yrs were12 (6%).Majority of diabetics in this study were above 50yrs of age.

In our study ,males 15(14.7%) and females 10(10.2%) were diagnosed with POAG.The proportion of cases diagnosed between males and females was not statistically significant(P>0.05%).It correlates with study conducted by Shital A patel et al[13] and Anhchuong le et al[11]. Barbados eye study[12] and Nalia ali et al[14] show higher incidence in men.

In our study,overall POAG proportion was 12.5%,Normal Tension Glaucoma cases were 3%,Ocular Hypertension cases were 2% and remaining 82.5% were normal. Our results were comparable to Armstrong et al [8]study which showed prevalence of POAG was 4% in diabetics ,Epidemiological study of diabetics in Denmark[15] which showed prevalence of POAG and OHTN were 6% and 3% respectively and Thomas et al[16] , Community based study which showed prevalence of 4.1% in diabetics.

IOP is important factor in association between Diabetes and POAG as persons with diabetes have slightly higher IOP[17]. Several hypothesis showed association between Diabetes and increase in IOP. Diabetes induced autonomic dysfunction may increase IOP.Persons with Diabetes have greater central Corneal thickness may increase IOP.Few comparative studies like kayako Matsuyama et al study revealed that IOP in DM patients is significantly higher than in Non DM patients .

Mean C:D ratio was found higher in POAG patients (0.68) than in Nonglaucomatous patients (0.3) which correlates with studies including Baltimore,BeaverDam,Barbados and Framingham.

V.   Conclusion

From our study,we conclude that there is association between Type 2 DM and POAG and prevalence of POAG is more in diabetics compared to normal population .POAG is asymptomatic and patients present with significant visual field loss leading to irreversible blindness.So timely detecting and treating glaucoma is important.There is also increased incidence of diabetes at present in general population.So all diabetics should be done detailed ophthalmic evaluation and screened for glaucoma and timely intervention is to be taken.

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