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A CLINICAL STUDY ON THE PROPORTION OF SYSTEMIC RISK FACTORS FOR NORMAL TENSION GLAUCOMA

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ABSTRACT

Background: Glaucoma is a progressive optic neuropathy associated with a specific pattern of optic disc changes and irreversible visual field changes for which intraocular pressure (IOP) is considered the most common risk factor. Glaucomatous disc damage in individuals with normal IOP is attributed to many systemic risk factors, all causing hypo perfusion of the optic nerve head. The present study was undertaken to determine the proportion of risk factors in such patients.

Purpose: To determine the proportion of systemic risk factors in patients with Normal Tension Glaucoma

Method: This was a hospital based cross sectional study of 31 patients. NTG Patients attending the Eye department from October 2019 to November 2021 were recruited. After obtaining informed consent, relevant data like age, sex, h/o smoking, h/o diabetes mellitus and its duration, h/o systemic hypertension, Cerebrovascular accident, migraine, Raynaud's phenomenon, sleep apnea, family history of glaucoma etc. were obtained. A complete ocular examination including IOP and clinical evaluation of optic disc was then performed. Visual fields by automated perimetry and Optical Coherence Tomography of the optic disc and nerve fibre layer were done wherever necessary. Data was entered in MS excel and SPSS version 19.0 was used for statistical analysis.

Results: 53% of patients were in the age group of 50 to 70 years. Female to male ratio was 2:1. 40% of the patients had type 2 DM, 33% had systemic hypertension and 36.7% had dyslipidemia. 20% gave a history of ischemic heart disease. Migraine headache was reported by 26.7% patients. 3% had Raynaud phenomenon. Moderate loss of visual field was noted in 60% of male and 95% of female patients. Field loss was more significant in patients with multiple risk factors.

Conclusion: Normal tension glaucoma was more common in older females. Type 2 Diabetes Mellitus was the most common risk factor followed by hypertension and dyslipidemia. There was no significant association with smoking or family history of glaucoma. Presence of multiple risk factors had more impact on field loss.

Keywords: Normal tension glaucoma, hypertension, diabetes mellitus, migraine, risk factors.

INTRODUCTION

Glaucoma is defined as a progressive optic neuropathy with typical optic nerve head changes and a

specific pattern of irreversible field defects for which intraocular pressure (IOP) is the most common and modifiable risk factor. Traditionally, primary open angle glaucoma has been classified into two distinct entities – High Tension Glaucoma with an IOP more than 21mmHg and Normal Tension Glaucoma (NTG) if the IOP is less than 21 mmHg [(1)]. Various systemic risk factors have been identified for glaucomatous damage in subjects with normal IOP. These are independent of intraocular pressure and are believed to cause glaucomatous damage by hypoperfusion of the optic nerve head[(2)]. Examples for these IOP independent risk factors are Systemic Hypertension, nocturnal hypotension, Type 2 Diabetes Mellitus, Migraine, Dyslipidemia, sleep apnea etc.[(3,4,5)]. Low CSF pressure in the sub arachnoid space around the optic nerve has also been reported as a risk factor for normal tension glaucoma[(6)]. The present study was undertaken to assess the risk factor profile of patients with NTG attending our eye department.

AIMS AND OBJECTIVES

To determine the proportion of various known systemic risk factors in patients with Normal Tension Glaucoma attending the eye department of a tertiary care center in South Kerala.

MATERIALS AND METHODS

This was a hospital based cross sectional study on patients with Normal Tension Glaucoma (NTG) attending the eye department at Dr Somervell Memorial CSI Medical College, Karakonam from October 2019 to November 2021.

Inclusion Criteria

1. IOP less than or equal to 21 mmHg without treatment, never higher than 24 mmHg without treatment
2. Open angles on gonioscopy
3. Typical glaucomatous optic disc changes (rim thinning, cupping, splinter hemorrhage, notch, nerve fiber layer defect)
4. Visual field changes compatible with glaucomatous disc damage on automated perimetry.

Exclusion Criteria

1. Visual field changes attributable to conditions other than glaucoma
2. Occludable angles on gonioscopy
3. Intermittent elevation of IOP due to various causes
4. Previous surgery / laser procedures/ use of topical or systemic steroids
5. Inability to attend follow up

Written informed consent was obtained from all the study subjects.

A detailed history was obtained from all participants which included age, sex, h/o smoking, h/o Diabetes mellitus and its duration, systemic hypertension and details of treatment, h/o ischemic heart disease, cerebrovascular accident, sleep apnea, migraine, Raynaud phenomenon and family history of glaucoma.

All patients underwent complete ocular examination including slit lamp evaluation of anterior segment and optic disc and gonioscopy. Visual field evaluation was performed using Humphrey Field Analyzer. Spectral domain OCT was used to assess Central Corneal Thickness (CCT), and the retinal nerve fiber layer (RNFL).

Statistical Analysis

Statistical analysis was performed using SPSS version 19.0. Quantitative variables were expressed as mean and standard deviation. Qualitative variables were presented as frequencies and percentages. Appropriate tests of significance were done wherever necessary.

RESULTS

A total of 31 patients diagnosed to have Normal Tension Glaucoma were enrolled in the study. Age of the patients ranged from 30 to 70 years.

Age Group (Years)	Frequency (n)	Percentage
30-50	6	20%
51-70	17	53%
71-90	8	27%

Table 1: Age group of the participants

Among the 31 patients, 21 were female (67%) and 10 were males (33%).
40% of the patients had type 2 Diabetes mellitus (n=13), 33.3% had systemic hypertension (n=10) and 36.7% had dyslipidemia (n=12). Ischemic heart disease was noted in 20% (n=6).
26.7 % gave a history suggestive of migraine headache (n=8) and 3.3% (1 patient) gave history suggestive of Raynaud's phenomenon. Only 2 patients were smokers (6.7%). None of the patients had cerebrovascular accident. Sleep apnea was not reported by any of the patients.

Known ocular and systemic risk factors	Count	Percentage
Migraine	8	26.7
Type 2 DM	13	40.0
Hypertension	10	33.3
Dyslipidemia	12	36.7
Ischemic heartdisease	6	20
Smoking	2	6.7
Raynaud phenomenon	1	3.3
CVA	0	0

Table 2: Proportion of systemic risk factors among the participants

All patients had visual field changes and visual field changes were more severe in patients with multiple risk factors.

DISCUSSION

Normal tension glaucoma has been reported to be more common in the elderly age group in many studies. In the Beaver Dam Eye Study, an increase in prevalence of NTG was reported in the older age group – the prevalence increased from 0.2 % in the 43 to 54-year age group to 1.6% in the age group of more than 75 years[7]. In our study, 20% of the patients were in the age group of 30 to 50 years, 53% in the age group of 51 to 70 years and 27 % in the age group of 71 to 90 years. NTG was more common in the older age group. It is to be noted that NTG can still occur in patients less than 50 years of age and aggressive management of the condition is very important in this age group as they have a longer period of risk of progression. The dip in percentage above 70 years in our study could be a result of underreporting or lesser average lifespan of our population when compared with the Western study population.
A higher female preponderance was noticed in our study (M: F was 2:1). This has been reported by the Moorfields NTG study group [8].
Migraine and vasospastic conditions have been reported to be more common in patients with NTG[9,10]. In our study, 26.7% of the patients reported migraine headache and 3% had Raynaud disease. 40% of the patients had type 2 DM, 36.7% had dyslipidemia, 33% had systemic hypertension and 20% had a history of ischemic heart disease, again pointing to the role of vascular factors in the causation of NTG. Statistically significant association was noted between all the systemic risk factors put together and the severity of visual field loss. None of the patients had features or history of cerebrovascular accident.

Family history of glaucoma was not reported by any of the patients, though positive family history has been reported to range from 5 to 40% in otherstudies[11]. The differences noted could be due to the limited sample size in our study.

CONCLUSION

Normal tension glaucoma (NTG) is more prevalent in the older age group. Female sex appears to be at a greater risk of developing NTG. Type 2 Diabetes mellitus was the most common risk factor followed by systemic hypertension and dyslipidemia. Presence of multiple risk factors can increase the risk of developing NTG.

RECOMMENDATIONS

NTG was reported in 27% of patients less than 50 years of age in our study. It is therefore recommended that early screening for glaucoma should be undertaken even in the younger age group.

Severity of field loss was more in patients with multiple risk factors. This observation was not part of our study objective, but suggests that it requires further evaluation. A larger study with a greater number of patients is recommended to investigate these aspects.

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