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ORIGINAL ARTICLE

Assessment of C-reactive Protein levels among Patients with Normal Tension Glaucoma

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ABSTRACT:

Background: The diagnosis of normal-tension glaucoma (NTG), characterized by the presence of glaucoma without significantly elevated IOP, relies on the identification of symptoms and signs indicative of optic nerve susceptibility.Hence; the present study was conducted for assessing C-reactive Protein levels among Patients with Normal Tension Glaucoma. **Materials & methods:** A total of 30 patients diagnosed with normal-tension glaucoma (NTG) were included in the study. Comprehensive demographic and clinical information for each participant was collected. An additional group of control subjects (n=30) also underwent a thorough clinical eye examination, which included intraocular pressure measurements at two-hour intervals, fundoscopic evaluation, optic nerve head assessment, and OCTOPUS visual field testing using the full threshold program. Plasma levels of C-reactive protein (CRP) were quantitatively assessed in all participants using a highly sensitive CRP assay. **Results:** Mean age of the patients of the study group and control group was 41.8 years and 39.4 years respectively. Majority proportion of patients were males and were of urban residence.Mean CRP levels among patients of the study group and control group 4.32 mg/L and 4.17 mg/L respectively. Non-significant results were obtained while comparing the mean CRP levels among patients of the two study groups. **Conclusion:** The vascular inflammatory conditions related to high-sensitivity C-reactive protein may not have a direct correlation with the onset of normal-tension glaucoma.

Key words: C reactive proteins, Normal Tension, Glaucoma

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INTRODUCTION

Glaucoma is currently understood as an abnormal physiological condition affecting the optic nerve head, which interacts with intraocular pressure (IOP). The extent and speed of damage are influenced by IOP levels and the severity of the underlying abnormal physiology. The diagnosis of normal-tension glaucoma (NTG), characterized by the presence of glaucoma without significantly elevated IOP, relies on the identification of symptoms and signs indicative of optic nerve susceptibility, alongside the exclusion of alternative causes for optic disc abnormalities and visual field deficits.[1,2] Notable clinical findings may include a halo or crescent of absent retinal pigment epithelium surrounding the optic disc, bilateral pre-chiasmal visual field defects, splinter hemorrhages at the disc's edge, and signs of vascular dysregulation such as hypotension, cold extremities, migraine with aura, among others. Additionally, a familial history of glaucoma may be pertinent, as well as a personal history of hemodynamic crises, arterial obstructive diseases, or sleep apnea.[3, 4]Thorough ophthalmoscopic examination can determine if the optic disc exhibits excavation without associated pallor of the neuro-retinal rim. Additionally, it may indicate the presence of congenital anomalies, past retinal vascular occlusions, optic nerve head drusen, or other related conditions. Anterior segment assessment may reveal pigment dispersion indicative of prior pigmentary glaucoma or a shallow anterior chamber with narrow angles. Furthermore, visual field testing is expected to demonstrate characteristic defects in the nerve fiber bundles.[5, 6]Hence; the present study was conducted for assessing C-reactive Protein levels among Patients with Normal Tension Glaucoma.

MATERIALS & METHODS

The present study was conducted for assessing C-reactive Protein levels among Patients with Normal Tension Glaucoma.A total of 30 patients diagnosed with normal-tension glaucoma (NTG) were included in the study. Comprehensive demographic and clinical information for each participant was collected. The diagnosis of NTG was established through a clinical assessment that involved measuring intraocular pressure at two-hour intervals, consistently yielding values below 22 mm Hg, along with an open chamber angle, characteristic optic nerve head damage associated with glaucoma, and the presence of glaucomatous visual field defects. An additional group of control subjects (n=30) also underwent a thorough clinical eye examination, which included intraocular pressure measurements at two-hour intervals, fundoscopic evaluation, optic nerve head assessment, and OCTOPUS visual field testing using the full threshold program. A detailed medical history was recorded for all participants. Individuals with known systemic inflammatory diseases, malignancies, or

those undergoing steroid treatment were excluded from the study. The control group was matched for gender and age with the patients and had no ocular diseases. Plasma levels of C-reactive protein (CRP) were quantitatively assessed in all participants using a highly sensitive CRP assay. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. Chi-square test and student t test were used for evaluation of level of significance.

RESULTS

Mean age of the patients of the study group and control group was 41.8 years and 39.4 years respectively. Majority proportion of patients were males and were of urban residence.Mean CRP levels among patients of the study group and control group 4.32 mg/L and 4.17 mg/L respectively. Non-significant results were obtained while comparing the mean CRP levels among patients of the two study groups.

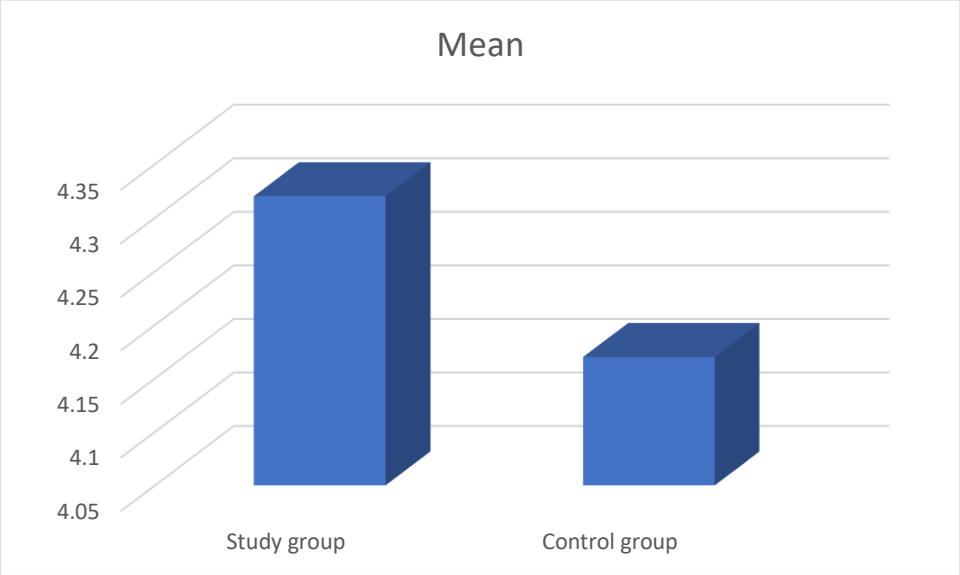
Table 1: Demographic data

Variable	Study group	Control group
Mean age (years)	41.8	39.4
Males	18	19
Females	12	11
Rural residence	11	14
Urban residence	19	16

Table 2: Comparison of CRP levels

CRP levels	Study group	Control group
Mean	4.32	4.17
SD	1.54	1.38
p-value	0.1125	

Graph 1: Comparison of CRP levels



DISCUSSION

Normal tension glaucoma (NTG) is a progressive optic neuropathy that resembles primary open-angle glaucoma (POAG) but is characterized by the absence of elevated intraocular pressure (IOP) or other contributing factors that typically result in optic neuropathy. The primary clinical characteristics of NTG include normal anterior chamber angles observed through gonioscopy, optic nerve cupping, and visual field deficits that correspond with the degree of cupping, indicating ongoing damage to the optic nerve.[7- 9]In the management of normal-tension glaucoma (NTG), the primary strategy involves monitoring for any recorded advancement of the condition. This assessment encompasses several indicators: 1) alterations in the retinal nerve fiber layer, optic nerve head, and visual fields; 2) a familial history of NTG characterized by swift progression; 3) visual symptoms that may suggest progression; and 4) episodes of recurrent hemorrhaging at the optic disc.[8-10]Hence; the present study was conducted for assessing C-reactive Protein levels among Patients with Normal Tension Glaucoma.

Mean age of the patients of the study group and control group was 41.8 years and 39.4 years respectively. Majority proportion of patients were males and were of urban residence.Mean CRP levels among patients of the study group and control group

4.32 mg/L and 4.17 mg/L respectively. Non-significant results were obtained while comparing the mean CRP levels among patients of the two study groups. de Voogd S et al conducted a study to evaluate the hypotheses that atherosclerosis and elevated serum C-reactive protein (CRP) levels serve as risk factors for open-angle glaucoma (OAG). The risk factors were classified into tertiles and assessed based on standard deviation. Following an average follow-up period of 6.5 years, incident OAG was identified in 87 out of 3842 (2.3%) participants considered at risk. The study found that carotid artery plaques, carotid intima-media thickness, aortic calcifications, ankle-arm index, and CRP levels did not emerge as significant risk factors for OAG. The odds ratios for the highest and lowest tertiles were as follows: 1.43 for carotid plaques, 0.86 for carotid intima-media thickness, 1.02 for aortic calcifications, 0.69 for ankle-arm index, and 1.19 for CRP. Ultimately, neither atherosclerosis nor serum CRP levels were determined to be significant risk factors for OAG.[9]Goldenberg-Cohen N et al investigated the levels of C-reactive protein (CRP) in patients experiencing acute retinal artery occlusion (RAO) and examined their relationship with atherosclerotic risk factors. The study involved comparing CRP levels in 16 RAO patients with those of 16 age-matched controls who were at risk for atherosclerosis, as well as 16 young volunteers. A follow-up CRP assessment was conducted six years later. The findings revealed that elevated CRP levels (greater than 3 mg/l) and atherosclerotic risk factors were present in seven patients from the RAO group (44%) and nine at-risk controls (56%). Upon follow-up, all seven patients who were retested showed a decrease in CRP levels. Within a five-year period, six patients succumbed to vascular events, four of whom had elevated CRP levels during their RAO episode. While CRP levels are associated with atherosclerosis, they do not show a significant elevation in patients suffering from RAO.[10]Stojčić M et alcompared high-sensitivity CRP (hsCRP) levels in plasma between patients with NTG and normal controls. They studied 20 patients (4 males and 16 females) with the NTG diagnosis and compared their CRP values to those obtained in 25 controls (5 males and 20 females) with no ocular disease. Both groups had similar demographic parameters (age, sex, body mass index – BMI) and similar vascular risk profile. Plasma CRP levels were comparable between patients with NTG and controls (mean values 4.99 ± 0.77 mg/L, median 4.50 mg/L, range 2.50–18.90 mg/L and mean value 4.19 ± 0.30 mg/L, median 3.50 mg/L range 2.20–8.50 mg/L, respectively, $p > 0.5$. The results obtained in their study suggested that CRP levels are not altered in NTG patients.[11]

CONCLUSION

The vascular inflammatory conditions related to high-sensitivity C-reactive protein may not have a direct correlation with the onset of normal-tension glaucoma.

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