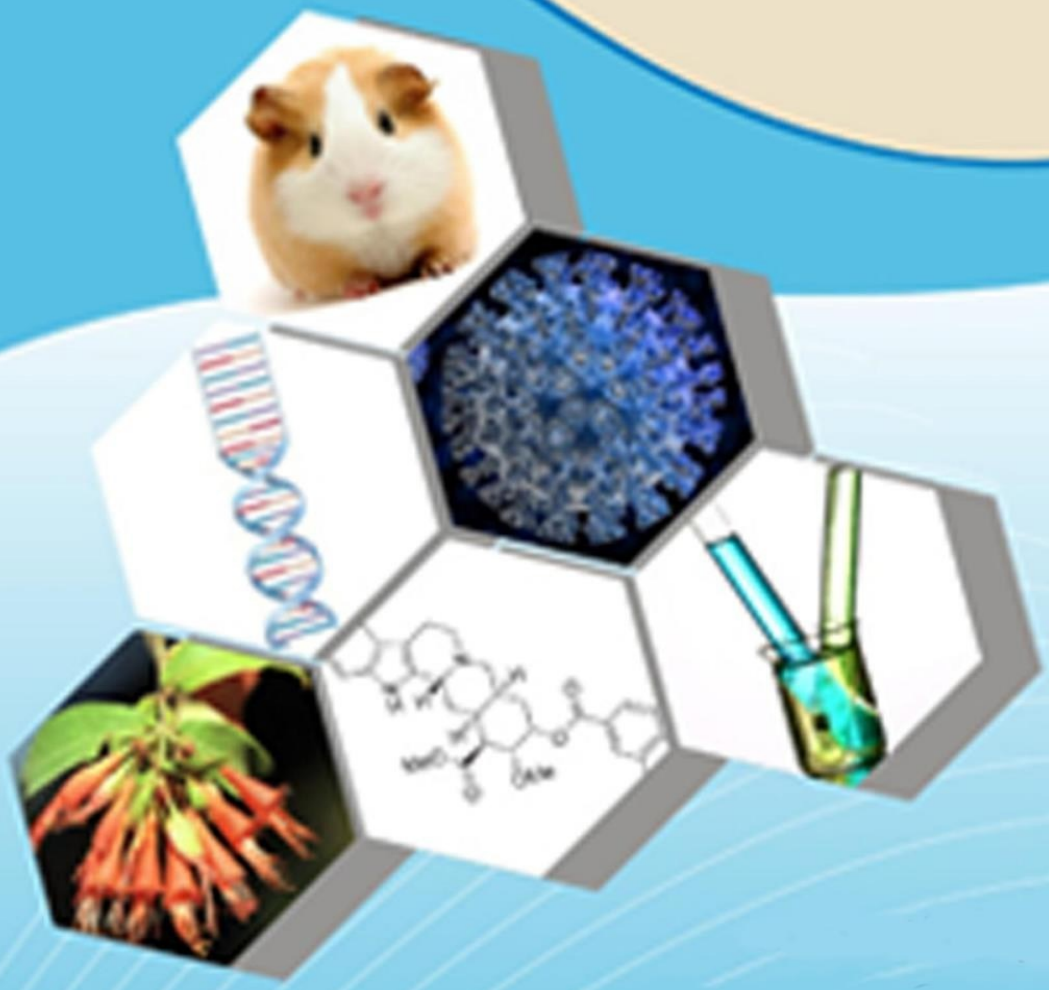
ISSN : 2347-2251

Indo-American Journal of Pharma and Bio Sciences



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Indo-Am. I. Pharm & Bio.Sc.,2024

ISSN 2347-2251 www.iajpb.com

Indo-American Journal of Pharma and Bio Sciences

Vol. 22, Issue 4, 2024

A correlation was found between the intraocular pressure and the random blood glucose level in patients who were diagnosed with primary open-angle glaucoma.

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ABSTRACT

Primary open angle glaucoma, also known as POAG, is a kind of persistent optic neuropathy that appears to be caused by multiple factors. The progressive loss of retinal ganglion cells (RGC) is the defining characteristic of this condition. This loss leads to structural damage to the optic nerve head (ONH) and the retinal nerve fiber layer (RNFL), as well as impairments in the visual field. The purpose of this inquiry was to determine whether or not there is a connection between the levels of blood glucose and the intraocular pressure in patients who were diagnosed with primary open-angle glaucoma. The investigation was carried out at the Department of Optometry Teaching Clinic at the selected teritary hospital.There were a total of 37 people that took part in the research, with 14 males and 23 females participating. The Accu Chek glucometer was utilized in order to ascertain the random blood glucose level, and the Perkins applanation tonometer was utilized in order to ascertain the intraocular pressure during the examination. According to the findings, the average intraocular pressure was measured at 16.57±3.97, and the average random blood glucose level was found to be 168.43±108.48. SPSS version 23 was used to perform the analysis of the data, and the Pearson Product Moment Correlation was utilized. Using the 0.05 level of significance and the 95% confidence interval, the coefficient suggested that there was no link between the random blood glucose level and intraocular pressure ($P > 0.05$). This was the conclusion reached by the researchers. Patients diagnosed with primary open-angle glaucoma should pay close attention to their blood glucose levels on a consistent basis, according to the recommendation.

Keywords: Intraocular Pressure, Random Blood Glucose, Primary Open Angle Glaucoma, Diabetes Mellitus

INTRODUCTION:

The progressive optic neuropathy that is a hallmark of glaucoma is characterized by the loss of retinal ganglion cells (RGCs) and chronic axonal injury. It influences the eye and is linked to an elevated intraocular pressure (IOP), which is the sole modifiable risk factor in the

management of glaucoma. Patients may progressively experience a visual field loss and even lose their sight if left untreated. It is the primary cause of irreversible vision loss and the second most common cause of blindness worldwide. In addition to visual field (VF) constriction, glaucoma is characterized by a progressive loss of retinal ganglion cells (RGC) and characteristic alterations in neuroretina rim tissue in the optic nerve head (ONH). Six This eye disease, which is a significant public health issue on a global scale, is a primary cause of irreversible blindness. Intraocular pressure (IOP) is controlled by the equilibrium between aqueous humor production and outflow, and IOP homeostasis is primarily maintained by fluctuations in aqueous humor outflow resistance. Seven IOP is influenced by a variety of factors, including non-modifiable risk factors (e.g., age, race, refraction, and central corneal thickness (CCT)) and modifiable risk factors (e.g., blood pressure (BP), physical activity, and obesity) that have been identified in epidemiological studies. Glaucomatous optic nerve damage and consequent visual field deficits may result from elevated IOP. Glaucoma disease progression is indicated by the optic disc evaluation. The optic disc is a small blind spot on the retina's surface that is made up of RGC axons. These axons undergo a significant amount of bending at the disc's surface in order to escape the eye through the lamina cribrosa. a.

MATERIALS AND METHODS

At the Department of Optometry Teaching Clinic, Selected Tertiary hospital,Madurai.Tamilnadu this clinical study was conducted out. All subjects who participated in the investigation provided informed assent. The Ethics Committee of the Selected Tertiary hospital,Madurai.Tamilnadu granted ethical sanction for the study. The study included patients who had been diagnosed with Primary Open Angle Glaucoma. The Perkins applanation tonometer was employed to measure their intraocular pressure, and the Accu Chek glucometer was employed to determine their blood glucose level.

STATISTICAL METHODS

The data obtained from the study was uploaded into the Statistical Package for Social Sciences (SPSS) version 23 software. The Pearson Product Moment Correlation Coefficient was used to test the correlation of intraocular pressure and blood glucose levels at 0.05 level of significance and 95% confidence interval.

RESULTS

This study utilized a total of 37 patients who were diagnosed with Primary Open Angle Glaucoma. The distribution of the subjects' gender and age was illustrated in Table 1. There were 14 males and 23 females. The percentage frequency of males aged 39 to 58 (middle-aged adults) was 13.51%. Both males and females exhibited the lowest frequency of 2.7% among

subjects aged 79-98. The percentage frequency of male and female subjects in the age range of 19 to 38 (young adults) was 10.81%. Table 2 displayed the mean intraocular pressure values and the frequency of intraocular pressure values within a variety of ranges. Out of the 37 patients, IOP was assessed in 70 eyes. One eye had an IOP of 26-30mmHg, three eyes had an IOP of 5-10mmHg with a mean of 9.67mmHg, and 29 eyes had an IOP of 16-20mmHg with a mean of 17.76mmHg. The mean Random Blood Glucose Levels and frequency of subjects were presented in Table 3. Three of the 21 subjects whose RBG was measured were in the lowest range of 1–100 mg/dl, with a mean random BGL of 74.33mg/dl. Two subjects were within the range of 401–500 mg/dl, with a mean random BGL of 431.50mg/dl. The remaining 14 subjects were in the range of 100–200 mg/dl, with a mean fasting BGL of 132.57mg/dl. The descriptive statistics values for intraocular pressure and IOP were presented in Table 4. The range between the minimum and maximum IOP values was 17mmHg, with a minimum of 9mmHg and a maximum of 26mmHg. The mean was 16.57mmHg and the standard deviation was 3.97mmHg. Twenty-one subjects were assessed for their random blood glucose levels. The range was 416mm/dl, with a minimum value of 42mg/dl and a maximum value of 458mg/dl. The standard deviation was 108.48mg/dl, and the mean was 168.43mg/dl. The correlation between RBG and IOP was tested using the Pearson Product Moment Correlation Coefficient at a 0.05 level of significance and a 95% confidence interval in the SPSS data analysis presented in Table 5. It demonstrated a Pearson correlation of -0.076 and a P value of 0.745. A correlation between the IOP and the RBG levels was not observed (P>0.05) among the subjects.

Table 1: Age and Gender Distribution of Subjects

Age (Years)	Male		Female		Total	
	n	%	n	%	n	%
19 – 38	4	10.81	4	10.81	8	21.62
39 – 58	5	13.51	12	32.43	17	45.95
59 – 78	4	10.81	6	16.22	10	27.03
79 – 98	1	2.70	1	2.70	2	5.41
TOTAL	14	37.84	23	62.16	37	100.00

Table 2: Intraocular Pressure Distribution of Subjects

IOP (mmHg)	n	Mean (mmHg)
5 – 10	3	9.67

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11 – 15	26	13.19
16 – 20	29	17.76
21 – 25	11	22.45
26 – 30	1	26.00
Total	70	

Table 3: Distribution of Random Blood Glucose Level of Subjects

Random BGL (mg/dl)	**n**	**Mean (mg/dl)**
1 – 100	3	74.33
101 – 200	14	132.57
201 – 300	1	242.00
301 – 400	1	353.00
401 – 500	2	431.50
Total	21	

Table 4: Descriptive Statistics for Intraocular Pressure and Random Blood Glucose Levels

Variable	**n**	**Range**	**Min**	**Max**	**Mean**	**S.D**
IOP (mmHg)	70	17	9	26	16.57	3.97
RBG (mg/dl)	21	416	42	458	168.43	108.48

n = number; IOP = Intraocular Pressure, Min = Minimum, Max = Maximum, S.D. = Standard Deviation

Table 5: SPSS data analysis result showing P value for testing of correlation

Variables	**Pearson Correlation**	**P-value**
RBG - IOP	-0.076	0.745

DISCUSSION

The results of the research suggested that there was no association between the levels of blood

glucose in the blood and the intraocular pressure of the subjects (P>0.05). As age proceeded, there was a progressive increase in intraocular pressure (IOP) as evidenced by the mean IOP for the various age categories. There is a substantial correlation between increased intraocular pressure (IOP) levels and the presence of primary open-angle glaucoma. The prevalence of glaucoma grows with age, according to the findings of a study that looked at the relationship between diabetes and intraocular pressure. However, the same experiment also showed that there was no association between age and intraocular pressure (IOP). Female individuals had a mean intraocular pressure (IOP) value of 17.51mmHg, whereas male subjects had a mean IOP value of 14.88mmHg. The results of our study showed that female subjects had higher IOP values than male subjects. In spite of the fact that Khalaj et al. demonstrated that there was no significant difference in mean intraocular pressure (IOP) between the sexes of diabetic and non-diabetic patients, Khachatryan et al. assert that the male gender was significantly associated with the risk of Primary Open-Angle Glaucoma among Indians aged 35 and older. A study on genetically predicted fasting blood glucose levels provides evidence for a causative role for genetically determined fasting blood glucose levels in the development of high intraocular pressure (IOP). Those patients who do not have diabetes but have elevated fasting blood sugar levels should have their intraocular pressure (IOP) taken into consideration. The presence of increased intraocular pressure (IOP) levels, which are also the source of ocular hypertension, is a strong predictor of primary open-angle glaucoma because of its predictive power. Choi et al. [23] conducted a study to investigate the connection between fasting glucose levels and the risk of Open-Angle Glaucoma. The findings of this study revealed that individuals with the highest fasting blood glucose levels (>= 160mg/dL) exhibited a higher hazard ratio (HR 2.189) and a correlation (P < 0.001) for Open-Angle Glaucoma in comparison to those with the lowest levels (< 80mg/dL) for both non-diabetic patients and patients with type 2 diabetes. This is in direct contradiction to the findings of our study, and it is probable that none of the people who participated in our study documented blood glucose levels that were as high as these. Additional characteristics, such as hypertension, smoking, drinking, and exercise behaviors, as well as body mass index (BMI), were not taken into consideration by us. During the process of evaluating the first hypothesis, the statistical analysis revealed a Pearson correlation value that was negative (-0.076), which indicated that there is an inverse association between intraocular pressure and blood glucose levels, and vice versa. The negative number, which was closer to zero, demonstrated that the association was not substantial. This was proved by the data.

The only risk factor that can be treated for POAG at the moment is increased intraocular pressure (IOP), which has also been proven as an independent risk factor. There are a great number of other risk variables that are implicated in the pathogenesis of glaucoma, and intraocular pressure (IOP) is not the only risk factor that might increase a patient's risk of peripheral oxidative glaucoma (POAG). Myopia, central corneal thickness (CCT), ocular perfusion pressure, intracranial pressure (ICP), translamina cribrosa pressure gradient, diabetes, systemic blood pressure, ocular blood flow, vascular dysregulation, genetic factors, and age are some of the additional factors that have been shown to be associated with the development of ocular abnormalities of the eye (POAG).Despite the fact that gender and ethnicity are acknowledged as factors that modify the relative risk for POAG, the extent to which these factors influence an individual's risk has not yet been defined. Multiple investigations have shown that diabetic people with glaucoma have a more strong vascular component in their progression of glaucomatous disease compared to patients with POAG who do not have diabetes. It has been proven that diabetes has an effect on anatomical and hemodynamic parameters that are associated with the flow of blood to the eyes. A strong link was found between the ONH (such as rim volume, cup to disc area ratio, rim area, cup area, cup shape, and linear c/d ratio) and changes in inferior retinal blood flow in patients with POAG who had diabetes over a period of four years. Additionally, after four years, there was a significant correlation between the changes in macular thickness in these patients and the changes in retinal blood flow. The implication of this is that people with POAG who also have diabetes may have a more severe vascular component to their glaucomatous structural impairment. The degradation of the retinal nerve fiber layer (RNFL) and macula in patients with polycystic ovary syndrome (POAG) who also had diabetes mellitus was found to have a strong correlation with alterations in vascular resistance.In a study that was carried out by Amato and colleagues, the DBA/2J mice (D2) model of glaucoma was utilized in order to evaluate the influence that diabetes has on the early evolution of glaucomatous RGC dysfunction prior to the elevation of intraocular pressure (IOP). Diabetes and the passage of time did not appear to have any impact on intraocular pressure (IOP), according to the findings. The D2 group, on the other hand, had a gradual decrease in RGC activity that was not affected by an increase in intraocular pressure (IOP) or by malfunction in the outer retina.

CONCLUSION

In summary, the results of this investigation demonstrated that there was no substantial correlation between intraocular pressure and random blood glucose levels in patients with

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Primary Open-Angle Glaucoma who were enrolled in the Optometric Teaching Clinic at the Federal University of Technology in Owerri, Imo State, Nigeria. Nevertheless, it was advised that patients with Primary Open Angle Glaucoma have their blood glucose levels measured.

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