http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v8i11.62

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Research Article

A Study on Abnormalities of Lipid Profile in relation to primary open angle glaucoma in type-2 Diabetes mellitus

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Abstract

Introduction: *In developing countries like INDIA the prime source of irrevocable visual impairment mainly because of an age related chronic disorder Primary open-angle glaucoma (POAG). It is well known that POAG associated with Type 2 diabetes and hypertension patients.*

Aim and Objective: *This study aimed to assess the biochemical study in Type-2 Diabetes mellitus primary open angle glaucoma patients as compared to normal controls.*

Material and Methods: *A total of 200 patients, 100 Type-2 Diabetes mellitus Primary open-angle glaucoma patients with Diabetes and 100 diabetes without POAG from the last one year and 100 normal healthy individuals were chosen as a control group.*

Results: *The mean values of FBS, HbA1c were significantly increased (P<0.0001) in type -2 Diabetes mellitus Primary open-angle glaucoma cases as compared to normal healthy individuals. Other mean values TC, TG, LDL significantly increased (P<0.0001) in type -2 Diabetes mellitus Primary open-angle glaucoma patient as compared to controls. Whereas the mean value of HDL was significantly decreased in type -2 Diabetes mellitus Primary open-angle glaucoma patient as compared to controls.*

Keywords: *Primary open-angle glaucoma, FBS, HbA1c, and lipid profile, Type – 2 diabetes mellitus.*

Introduction

The primary cause of blindness in developing countries like especially in India because of Glaucoma which is a continuous optic neuropathy disorder[1]. The exact causes of glaucoma so far unknown but oxidative stress seem to have a key role in this continuous ongoing neuropathy leading to optic nerve damage[2-4].

POAG is known to be associated with diabetes mellitus (DM) type 2 and hypertension. Diabetes

and hypertension are linked to high lipid levels (dyslipidaemia and insulin resistance being interrelated) and high lipid levels cause atherosclerotic changes leading to Hypertension. Thus there is possibility that glaucoma is indirectly related to serum lipid levels.[5]

Lipid peroxidation leading to oxidative stress may directly damage trabecular meshwork and endothelium of blood vessels supplying optic nerve head or atherosclerotic changes due to high cholesterol level may affect ocular perfusion.[5, 6]

Recent epidemiologic studies have suggested that hyperlipidaemia may be associated with glaucoma. For instance, the study by Lin and colleagues, which used the National Health Insurance Database, indicated that hyperlipidaemia increases the odds of developing Primary open-angle glaucoma.[7] The present study attempts to establish a relation between serum lipids and its components with POAG.

Materials and Methods

The present study was carried out in the Department of Biochemistry and collaboration with the Department of Ophthalmology at Index Medical college hospital and Research Centre, Malwanchal University, Indore. The study was approved by the Institutional Ethical and Research Committee to use human subjects in the research study. Informed consent was taken from patient and control subjects. 200 Patient were included in the study they were divided into two groups. 100 of POAG with diabetes and 100 diabetes patient without POAG age group 35-85 both genders attending the Ophthalmology ward of the Hospital for the last one year have been included in this study as compared to 100 healthy control groups. Inclusion criteria- Normal subject has normal fasting blood glucose level with no history of diabetes. Diagnose Diabetes person having POAG without any other diseases. In exclusion criteria- Patient with ocular surgery, Patients having Pancreatitis, Infection of inflammation of eye, evidence of renal or hepatic diseases, Autoimmune disorder and carcinomas were excluded from the study

Collection of Blood Sample

Approximately 3 -5 ml of venous blood wad collected From the antecubital vein by sterile needle in vacutainer tube. Once the blood clot is formed, the separation of serum was carried out by centrifuge process for 10 min in 3000 rpm and stored in -20^0c until analysis. By this sample estimation of FBS, HbA_1C and serum lipid profiles were done by the following methods.

Estimation of Glycated haemoglobin by Nephelometry, estimation of Serum Fasting blood glucose,

Method: Glucose Oxidase and Peroxidase (GOD – POD) Method [8].

Serum lipid profiles were measured by:

Estimation of Serum Triglycerides[9].

Method: Glycerol Peroxidase (GPO) Kinase, Glycerol Oxidase Method.

Estimation of Serum cholesterol[10].

Method: Cholesterol Oxidase and Peroxidase (CHOD-POD) method.

Estimation of Serum HDL cholesterol[11].

Method: Direct Method.

Serum LDL Cholesterol[12].

Method: Direct method.

Statistical Analysis: Data were compiled and analyzed using by t-tests (student t-test) software package. It was expressed as mean ± S.D. (standard deviation).

Results

Table No 1: Showing mean age of Cases, Diabetes without (POAG)and Controls

Subject	Age Years Mean & SD (n = 100)	Maximum	Minimum	Median	*p*-value
Controls	47.61 ± 6.05	64	38	47	P<0.001
DM without POAG	55.87 ± 8.53	70	36	55.5	
POAG with DM	59.73 ± 6.56	70	45	59	

Table No: 2: Gender-wise distribution of patients Diagnose POAG with DM, Diabetes without (POAG) and controls.

Sex	Control		DM without POAG		POAG with DM	
	NO.	%	NO.	%	No	%
Male	68	68%	58	58%	60	60 %
Female	32	32%	42	42%	40	40 %
Total	100	100%	100	100%	100	100 %

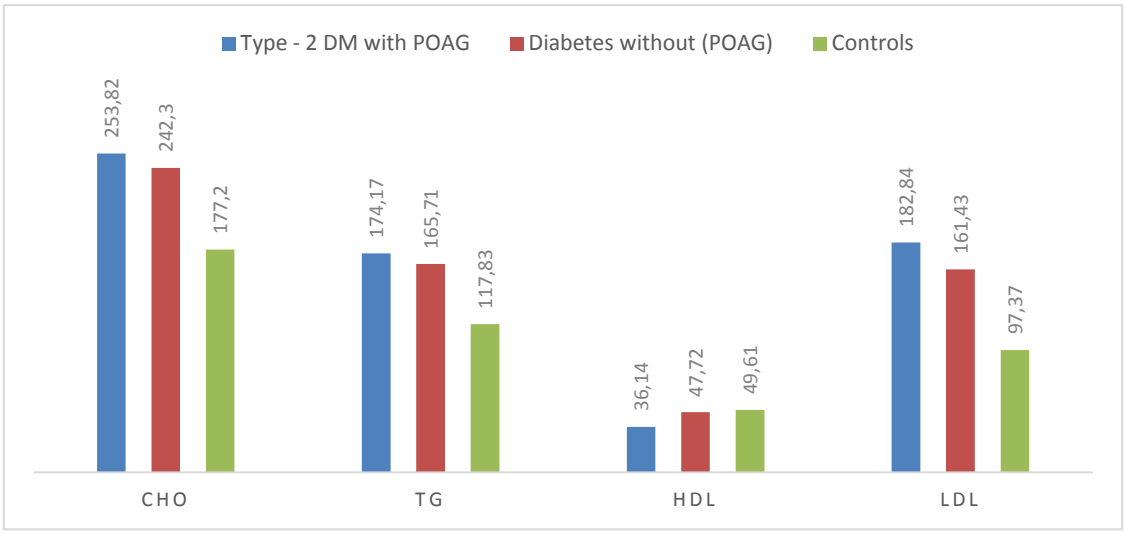
Table No: 3: Comparison of mean blood glucose and HbA1clevel among diabetics with POAG, Diabetes without (POAG)and Controls .

Parameters	Diagnosis			p value
	Type 2 Diabetics with POAG	Diabetes without(POAG)	Controls	
FBS	187.96 ± 44.92	145.40 ± 24.36	91.63± 8.07	P < 0.001
HbA1c	8.28± 1.98	7.06± 0.70	5.03 ± 0.43	P < 0.001

Table No:4: Comparison of mean values for lipid profile parameters in POAG with DM,Diabetes without POAGand Controls.

Parameters	Type - 2 DM with POAG	Diabetes without (POAG)	Controls	P value
CHO	253.82 ± 26.35	242.30 ± 34.18	177.2 ± 18.41	P<0.001
TG	174.17 ± 15.21	165.71 ± 17.64	117.83 ± 16.08	P<0.001
HDL	36.14 ± 6.64	47.72 ± 7.58	49.61 ±2.83	P< 0.02
LDL	182.84 ± 24.32	161.43 ± 34.16	97.37 ± 19.25	P<0.001

Figure No 1: shows for lipid profile parameters in POAG with DM, Diabetes without POAG and Controls.



P<0.01 Statistical Significant, P<0.001 Highly statistically significant, P<0.0001 extremely statistically significant.

Discussion

Clinical parameters of the study population. Fasting blood glucose and HbA1c levels were significantly high in POAG patients than control group[13].Diabetes Mellitus occurs more often in patients with Primary Open Angle Glaucoma than in non-glaucomatous populations. Similarly, Glaucoma is more prevalent in diabetic than in non-diabetic population[14].

I have reported that Age group mean value of Type – 2 DM. Primary open angle glaucoma, Diabetes without (POAG), 59.73 ± 6.56, 55.87± 8.53 and control 47.61 ± 6.05statistically significant. Table no.1 our result correlated well with finding showed by NR. Hazari et al[13], Channabasappa S. et al[15], Desai A[17].

In our study we observed significantly increased levels of Fasting blood glucose and HbA1c levels

Type 2 Diabetics with POAG, Diabetes without (POAG), as compared to controls groups ($p< 0.001$) and decreased HDL levels in Type-2 DM with POAG as compared to controls.table no 3. Our study correlated with NR. Hazari et al[13], Channabasappa S. et al[15], Desai A[18].

Various literatures showed the risk factors that involve in development of POAG, one such risk factor is hyperlipidaemia. The strong relation between hyperlipidaemia and POAG has been mentioned by numerous studies. One of the reason behind oxidative stress is lipid peroxidation which can damage the blood vessels of optic nerve. The other possible reason might be abnormalities in cholesterol transport causing atherosclerotic changes finally effecting perfusion in eye. Excess lipid accumulation in ocular blood vessels decreases the episcleral venous pressure resulting diminished outflow. LDL fraction of Cholesterol plays a key role in glaucoma. With the above we can say that pathogenesis of glaucoma interlinked with hypertension and dyslipidemia[7].

In our study we observed significantly increased levels of TC, TG, LDL levels in Type-2 DM with Primary open angle glaucoma, Diabetes without (POAG) as compared to the controls groups ($p<0.001$). Whereas the mean value of HDL was significantly decreased in type -2 Diabetes mellitus Primary open-angle glaucoma patient, Diabetes without (POAG) as compared to controls. Table no 4. Our study correlated with Asceric M. et al,. (2009)[16],Raffaella et al., (2018)[17].

Another study finds out that in patients with higher values of total cholesterol, particularly atherogenic LDL fraction, may have certain influence in diagnosed glaucoma. In this study, serum lipid values were similar in both groups for triglycerides, HDL and LDL lipoproteins but cholesterol values were significantly higher in the POAG group[16].

Conclusion

At last, after this we can conclude that type - 2 diabetes mellitus POAG cases showed disturbed FBS, HbA_1c, lipid profile which may be responsible for various and after this observation we can suggest that early lipid profile investigation is a must in diabetes mellitus type – 2 POAG patients. For better diagnosis and prognosis, these treatments of dyslipidaemia can provide a potential preventing strategy for primary open angle glaucoma.

Acknowledgements

The authors are grateful to the Management, Malwanchal University, Index Medical college hospital and Research Centre, Malwanchal University, Department of Ophthalmology, Biochemistry and Hospital for providing the necessary arrangement in conduction of the study. And special thanks to my guideDr. Shreya Nigoskar, Professor & HOD, Department of BiochemistryIndex Medical college hospital and research Centre& Professor Dr.Suresh Babu.K, Department of Biochemistry SMCW for their timely guidance and help in preparation of the manuscript.

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