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DETERMINATION OF SERUM CHOLESTEROL, TG, HDL-C AND LDL-C CONCENTRATIONS IN PATIENTS WITH DIABETIC RETINOPATHY THAT REFERRED TO INDIRA GANDHI INSTITUTE OF MEDICAL SCIENCES, PATNA DURING 2017-2018.

Biochemistry

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ABSTRACT

The study enrolled total 400 subjects: 200 subjects having diabetes mellitus (DM) without retinopathy as controls and 200 subjects having diabetic retinopathy (DR) as cases. Fasting plasma sugar, Total Cholesterol (TC), TG, HDL, LDL & HbA1c, was done for each patient. Statistically significant positive correlation between severity of DR with TC P=0.000(r =0.972), LDL P = 0.000(r = 0.874), TG P = 0.000(r =0.917), was documented. DR was also strongly positively correlated with duration of diabetes P = .00001. There was strong inverse correlation of DR with HDL P = 0.001(r = -0.728). Serum lipids were significantly correlated with severity of DR.

KEYWORDS

Diabetes Mellitus, Diabetic retinopathy, fasting blood sugar, low density lipoprotein

INTRODUCTION

Diabetic patients are prone to developing microangiopathy, clinically manifested as diabetic nephropathy, neuropathy and retinopathy (American Diabetes Association, 2003). In developed countries, DR is the leading cause of vision loss in adults of working age (Jung, 2004). DR currently affects almost 100 million people worldwide and is set to become an ever-increasing health burden, with estimates between 1990 and 2010 showing that DR-related visual impairment and blindness increased by 64% and 27% respectively (Leasher,2016). Early identification and treatment are key priorities for reducing the morbidity of diabetic retinopathy DR. Population and family studies have shown the pathogenesis of DR due to the interaction of several environmental, nutritional, and genetic risk factors (Newfield, 1997). It has been demonstrated that atherogenic lipoproteins, such as total cholesterol, LDL cholesterol, oxidized low density lipoprotein, and triglycerides are associated with progression of retinopathy, and the development of macular oedema (Orchard, 1990; Davis, 1998; UÇgun, 2007). DR falls into 2 broad categories: the earlier stage of nonproliferative diabetic retinopathy (NPDR) and the advanced stage of proliferative diabetic retinopathy (PDR). Classification of NPDR is based on clinical findings manifested by visible features, including microaneurysms, retinal hemorrhages, intraretinal microvascular abnormalities (IRMA), and venous caliber changes, while PDR is characterized by the hallmark feature of pathologic preretinal neovascularization(Stitt,2016).

Review of Literature

DR is the most common complication of DM and is a leading cause of blindness among working-age people worldwide (Whiting, 2011).Globally, it has been estimated that about 30% of people with DM have DR (Zheng, 2012). Park et al. reported that overall prevalence of any DR was 19%, and the prevalence of vision threatening DR was 5%. The presence of DR is strongly related to the duration of diabetes. In the Seoul Metropolitan City-Diabetes Prevention Program study, participants with duration of 10 years or greater, retinopathy was found in 55.2% compared with 12.6% in those with diabetes for a duration of 10 years or less (Park, 2012). In addition, there was an approximate 3-fold increase in vision-threatening DR in those who had diabetes for 10 years or more compared with those with diabetes for 10 years or less (Klein, 2008). Diabetic retinopathy is considered as the disease of eye associated with diabetes. It is caused by the blood vessels changes in the retina. After these blood vessels get damaged, the leaking of blood may occur resulting in the growth of fragile new vessels. These changes of cell damage leads to the impairment of vision. These changes can result in blurring of the vision, hemorrhage into the eye, or, if untreated, retinal detachment can also take place (Grunwald, 2012). Microaneurysms, Retinal edema and hard exudates, Cotton-wool spots, Dot and blot hemorrhages, Macular edema are some of the related causes of Diabetic retinopathy. Fluorescein angiography, Optical coherence tomography scanning and B-scan ultrasonography are the preferred diagnosis for Diabetic retinopathy. This is further classified as mild, moderate and severe depending on the presence of various deciding factors (Simó, 2009). Maintaining a regular exercise and a healthy diet, keeping blood sugar within the normal limits and the prescribed medications can be opted in the day to day life to prevent diabetic retinopathy (Ministry of Health Malaysia, 2011).

MATERIALS AND METHODS

This cross-sectional comparative study was conducted in the department of Biochemistry in collaboration with the department of Ophthalmology at IGIMS, Patna from April'2017' to November '2018'. After approval by the hospital ethical review committee, informed written consent was taken from all subjects and details of procedure were explained to them in the local language prior to inclusion in the study. The present study enrolled total 400 subjects: 200 subjects having diabetes without retinopathy as controls and 200 subjects having diabetic retinopathy (DR) as cases.

Fasting plasma sugar, Total cholesterol (TC) low density lipoprotein (LDL), triglyceride level (TG), high density lipoprotein (HDL) and glycated hemoglobin (HbA1c) was done for each patient. Patients were divided in five groups according to retinopathy status based on early treatment DR study (ETDRS) disease severity level (ETDRS, 1991). Statistical analysis was performed with Statistical Packages for Social Sciences (SPSS) statistical software (version 17.0 for Windows).

RESULTS

The study enrolled total 400 subjects: 200 subjects had diabetes without retinopathy as controls and 200 subjects had diabetic retinopathy (DR) as cases. Out of 200 subjects of DR, 141(51.1%) were male and 59 (47.6 %) were female as shown in figure 1.There was statistically significant positive correlation between severity of DR with TC P=0.000(r = 0.972), LDL P = 0.000(r = 0.874), TG P = 0.000(r = 0.917).There was strong negative correlation of DR with HDL P = 0.001(r = - 0.728) The results are summarized in Table1 and figure2.

Table 1 Level of Serum lipid profile (TC, TAG, HDL, LDL, VLDL) in Cases & control group.

Lipid Profile	Group	Mean ± S.D	P Value(sig-2 tailed)	r- value
TC	Case	231.7 ±29.41	.000	0.972
	Control	184.05 ± 13.15		

TAG	Case	231.15 ±22.33	.000	0.917
	Control	171.02± 6.11		
HDL	Case	31.62 ±2.01	.000	-0.782
	Control	42.25 ± 1.81		
LDL	Case	127.32 ± 20.36	.000	0.874
	Control	92.53 ± 4.63		
VLDL	Case	45.97 ± 4.17	.000	0.732
	Control	34.2 ± 1.22		

Table 1

Table 1 shows there is statistically significant change from case Serum Lipid Profile TC, TAG, HDL, LDL, VLDL and control group TC, TAG, HDL, LDL, VLDL. The result is significant at P < .05.

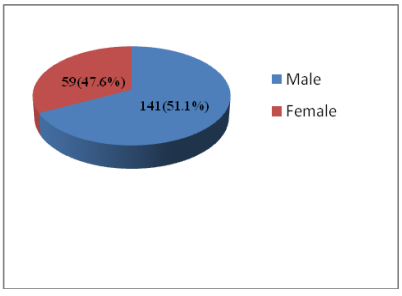

Figure 1. Gender wise distribution in cases.

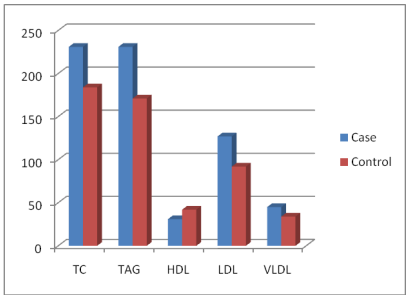

Figure 2. Level of Serum lipid profile (TC, TAG, HDL, LDL, and VLDL) in Cases & control group.

DISCUSSION

In this study there was a significant correlation between serum lipid and severity of DR, which is similar to the study of Ozera et al. in 2009. In a study conducted in Australia, the incidence of retinal damage has been augmented with increasing duration of diabetes. In this investigation, it has been shown that the prevalence of DR has been less than 10% in patients with less than five years of diabetes onset to more than 50% in patients with 20 or more years of duration of diabetes Tapp et al. in, 2003. There was strong negative correlation of DR with HDL, which is similar to the study of Agroiya et al. in.

CONCLUSION

Serum total cholesterol, LDL-C and TG levels were significantly elevated and serum HDL-C level was decreased in patients with DR indicating a need to promptly address these modifiable risk factors in order to reduce the morbidity related to DR.

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