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Evaluation of Lipid Disorders in Diabetic Patients: Study in a Tertiary Care Hospital, Cumilla, Bangladesh

Dr. Ganesh Chandra Haldar Saurav[1*], Dr. Ajit Kumar Paul[2], Dr. Ripon Chandra Majumder[3]

[1]Assist professor, Department of Medicine, Mainamoti Medical College & Hospital, Cumilla, Bangladesh
[2]Asssociate professor, Department of Endocrine and Metabolism, Mainamoti Medical College & Hospital, Cumilla, Bangladesh
[3]Assist Professor, Department of Nephrology, Eastern Medical College& Hospital, Cumilla, Bangladesh

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***Corresponding author:** Dr. Ganesh Chandra Haldar Saurav

Abstract **Original Research Article**

Background: Lipid disorder is one of the common disorders which is seen in most of the diabetes patients that causes cardio vascular disorders. The incidence of coronary artery diseases is 3 to 5 times higher in diabetic patients compared to general population. Although this has been demonstrated for the Caucasian population few data are available for Asian Indians. Individuals with diabetes may have several forms of dyslipidemia leading to additive cardiovascular risk of hyperglycemia. **Aim of the study:** The aim of this study was to evaluate the levels of lipid disorder among diabetic patients in Bangladesh. **Methods:** This was a prospective cross-sectional study conducted in the Department of Medicine, Mainamoti Medical College &Hospital, Cumilla, Bangladesh during the period from January 2020 to July 2020. Eighty eight (88) diabetic patients were enrolled as case group participants whereas 16 healthy people of similar ages were included in control group. This study was approved by the ethical committee of the mentioned hospital. Proper written consents were taken from all the participants before starting data collection. A pre-designed questionnaire was used in patent data collection. The serum total cholesterol, HDL-cholesterol and triglycerides were assayed in patients and controls, using standardized assay methods. All data were processed, analyzed and disseminated by MS Office and SPSS version as per need. **Result:** In this current study, in analyzing the comparative statuses of lipid profile we observed, the mean (±SD) TC (mg/dl) of case and control group participants were 208.9±54.6 and 257.4±103.4 respectively where we found significant correlation between the groups (P=0.006). We did not find any correlation between the groups in analyzing TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) analyzing. In case group the mean (±SD) TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) level were found 216.4±306.0, 39.2±11.0 and 114.8±47.4 respectively. On the other hand, in the control group the mean (±SD) TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) level were found 222.9±124.0, 39.8±6.2 and 122.4±46.3 respectively. **Conclusion:** In this current study, in analyzing the comparative statuses of lipid profile we found significant correlation between the groups of diabetic and non-diabetic patients. Although in analyzing other components of lipid we did not get any significant correlation between the groups, we think lipid profiling may be a potential predictor of diabetic patient screening.

Keywords: Lipid disorder, Diabetic patients, Endocrinology, Metabolic syndrome.

INTRODUCTION

Lipid disorder is one of the common disorders which is seen in most of the diabetes patients that causes cardio vascular disorders. The incidence of coronary artery diseases is 3 to 5 times higher in diabetic patients compared to general population. Although this has been demonstrated for the Caucasian population few data are available for Asian Indians. Individuals with diabetes may have several forms of dyslipidemia leading to additive cardiovascular risk of hyperglycemia. Diabetes Mellitus (DM) is a group of metabolic diseases characterized by increase blood glucose level resulting from defects in insulin secretion, insulin action, or both [1]. The prevalence of diabetes is in rising faze and more alarmingly in the developing nations. Diabetes mellitus is ranked 7th among leadingcauses of death & has been rated 3rd when all its fatal complications are taken in account. Generally, patients with type-2 diabetes have increased risk of cardiovascular disease as well as atherogenic dyslipidemia. Coronary artery disease, especially myocardial infarction is the leading cause of morbidity and mortality worldwide [2]. Hyperglycemia and

atherosclerosis are related in type-2 diabetes [3]. On the other hand, multiplying the risks of coronary artery diseases, diabetes enhances incidences of cerebrovascular strokes also. It is considered as the leading cause of acquired blindness& accounts for more than 25% cases with end stage renal diseases and 50% non-traumatic lower limb amputations. Being a pan metabolic disorder, diabetes is characterized by alteration in lipid profile, both quantitative & qualitative. Hyperglycemia causes glycosylation of all proteins, especially collagen cross linking and matrix proteins of arterial wall. This eventually causes endothelial cell dysfunction that contribute further atherosclerosis. The prevalence of dyslipidemia in diabetes mellitus is 95% [4]. The dyslipidemia is a major risk factor for Coronary Heart Disease (CHD) [5]. The cardiovascular disease is a cause of morbidity and mortality in patients with diabetes mellitus because of disturbance in lipoproteins i.e. serum triglycerides (TC) 69%, serum cholesterol 56.6%, Low- Density Lipoprotein cholesterol (LDL) 77% and High Density Lipoprotein cholesterol (HDL) 71% [6]. In uncontrolled diabetes, serum triglycerides, very low-density lipoproteins, cholesterol are raised both at fasting as well as following fixed meal. In post mixed meal chylomicrons remnants and low-density lipoproteins remain high for longer period than the normal. Total cholesterol and low-density lipoproteins (LDL) are mild to moderate high in 1/3 patients. On other hand High Density Lipoprotein cholesterol (HDL) remain significantly low particularly in type-2 diabetes patients with central obesity. Among changes in composition of lipoproteins high proportion of small, dense triglyceride rich LDL and glycoxidation products of low-density lipoproteins are considered to be most atherogenic. Age adjusted incidence of coronary artery diseases is 3 to 5 times higher in both male and female diabetics compare to general population. Patients with diabetes may have several forms of dyslipidemia leading to additive cardiovascular risk of hyperglycemia. So, lipid abnormalities should be aggressively detected and treated as a part of comprehensive diabetic care.

OBJECTIVES

General Objective

- To analyze the comparative status of lipid profile of both the case and control group participants.

Specific Objective

- To collect information regarding demographic status of the participants.
- To collect information regarding the comorbidities of case group participants.

METHODS

This was a prospective cross-sectional study which was in the Department of -Medicine, Mainamoti Medical College &Hospital, Cumilla, Bangladesh during the period from January 2020 to July 2020. In total 88 diabetic patients were enrolled as case group participants whereas 16 healthy people of similar ages were included in control group. This study was approved by the ethical committee of the mentioned hospital. Proper written consents were taken from all the participants before starting data collection. A pre-designed questionnaire was used in patent data collection. The serum total cholesterol, HDL-cholesterol and triglycerides were assayed in patients and controls, using standardized assay methods.The detail history was taken; relevant clinical examination and all routine investigations were performed. As per the excluding criteria of this study pregnant women, severely ill patients, patients with more than three serious morbidity were excluded. Patients with un-authentic documentation and incomplete data were also secluded before starting analyzing. Every patient was advised for at least 12-14 hours overnight fasting and the 5ml venous blood sample were collected in a disposable syringe on next morning (before breakfast) for the serum lipid profile and fasting blood sugar (for the assessment of blood glucose level). The lipid profiles were evaluated. The known cases of type 2 diabetes mellitus were also evaluated for their blood sugar (control or un-control) by advising the HbA1C level. All data were processed, analyzed and disseminated by MS Office and SPSS version as per need.

RESULT

In this study in case group among 88 participants 17.05%, 63.64% (Highest) and 19.32%patients were from 21-40, 41-60 and >60 years' age groups respectively. On the other hand, in control group among 16 participants 50.00% (Highest) 37.50% and 12.50% were from 21-40, 41-60 and >60 years' age groups respectively. The mean (±SD) ages of the case and control group patients were 49.29 ± 16.16 and 42.22 ± 14.34 years respectively. In the case group, 44% (n=39) participants were male whereas 56% (n=49) participants were female. So female was dominating in number and the male-female ratio was 1:1.26. As per the distribution of comorbidities among case group participants we observed, dyslipidemia, hypertension (HTN), ischemic heart disease (IHD), B. Asthma, chronic kidney disease (CKD), hypothyroid, urinary tract infection) UTI, chronic obstructive pulmonary disease (COPD), diabetic peripheral neuropathy (DPN), ischemic cardiomyopathy (ICM), benign prostatic hyperplasia (BPH), coronary artery disease (CAD) and left ventricular failure (LVF) were associated among 37.50% (Highest), 36.36%, 31.82%, 9.09%, another 9.09%, 7.95%, 5.68%, 4.55%, 3.41% another 3.41%, 2.27%, another 2.27% and another 2.27% diabetic patients respectively. In this current study, in analyzing the comparative statuses of lipid profile we observed, the mean (±SD) TC (mg/dl) of case and control group participants were 208.9±54.6 and 257.4±103.4 respectively where we found significant correlation between the groups (P=0.006). We did not find any correlation between the groups in

analyzing TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) analyzing. In case group the mean (±SD) TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) level were found 216.4±306.0, 39.2±11.0 and 114.8±47.4 respectively. On the other hand, in the control group the mean (±SD) TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) level were found 222.9±124.0, 39.8±6.2 and 122.4±46.3 respectively.

Table-1: Age distribution of participants (n=104)

Age (Year)	Case (n=88)		Control (n=16)	
	n	%	n	%
21-40	15	17.05	8	50.00
41-60	56	63.64	6	37.50
>60	17	19.32	2	12.50
Total	88	100	16	100
Mean ± SD	49.29 ± 16.16		42.22 ± 14.34	
P value	0.105			

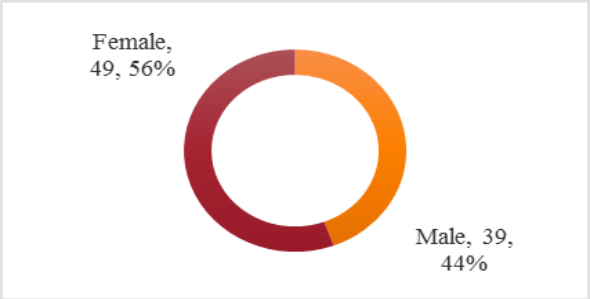

Fig-1: Gender distribution of case group participants (n=88)

Table-2: Distribution of comorbidities among case group participants (n=88)

Comorbidity	n	%
Dyslipidemia	33	37.50
Hypertension (HTN)	32	36.36
Ischemic heart disease (IHD)	28	31.82
B. Asthma	8	9.09
Chronic kidney disease (CKD)	8	9.09
Hypothyroid	7	7.95
Urinary tract infection) UTI	5	5.68
COPD	4	4.55
Diabetic peripheral neuropathy	3	3.41
Ischemic cardiomyopathy (ICM)	3	3.41
Benign prostatic hyperplasia (BPH)	2	2.27
Coronary artery disease (CAD)	2	2.27
Left ventricular failure (LVF)	2	2.27

Table-2: Lipid profile analysis between case and control groups (n=104)

Lipid profile	Case (n=88) Mean±SD	Control (n=16) Mean±SD	P-value
TC (mg/dl)	208.9±54.6	257.4±103.4	0.006
TG (mg/dl)	216.4±306.0	222.9±124.0	0.934
HDL (mg/dl)	39.2±11.0	39.8±6.2	0.833
LDL (mg/dl)	114.8±47.4	122.4±46.3	0.694

DISCUSSION

The aim of this study was to evaluate the levels of lipid disorder among diabetic patients in Bangladesh. Basically, this was a prospective cross-sectional study in nature. In total 88 diabetic patients were enrolled as case group participants whereas 16 healthy people of similar ages were included in control group. Now it is known to all treatment professionals that, diabetes is associated with a greater risk of mortality from cardiovascular disease (CVD) which is well known as dyslipidemia, which is characterized by raised triglycerides, low high-density lipoprotein (HDL) and high small dense low-density lipoprotein (LDL) particles [7]. It may be present at the diagnosis of type 2 Diabetes mellitus and is acomponent of the metabolic syndrome. Abnormal serum lipids are likely to contribute to the risk of coronary artery disease in diabetic patients [8]. Lipid abnormalities are very common in diabetics and frequently seen in type-2 diabetics. Dyslipidemias make diabetics prone to develop coronary heart diseases (CHD) and other complications of atherosclerosis.In this current study, in analyzing the comparative statuses of lipid profile we observed, the mean (±SD) TC (mg/dl) of case and control group participants were 208.9±54.6 and 257.4±103.4 respectively where we found significant correlation between the groups (P=0.006). We did not find any correlation between the groups in analyzing TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) analyzing. In case group the mean (±SD) TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) level were found 216.4±306.0, 39.2±11.0 and 114.8±47.4 respectively. On the other hand, in the control group the mean (±SD) TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) level were found 222.9±124.0, 39.8±6.2 and 122.4±46.3 respectively. According to the CDC, 97% of adults with diabetes have one or more lipid abnormalities while the prevalence of diabetic dyslipidemia varies from 25% to 60% in other studies [9]. This variation in prevalence may be due to differences in BMI and possibly genetic variation. A study conducted in Nishtar Hospital, Multan by Ahmad et al. showed that 21% patients with type-2 diabetes had raised serum cholesterol (>200 mg/dl) and34. 2% patients have raised triglycerides in serum (>150 mg/dl) [10]. The values of serum TG of our study were consistent with above mentioned study. The reason for difference in serum cholesterol values may be due to difference in the dietary habits of the people. Another study conducted at Hazara division Pakistan on “Frequency of dyslipidemia in type 2 diabetes mellitus in patients of hazara division” showed that serum triglyceride was raised in 59% [11]. In Singapore, fasting serum TG levels, but not HDL and LDL concentrations, were found to be higher among persons with type 2 DM than those of nondiabetics [12]. High TG levels cause increased transfer of cholesteryl esters from HDLC and LDLC to very VLDLC via cholesteryl ester transfer protein, thus forming cholesteryl ester depleted, small dense LDLC particles [13]. These small dense lipoprotein particles are taken

up by arterial wall macrophages, resulting in atherogenesis [14]. HDL acts by enhancing the removal of cholesterol from peripheral tissues and so reduces the body's cholesterol pool. Type 2 DM was usually associated with low plasma levels of HDL•C [15]. Low HDL-C concentrations are often accompanied by elevated triglyceride levels as seen in this study and others, [16] and this combination has been strongly associated with an increase in risk of coronary heart disease.

Limitations of the study

This was a single centered study with a small sized sample. So, the findings of this study may not reflect the exact scenario of the whole country.

CONCLUSION AND RECOMMENDATIONS

Common lipid abnormalities in diabetes are raised triglycerides, raised serum LDL, raised serum cholesterol and low serum HDL.In this current study, comparative statuses of lipid profile we found significant correlation between the groups of diabetic and non-diabetic patients. Although in analyzing other components of lipid, we did not get any significant correlation between the groups, we think lipid profiling may be a potential predictor of diabetic patient screening. For getting more reliable information we would like to recommend for conducting more studies in several places with larger sized samples.

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Conflict of Interest: None declared.

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