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Lipid Profile in Diabetic Patients: Study in a District Hospital

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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. 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 which was conducted in the Department of Cardiology, Abdur Rahim Medical College, Dinajpur, Bangladesh during the period from January 2020 to December 2020. In total 50 diabetic patients were enrolled as case group participants whereas 16 healthy people of similar ages were included in control group. 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.

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

1. INTRODUCTION

One of the most prevalent diseases observed in diabetic patients that causes cardiovascular problems is lipid disorder. The incidence of coronary artery diseases is 3 to 5 times higher in diabetic patients compared to general population. Although this has been proven for the Western population, limited statistics on Asian Indians are available. Diabetes patients may have many types of dyslipidemia, which increases the cardiovascular risk of hyperglycemia. Diabetes Mellitus (DM) is a category of metabolic disorders defined by elevated blood glucose levels caused by abnormalities in insulin production, function, or both [1]. Diabetes is becoming more prevalent, particularly in poorer countries. All of its fatal complications put diabetes mellitus in the third rank when it comes to the top 10 major causes of mortality. 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. Diabetes, as a pan metabolic disease, is defined by changes in the lipid profile, both quantitative and qualitative.

Hyperglycemia induces glycosylation of all proteins, particularly collagen cross-linking and arterial wall matrix proteins. 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]. A disruption in lipoproteins, such as serum triglycerides (TC) of 69% and cholesterol of 56.6%, triggers cardiovascular disease in individuals with diabetes mellitus, as well as a rise in LDL cholesterol of 77% and HDL cholesterol of 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. Several types of dyslipidemia can be present in patients with diabetes, resulting in a higher cardiovascular risk due to hyperglycemia. In other words, lipid problems must be actively recognized and addressed as part of comprehensive diabetes treatment [7].

2. 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.

3. METHOD

This was a prospective cross-sectional study which was conducted in the Department of Cardiology, M. Abdur Rahim Medical College, Dinajpur, Bangladesh during the period from January 2020 to December 2020. In total 50 diabetic patients were enrolled as case group participants whereas 16 healthy people of similar ages were included in control group. 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 morbidities 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.

4. RESULT

In this study, in case group formed among 50 participants, 16% were from the age group of 21-40, 64% from the age group of 41-60, and the remaining 20% were older than 60 years. On the other hand, in the control group among 16 participants, 50.00% (Highest) were from 21-40 years age group, 37.50% were from 41-60 years of age group, and 12.50% were from >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=22) participants were male whereas 56% (n=28) participants were female. So female predominance was observed in present study, and the male-female ratio was 1:1.26. As per the distribution of comorbidities among case group participants, we observed, dyslipidemia (38%), hypertension (HTN) (36%), ischemic heart disease (IHD) (32%), B. Asthma (8%), chronic kidney disease (CKD) (10%), hypothyroid (8%), urinary tract infection (UTI) (6%), chronic obstructive pulmonary disease (COPD) (4%), diabetic peripheral neuropathy (DPN) (4%), ischemic cardiomyopathy (ICM) (2%), benign prostatic hyperplasia (BPH) (2%), coronary artery disease (CAD) (2%) and left ventricular failure (LVF) (2%) 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=66)

Age (Year)	Case		Control	
	(n=50)		(n=16)	
	N	%	n	%
21-40	8	16	8	50.00
41-60	32	64	6	37.50
>60	10	20	2	12.50
Total	50	100	16	100
Mean ± SD	49.29 ± 16.16		42.22 ± 14.34	
P value	0.105			

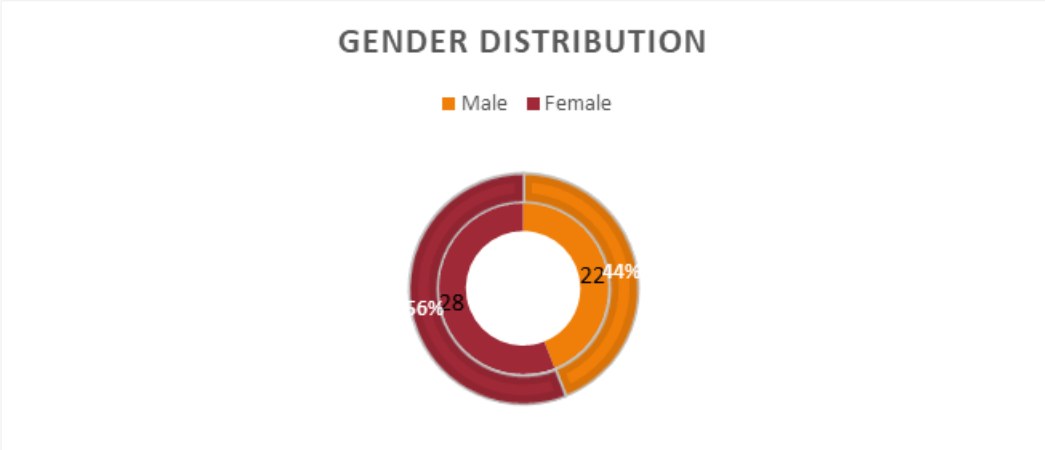

Figure 1: Gender distribution of case group participants (n=50)

Table 2: Distribution of comorbidities among case group participants (n=50)

Comorbidity	n	%
Dyslipidemia	19	38
Hypertension (HTN)	18	36
Ischemic heart disease (IHD)	16	32
B. Asthma	4	8
Chronic kidney disease (CKD)	5	10
Hypothyroid	4	8
Urinary tract infection) UTI	3	6
COPD	2	4
Diabetic peripheral neuropathy	2	4
Ischemic cardiomyopathy (ICM)	1	2
Benign prostatic hyperplasia (BPH)	1	2
Coronary artery disease (CAD)	1	2
Left ventricular failure (LVF)	1	2

Table 3: Lipid profile analysis between case and control groups (n=50)

Lipid profile	Case	Control	P-value
	(n=50)	(n=16)	
	Mean ± SD	Mean ± SD	
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

5. DISCUSSION

The purpose of this study was to assess the prevalence of lipid disorders in diabetes patients in Bangladesh. Basically, this was a prospective cross-sectional study in nature. In total, 50 diabetic patients were enrolled as case group participants whereas 16 healthy people of similar ages were included in control group. Diabetes is now known to all treatment professionals to be associated with a higher risk of mortality from cardiovascular disease (CVD), which is

well known as dyslipidemia, which is characterized by elevated triglycerides, low high-density lipoprotein (HDL), and high small dense low-density lipoprotein (LDL) particles. It is a component of the metabolic syndrome and may be present at the time of type 2 diabetes mellitus diagnosis. 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. Diabetics who have dyslipidemia are more prone to developing coronary heart disease (CHD) and other atherosclerotic problems. In this present investigation, after evaluating the comparative lipid profile statuses, we discovered that the mean (±SD) TC (mg/dl) of case and control group participants were 208.9±54.6 and 257.4±103.4, respectively, with a significant correlation between the groups (P=0.006). No significant correlation was found when analyzing TG (mg/dl), HDL (mg/dl) and LDL (mg/dl). 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, 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 in the control group [9]. Different BMIs and genetic variations may be to blame for this discrepancy. It was shown that 21% of patients with type-2 diabetes had elevated serum cholesterol (>200 mg/dl) and that 34.2% had elevated serum triglycerides (>150 mg/dl) in a study by Ahmad *et al*., [10]. The values of serum TG of our study were consistent with above mentioned study. People's food habits might explain the differences in serum cholesterol levels. Another study conducted in Pakistan's Hazara division found that serum triglycerides were elevated in 59% of patients with type 2 diabetes mellitus [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]. Atherogenesis occurs when macrophages in the artery wall pick up these tiny dense lipoprotein particles [14]. HDL decreases the body's cholesterol pool by increasing the clearance of cholesterol from peripheral tissues. Type 2 DM was usually associated with low plasma levels of HDLC [15].

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.

6. CONCLUSION

Common lipid abnormalities in diabetes are raised triglycerides, raised serum LDL, raised serum cholesterol and low serum HDL. 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. We think lipid profiling may be a potential predictor of diabetic patient screening.

7. RECOMMENDATIONS

It is recommended for conducting more studies in several places with larger sized samples to see the exact scenario of the whole country.

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