ORIGINAL ARTICLE

Gender Variation of Lipid Profiles of Type-2 Diabetes Mellitus Patients attended at a Specialized Diabetic Hospital in Dhaka

Roksana YEASMIN[1], Nazmun NAHAR [2], MA MUTTALIB[3], Md. Nizamul Hoque BHUIYAN[4], ATM Zoadur Rahim ZAHID[5], Waseka Akhter JAHAN[6]

[1]Associate Professor, Department of Biochemistry, Ibrahim Medical College, Dhaka, Bangladesh; [2]Associate Professor, Department of Biochemistry, Ibrahim Medical College, Dhaka, Bangladesh; [3]Professor, Department of Biochemistry, Bangladesh Institute of Research Diabetes & Metabolic Disorder (BIRDEM), Dhaka, Bangladesh; [4]Professor, Department of Food and Nutrition, Dhaka University, Dhaka, Bangladesh; [5]Associate Professor, Department of Physiology, Rangpur Medical College, Dhaka, Bangladesh; [6]Associate Professor, Department of Biochemistry, National Institute of Neurosciences & Hospital, Dhaka, Bangladesh

Abstract

Background: The pattern of dyslipidemia varies among the patients of type 2 of diabetes mellitus. **Objective:** The purpose of the present study was to observe gender difference of lipid abnormalities in type-2 Diabetes Mellitus patients. **Methodology:** This cross sectional comparative study was conducted in the OPD of Department of medicine at BIRDEM, Dhaka from January, 2014 to July, 2014 for a period of six months. Convenient purposive sampling method was used and data assessed in a prospective manner. Blood sugar (FBS, ABF), lipid profile (TG, TC, LDLC, and HDLC) were measured. Statistical analyses were performed with the SPSS software program. **Results:** A total number of 400 type 2 DM patients (200 males and 200 females) attending to BIRDEM OPD were recruited in this study. Blood sugar was higher than normal in both male and female (FBS=8.79±.20, 8.64±0.22 respectively and ABF=12.15±0.27, 11.8±0.29 mmol/l respectively). TG level was also higher in two groups of study subjects with male level is slightly more than female (194.99±6.72 and 185.21±15.51 respectively) with no significant difference between the groups (P>.05). Total cholesterol and LDL-C level was within normal physiological level in both groups, where as these levels were higher in female in comparison to male (TC=184.44±3.33 &166.16±3.04 respectively, LDLC=109.68±2.59 & 88.66±2.59 respectively), showing significant difference between the groups (P=.000). HDL-C was below normal in both male (38.28± 48) and female (39.02±2.59); however HDL-C was slightly higher in female than male and the difference was insignificant (p=.330). **Conclusion:** In conclusion dyslipidemia were observed in a greater proportion of female diabetic patients than male diabetic patients. [*Journal of Current and Advance Medical Research, 2015;2(2):34-38*]

Keywords: Dyslipidemia; Low density lipoprotein(LDL); Type 2 DM dyslipidemia, Fasting blood sugar(FBS); Blood sugar 2 hours after breakfast (ABF); Triacylglycerol (TG); Low density lipoprotein cholesterol(LDL-C); High density lipoprotein cholesterol(HDL-C)

Introduction

Diabetes mellitus induces a state of dyslipidemia with abnormalities in all lipoproteins, namely, chylomicrons, very low density lipoproteins (VLDL), low density lipoproteins (LDL), and high density lipoproteins (HDL). The pattern of dyslipidemia, however, may vary among patients with type 1, type 2, or other types of diabetes mellitus[8]. Also other studies have indicated that increased triglyceride (TG) levels are an independent risk factor and a predictor for development of coronary artery disease (CAD), especially in type 2 diabetics[9]. Frequent co-existence of hypertriglyceridemia and low HDL poses a greater risk for CAD development[10]. Thus there is a need to evaluate lipid profiles in our type 2 diabetes mellitus population and determine the major lipid risk factors for coronary artery disease.

It is estimated that 194 million people had diabetes in the year 2003 and about two-thirds of these people lived in developing countries[1]. Diabetes is considered a syndrome because of the many symptoms the individuals present with especially if management is not adhered to lack of insulin or relatively low insulin level affects the metabolism of carbohydrate, protein, fat, water and electrolyte balance resulting in diabetes[2-3]. Type 2 DM is the most common form of the DM, accounting for approximately 90% of all affected individuals and is caused by relatively impaired insulin secretion and peripheral insulin resistance[4-5] . The prevalence of type-2 DM increases with age such that in developing countries, most diabetics are in the age bracket of 45 to 65 years, while in developed countries the largest number is found in those aged 65 years and above[6]. The major risk factors for type-2 DM are obesity and sedentary lifestyle [4,7.] Dyslipidemia is elevation of plasma cholesterol, TG or both or a low HDL level that contributes to the development of atherosclerosis of which causes may be primary or secondary and diagnosed by measuring plasma levels of total cholesterol, TG and individual lipoproteins. The purpose of the present study was to observe gender difference of lipid abnormalities in type-2 Diabetes Mellitus patients.

Methodology

This cross sectional comparative study was conducted at Bangladesh BIRDEM Hospital, from January 2014 to July 2014, over a period of six months. Convenient purposive sampling method was used and data assessed in a prospective manner. Patients from BIRDEM OPD were included in this study with their informed consent, on the basis of inclusion and exclusion criteria. Patients on statins or fibrates were excluded from this study. After taking written consent, blood was drawn using standard venipuncture techniques and serum was separated from blood cells as soon as possible. Prior to ordering tests, confirm that the system inventory of matrix cells, bulk solutions and waste levels are acceptable. Report contains sample placement information and sample cup volume requirements for all order tests. It is recommended that this report be referenced when loading sample into segments. Fasting blood samples (12-14 hours) were analyzed for serum triglycerides and total cholesterol by using automated chemistry analyzer (Abbott Axsym System). HDL-C was determined by precipitation method and LDL-C and VLDL-C were estimated by Friedewald's formula[4]. Fasting blood sugar and ABF was measured by enzymatic method in colorimeter[5]. Current American Diabetes Association definitions and ATP III guide lines were used to label patients as type 2 diabetics and to classify lipoprotein concentrations into different cardiovascular disease risk categories respectively[5-6]. The values used to define low-, borderline-, and high-risk LDL cholesterol were <100 mg/dl , 100-129 mg/dl, >130 mg/dl, respectively. For triglycerides, the cutoff points were <200 mg/dl, 200-399mg/dl and >400 mg/dl. For total cholesterol low, borderline, high were <150 mg/dl, 150-200 mg/dl, > 200mg/dl respectively. High-, borderline-, and low-risk categories for HDL concentrations were defined according to sex. For men, the cutoff points were <35 mg/dl, 35-45 mg/dl, and >45 mg/dl, respectively. For women, the cutoff points were <45 mg/dl, 45-55 mg/dl, and >55 mg/dl, respectively. American Diabetic Association guidelines recommend an LDL of <100 mg/dl, a triglyceride levels of <200 mg/dl, and an HDL cholesterol level of >45 mg/dl in men and >55 mg/dl in women,[5-6]. The percentage of patients who had none, one, two, or all three of this lipoprotein not at goal levels was also determined. Statistical analyses were performed with the SPSS software program (SPSS Version 17.0). Analysis of variance was used to determine differences in patient characteristics and analysis of covariance was used to test for differences in mean lipid levels. The chi-square (X2) test was used to test for differences in proportions.

Results

Blood sugar was higher than normal in both male and female (FBS=8.79±.20 mmol/L, 8.64±0.22 mmol/L respectively and ABF=12.15±0.27 mmol/L, 11.8±0.29mmol/L respectively). Though

the value of FBS and ABF was higher in male than in female, significant difference between the groups was found only in ABF (p=0.000) (Table 1).

Table 1: Various biochemical parameters of DM in male and female (Mean ± SD)

Parameters	Male	Female	P value
FBS	8.79±0.20	8.64±0.22	0.607
ABF	12.15±0.27	11.81±0.29	0.000
TG	194.99±6.72	185.21±5.51	0.261
TC	166.16±3.04	184.44±3.33	0.000
LDLC	88.66±2.59	109.68±2.59	0.000
HDLC	38.28±0.48	39.02±2.59	0.330

TG level was also higher in two groups of study subjects with male level is slightly more than female (194.99±6.72 mg/dl and 185.21±15.51 mg/dl respectively) with no significant difference between the groups (P>.05). Total cholesterol and LDLC level was within normal physiological level in both groups, whereas the level was higher in female in comparison to male (TC=166.16±3.04 mg/dl & 184.44±3.33 mg/dl respectively, LDLC=88.66±2.59 mg/dl & 109.68±2.59 mg/dl respectively), showing significant difference between the groups (P=.000) (Table 1).

Table 2: Number of male diabetics in different lipid levels

Parameter	Low	Borderline	High
TG	70	80	50
TC	116	64	20
LDL-C	140	36	24
HDL-C	95	85	20

Hypertriglyceridemia is prominent in male diabetics than female because high TG level was present in 50 male than female diabetic where number was 40. High LDL-C level were found in 50 female diabetics and 24 male diabetics.

Table 3: Number of female diabetics in different lipid levels

Parameter	Low(mg/dl)	Borderline(mg/dl)	High(mg/dl)
TG	100	60	40
TC	70	100	30
LDL-C	65	85	50
HDL-C	110	67	23

High HDL-C was found in 23 female diabetics whereas 20 male diabetics have high HDL. Though cholesterol level was normal in both male and female, number of female patient was more than male with high TC level (30 male and 20 male) (Table 2 & 3).

Discussion

Diabetes mellitus is associated with a greater risk of morbidity and mortality from cardiovascular disease. Detection and treatment of dyslipidemia in diabetes is one major step towards reducing the risk of cardiovascular disease associated with diabetes[10.] Patients attuned in large urban outpatient diabetes clinics are primarily with type 2 diabetes and represent a group at high risk for cardiovascular disease.

The pathogenesis of heart disease in diabetes is complex, but serum lipids are frequently abnormal and likely to contribute to the risk of coronary artery disease[11]. Diabetes mellitus type 2 is typically associated with a dyslipidaemia characterized by hypertriglyceridaemia and low HDL levels, while the levels of total cholesterol and LDL may or may not differ significantly from those in the non-diabetics[12-13]. This study result is not fully consistent with this study.

In this study, when applying current American Diabetes Association Guidelines to classify lipoprotein concentration, the proportion of male and female diabetics having low , borderline and high category LDL-S was (140,36,24) (65,89,50) respectively and HDL-C in male and female (95,85,20), (110, 67,23) respectively. These results are in conformity with the results given by Moradian et al[14] and also coincide with other studies done in south-east Asian region.10 Similar proportion of patients were found to have high LDL, in a study conducted by Taskinen et al[11] in which they determined the lipid level differences and hypertension effect in black and white population with type 2 diabetes. In a native Pakistani study done recently by Firdous and Zafarullah[12] the percentage of diabetic patients affected by high LDL cholesterol was 32% where as our study shows 85%. This present study is consistent with that study. In another study done by Khalid et al[14] LDL was found high in 30 percent of patients. In an Iranian study by Sadeghi and coworkers statistically significant levels of high-risk LDL was reported among urban dwellers[15-16] . Similar trends were found in another Pakistani study done by Naheed and Khan[17].

In this study the distribution of HDL-C in male and female was (95, 85, 20),(110,67, 23) respectively. Similar results have been reported by Firdous and Zafarullah[12] and also by Mooradian[9] who found out 60% of the diabetic population suffering from high risk HDL levels, more so in men as compared to female on a percentage basis. Our result is consistent with that study. In a meta-analysis done by Wei et al[18] about 45% of American subjects had high-risk category HDL, albeit these studies was not done specifically on diabetic patients.

Regarding triglyceride (TG) concentrations, in patients, male 90% had high-risk TG levels, 60% were in the borderline-risk category, whereas 70% had a low-risk TG levels. In our female patients 40%, 60%, and 100% had high-risk, borderline-risk, and low-risk TG levels respectively. In the study done by Alaettin et al[19] overall 25% of the diabetics were found to have high-risk HDL levels. In another native study done by Firdous and Zafarullah[12] 38% of diabetic subjects were found to have high- risk category TG levels. This was reiterated in another native study done by Cleeman and Grundy[20]. In the Palestinian study mentioned above and also in the Iranian IHPP study, 35 to 40% of the diabetic population was found to have high risk category hypertriglyceridemia[16].

In the study hypertriglyceridemia is prominent in male diabetics because high TG level was present in 50 male than female diabetic where female number was 40 Hypercholesteromia was eminent in female diabetics because 30 female diabetics has high TC level where as 20 male diabetic has high TC level. High LDL-C level were found in 50female diabetics and 24 male diabetics. High HDL-C was found in 23 female diabetics whereas 20 male diabetics have high HDL.

In essence, most of our male diabetic with high TG levels and combination of low HDL which is the most common pattern of dyslipidaemia found in the study. The second most common pattern of dyslipidemia was unfavourable levels of three lipoprotein (LDL-C, TC, HDL-C) which was found in female diabetics. At present time there is good body of evidence with inferences from patho-physiological information and extrapolation from different studies, which strongly supports the treatment of dyslipidemia where it exists in diabetes[21]. The treatment regimen should optimize glycemic control and use diet and life style modification, as well as drug therapy directed to the specific lipoprotein disorder that is present. This will eventually help in the reduction of morbidity and mortality associated with cardiovascular diseases in diabetes mellitus.

Conclusion

Most of our patients had a combination of high LDL and a low HDL cholesterol level and high TC, which is the most common pattern of dyslipidemia found in this study found in female diabetics. The second most common pattern of dyslipidemia is the unfavorable levels of two lipoproteins combined which is increased TG, decreased HDL cholesterol. Overall, a greater proportion of women are found dyslipidemic as compared to men.

References

1. Chahil TJ, Ginsberg HN. Diabetic dyslipidemia. Endocrinol Metab Clin North Am 2006;35:491–510
2. Ahmad J, Hameed B, Das G, Siddiqui MA, Ahmad I. Postprandial hypertriglyceridemia and carotid intima – media thickness in north Indian type 2 diabetic subjects. Diabetes Res Clin Pract 2005;69:142-50
3. Dodani S. Distribution and determinants of coronary artery disease in an urban Pakistani setting. Ethn Dis 2005;15:429-35
4. Friedwald WT, Levy RI, Frederickson DS. Estimation of LDL cholesterolin plasma without use of the preparative ultracentrifuge. Clin Chem 1972;18:499-502
5. American Diabetes Association: Consensus statement on detection and management of lipid disorder in diabetes. Diabetes Care 1996;19(Suppl no.I):S96-S102
6. Expert Panel On Detection, Evaluation, and Treatment of high blood cholesterol in adults; Summary of the third report of NCEP (Adult Treatment Panel III). JAMA 2001;285: 2486 -2497. Updated 2004
7. Pyorala K, Pederson TR, Kjekshus J, Faergeman O, Olosson AG, Thorgeirsson G. The Scandinavian Simvastatin Survival Study (4S): Cholesterol lowering with simvastatin improves prognosis of diabetic patients with coronary artery disease, a subgroup analysis. Diabetes Care 1997;20:614-620
8. Nesto RW. Beyond low-density lipoprotein: addressing the atherogenic lipid triad in type 2 diabetes mellitus and the metabolic syndrome. Am J Cardiovasc Drugs 2005;5:379-87
9. Mooradian AD. Low serum high-density lipoprotein cholesterol in obese subjects with normal serum triglycerides: the role of insulin resistance and inflammatory cytokines. Diabetes Obes Metab 2007;9:441–443
10. Ahmad J, Hameed B, Das G, Siddiqui MA. Postprandial hypertriglyceridemia and carotid intima – media thickness in north Indian type 2 diabetic subjects. Diabetes Res Clin Pract 2005;69:142-50
11. Taskinen MR. Diabetic dyslipidaemia: From basic research to clinical practice. Diabetologia 2003;46:733-749
12. Firdous S, Zafarullah M. Comparison of patterns of lipid profile in type-2 diabetics and non-diabetics. Ann King Edward Med Coll. 2007;13(1): 84-87
13. Hannan F, Abdullatif H, Nahida H. The metabolic syndrome in west bank population, an urban-rural comparison. Diabetes Care 2001;24:275-279

14. Mooradian AD. The effect of select nutrients on serum high-density lipoprotein cholesterol and apolipoprotein. A-I levels. Endocr Rev 2006; 27: 2–16

15. Khalil AM, Rehman S. Prevalence of diabetic dyslipidemia in 120 patients of type 2 Diabetes Mellitus. J Med Sci 2005; 13(2):128-31

16. Sadeghi M, Raza H. Serum lipid distribution and prevalence of Dyslipidemia in urban and rural communities in Iran - IHHP study. Pak J Cardiol 2004;15(2): 88-94

17. Naheed T, Khan A. Dyslipidemias in type II Diabetes Mellitus patients in a teaching hospital of Lahore, Pakistan. Pak J Med Sci 2003;19(4):283-6

18. Wei M, Mitchell BD, Haffner SM. Effects of cigarette smoking, diabetes, high cholesterol, and hypertension on all-cause mortality and cardiovascular disease mortality in Mexican Americans: The San Antonio Heart Study. Am J Epidemiol 1996;144:1058-1065

19. Alaettin A, Abdullah D, Murat S. The predictive and discriminative value of serum lipoproteins in atherosclerotic coronary artery disease. Pak Heart J 1998;31:23-30

20. Cleeman JI, Grundy SM. Implication of recent clinical trials for the NCEP, ATP III guidelines. Circulation 2004;110:227-239

21. Ford I, Murray H. Long term follow up of the West of Scotland Coronary Prevention study. New Eng J Med 2007;357:1477-1486