World Journal of Pharmaceutical research

Volume 1, Issue 5, 1486-1393. Research Article ISSN 2277 – 7105

EFFECT OF GENDER ON DYSLIPIDAEMIA IN PATIENTS OF TYPE II DIABETES MELLITUS

Vinu Vij*, Pallavi Chitnis, Vijay Kumar Gupta.

Department of Physiology, Pad.Dr D Y Patil Medical College and Hospital, Nerul, Navi Mumbai, India.

Article Received on
08 October 2012,

Revised on 20 October 2012,
Accepted on 26 October 2012

***Correspondence for Author:**

*** Dr. VinuVij**
Department of Physiology, Pad.Dr D Y Patil Medical College and Hospital, Nerul, Navi Mumbai, India.
vijvinuvij@gmail.com

ABSTRACT

Type II diabetic patients are at an increased risk of coronary artery disease and cerebrovascular disease because of deranged lipid metabolism. The objective of the present study was to determine effects of gender on dyslipidaemia in type II diabetic patients. Pattern of dyslipidaemia in a total of 100 type II diabetic patients (50 males and 50 females) was studied and compared by measuring all the four lipid profile parameters - total cholesterol (TC), triglycerides (TG), high density lipoprotein-cholesterol (HDL-C) and low density lipoprotein-cholesterol (LDL-C). Glycosylated haemoglobin (HbA1c) and fasting plasma glucose (FPG) was also measured and the mean value was found to be higher in females in comparison to the male patients and the differences were significant($P<0.05$). Among the circulating lipids, total cholesterol (TC), triglycerides (TG) and low density lipoprotein-cholesterol (LDL-C) were significantly higher ($P<0.05$) in female patients. Although the mean level of high density lipoprotein-cholesterol (HDL-C) was slightly higher in females than males and this difference was also statistically significant, still the protection conferred by HDL-C on females is questionable in the given setting. Thus, type II diabetic females have a more adverse atherogenic profile as compared to males. An early intervention to normalize circulating lipids has been shown to reduce cardiovascular complications and mortality.

KEYWORDS: Type II diabetes mellitus, dyslipidaemia, gender.

INTRODUCTION

Patients with type II DM have two to fourfold increase in cardiovascular disease (CVD)[1, 2] and dramatically higher risk of accelerated cerebral and peripheral vascular disease [3,4]. Patients with type II DM often exhibit an atherogenic lipid profile, which greatly increases their risk of CVD as compared to people without diabetes. An early intervention to normalize circulating lipids has been shown to reduce cardiovascular complications and mortality[5,6]. Type II diabetes mellitus (DM) increases the risk of coronary heart disease (CHD) more markedly in women than men [7]. However, the reported magnitudes of the diabetes-related CHD risk in men and women vary widely between different studies [8,9,10,11,12].

The cause of the greater relative risk of CHD in diabetic women still remains incompletely understood, but several explanations have been offered. First, adverse changes induced by type II DM in some cardiovascular risk factors, such as high-density lipoprotein (HDL-C) cholesterol, triglycerides (TG), low-density lipoprotein (LDL) particle size and blood pressure have been found to be more pronounced in women than in men[13,14,15]. In addition, DM in women may interfere with protective mechanisms in the vascular wall and thereby lead to enhanced atherogenesis.

Diabetic dyslipidaemia is characterised by

1) High triglyceride (TG) concentrations, particularly post-prandially (post-prandial lipaemia)
2) Low high density lipoprotein-cholesterol (HDL-C) concentrations
3) Increased low density lipoprotein cholesterol (LDL-C) concentrations.

Many features of' diabetic dyslipidaemia can be explained by reduced action of insulin at the tissue level. This could be due to insulin resistance, although relative insulin deficiency associated with pancreatic beta-cell dysfunction also contributes. Some features of diabetic dyslipidaemia, however, may not be due to insulin resistance.

MATERIALS AND METHODS

Patients' Data

This study was conducted at a tertiary care hospital in Mumbai from 1st February 2010 to 31st March 2010. A total of 100 patients (50 males and 50 females) who attended OPD in the said period, who were of age ≥40 years, diagnosed as a case of diabetes mellitus type II, were included in the study. The diagnosis of DM was based on the American Diabetes Association

criteria for type II DM (fasting plasma glucose level higher than 126 mg/dl and/or glucose level exceeding 200 mg/dl at 2 hours in the 75 g oral glucose tolerance test).

Laboratory Data

Blood samples were drawn after at least 12.00 hours of overnight fasting. Fasting blood samples were obtained for measuring fasting plasma glucose (FPG), Glycosylated haemoglobin (HbA1c), total cholesterol (TC), triglyceride (TG), high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C).For serum lipid reference level, National Cholesterol Education Programme (NCEP) Adult Treatment Panel III (ATP III) guideline was referred. According to NCEP-ATP III guideline, hypercholesterolemia is defined as TC>200 mg/dl, high LDL-C when value is>100 mg/dl, hypertriglyceridemia as TG >150 mg/dl and low HDL-C when value is <40 mg/dl. Dyslipidaemia was defined by presence of one or more than one abnormal serum lipid concentration.

Statistical Analysis

All data was entered into Statistical Package for Social Sciences (SPSS 15.0 for windows) for analysis. Independent samples t-test (2-tailed) was used to compare means of different parameters. All values are expressed as mean ± standard deviation and a p-value of ≤0.05 was considered significant.

RESULTS

A total of 100 type II diabetic patients were included in the study out of which 50 (50%) were male patients and 50 (50%) female patients.

The mean age ± SD of male and female subjects was 53.44 ± 2.9977 years and 48.04± 3.2637 years respectively.

1) The mean value of FPG and HbA1c were higher in females in comparison to male patients and the differences were statistically significant (p - value < 0.05).

Table 1 : Mean values of FPG and HbA1c

Parameters measured	Normal values	Males (n = 50) (Mean ± SD)	Females (n = 50) (Mean ± SD)	p-value
FPG (mg/dl)	70-110mg/dl	150.16 ± 3.352	160.18 ± 2.654	0.000 *
HbA1c (%)	4.2 - 6.2 %	7.314 ± 0.028	7.70 ± 0.017	0.000 *

*p-value ≤0.05 –significant **

2) Among the circulating lipids, TC, TG and LDL-C were significantly higher (p-value <0.05) in female patients. Although the mean level of HDL-C was only slightly higher in females than males, this difference was also statistically significant(p- value < 0.05).

Table 2 : **Mean values of lipid profile parameters**

Parameter measured	Normal values	Males (n = 50) (Mean ± SD)	Females (n = 50) (Mean ± SD)	p-value
TC (mg/dl)	< 200	201.68 ± 2.92	241.28 ± 3.15	0.000 *
TG (mg/dl)	< 150	184.02 ± 2.68	224.38 ± 2.67	0.000 *
HDL-C (mg/dl)	> 59	44.46 ± 0.67	47.80 ± 0.75	0.000 *
LDL-C (mg/dl)	< 100	118.12 ± 1.33	144.18 ± 1.97	0.000 *

*p-value ≤0.05 –significant **

DISCUSSION

In the present study, we have evaluated the pattern of dyslipidaemia in type II diabetic male and female patients. This study reveals high prevalence of hypercholesterolemia, hypertriglyceridemia, high LDL-C and low HDL-C levels in type II diabetic patients which are well known risk factors for cardiovascular diseases. Insulin affects the liver apolipoprotein production. It regulates the enzymatic activity of lipoprotein lipase (LpL) and Cholesterol ester transport protein. All these factors are likely cause of dyslipidaemia in Diabetes mellitus [16]. Moreover, insulin deficiency reduces the activity of hepatic lipase and several steps in the production of biologically active LpL may be altered in DM [17].

The levels of FPG and HbA1c were higher in female patients, thereby indicating poorer glycaemic control in females as compared to the males. Although the mean level of high density lipoprotein-cholesterol (HDL-C) was slightly higher in females than males, still the protection conferred by HDL-C on females,in the given setting of poor glycaemic control and adverse lipid profile with respect to remaining parameters, remains inconclusive. The levels

of TC, TG and LDL-C were significantly higher in female patients as compared to male type II diabetic patients. This finding is in agreement with the previous studies[18, 19, 20, 21, 22, 23]. Hyperlipidaemia in females may be attributed to the effects of sex hormones on body fat distribution, which leads to differences in altered lipoproteins [24] .

Juutilainen *et al.* in their study of 1059 type 2 diabetic subjects aged 45-64 years found a considerably higher diabetes related relative risk for a major CHD event in diabetic women than in men [25].They found that the burden of obesity, elevated blood pressure, and atherogenic dyslipidaemia (low HDL cholesterol and high TG) was, in the presence of diabetes, greater in women than men.

Another theory to explain the sex difference relates to HDL cholesterol. Walden *et al.* suggested that HDL cholesterol levels are lower in diabetic women than men [26].It has also been postulated that the inverse association between CHD and HDL levels is stronger in women than men. Gorden*et al.* showed that for each milligram-per-deciliter increase in HDL, there was ~2% decrease in CHD risk in men, but a 3% decrease in women [27].

CONCLUSION

The present study shows that the derangement in the lipid profile in patients of type II diabetes mellitus is more adverse in females as compared to male patients. The management of dyslipidaemia, a well-recognized and modifiable risk factor among patients with type II DM, is an important element in the multifactorial approach to prevent coronary heart disease. Early identification of dyslipidaemia and aggressive management strategies, in addition to glycaemic control, are necessary to delay the onset and progression to more serious and debilitating cardiac events. Thus the relevance of the present study lies in recognizing increased risk of dyslipidaemia in female type II diabetic patients and hence monitoring of the lipid profile of newly diagnosed female type II diabetic patients, so that early intervention is possible.

REFERENCES

1. Grundy SM. Hypertriglyceridemia, insulin resistance, and the metabolic syndrome. Am J Cardiol. 1999 May 13; 83(9B):25F-29F.
2. Haffner SM; American Diabetes Association. Dyslipidemia management in adults with diabetes.Diabetes Care. 2004 Jan;27Suppl 1:S68-71.

3. Kim DK, Escalante DA, Garber AJ. Prevention of atherosclerosis in diabetes: emphasis on treatment for the abnormal lipoprotein metabolism of diabetes. ClinTher. 1993 Sep-Oct; 15(5):766-778.
4. Brown WV. Risk factors for vascular disease in patients with diabetes.Diabetes ObesMetab. 2000 Nov; 2 Suppl 2:S11-8.
5. Haffner SM, Lehto S, Ronnemaa T, Pyorala K, Laakso M. Mortality from coronary heart disease in subjects with type 2 diabetes and in nondiabetic subjects with and without prior myocardial infarction. N Engl J Med 1998; 339: 229-234.
6. Windler E. What is the consequence of an abnormal lipid profile in patients with type 2 diabetes or the metabolic syndrome? AtherosclerSuppl 2005;6: 11-14.
7. Juutilainen A, Kortelainen S, Lehto S, Ronnemaa T, Pyorala K, Laakso M. Gender difference in the impact of type 2 diabetes on coronary heart disease risk. Diabetes Care. 2004 Dec; 27(12):2898-2904.
8. Kannel WB, McGee DL. Diabetes and cardiovascular disease.The Framingham study.JAMA. 1979 May 11; 241(19):2035-2038.
9. Lee WL, Cheung AM, Cape D, Zinman B. Impact of diabetes on coronary artery disease in women and men: a meta-analysis of prospective studies. Diabetes Care. 2000 Jul; 23(7):962-968.
10. Kanaya AM, Grady D, Barrett-Connor E. Explaining the sex difference in coronary heart disease mortality among patients with type 2 diabetes mellitus: a metaanalysis. Arch Intern Med. 2002 Aug 12-26; 162(15):1737-1745.
11. Barrett-Connor E, Wingard DL. Sex differential in ischemic heart disease mortality in diabetics: a prospective population-based study. Am J Epidemiol. 1983 Oct; 118(4):489-496.
12. Barrett-Connor E, Giardina EG, Gitt AK, Gudat U, Steinberg HO, Tschoepe D. Women and heart disease: the role of diabetes and hyperglycemia. Arch Intern Med. 2004 May 10; 164(9):934-942.
13. Howard BV, Cowan LD, Go O, Welty TK, Robbins DC, Lee ET. Adverse effects of diabetes on multiple cardiovascular disease risk factors in women. The Strong Heart Study.Diabetes Care. 1998 Aug; 21(8):1258-1265.
14. Walden CE, Knopp RH, Wahl PW, Beach KW, Strandness E Jr. Sex differences in the effect of diabetes mellitus on lipoprotein triglyceride and cholesterol concentrations. N Engl J Med. 1984 Oct 11; 311(15):953-959.

15. Siegel RD, Cupples A, Schaefer EJ, Wilson PW. Lipoproteins, apolipoproteins, and low-density lipoprotein size among diabetics in the Framingham offspring study. Metabolism. 1996 Oct; 45(10): 1267-1272.
16. Suzuki T, Oba K, Igari Y, Matsumura N, Inuzuka Y, Kigawa Y, Ajiro Y, Okazaki K, Nakano H, Metori S. [A four-year prospective study on the influence of serum elevated lipoprotein (a) concentration on ischemic heart disease and cerebral infarction in elderly patients with type 2 diabetes]. Nippon Ronen IgakkaiZasshi. 2001 Jul; 38(4):507-13. Japanese.
17. Habib SS, Aslam M. Lipids and lipoprotein(a) concentrations in Pakistani patients with type 2 diabetes mellitus. Diabetes ObesMetab. 2004 Sep; 6(5):338-343.
18. Assmann G, Schriewer H, Schmitz G, Hägele EO. Quantification of high-density-lipoprotein cholesterol by precipitation with phosphotungstic acid/MgCl2. ClinChem 1983; 29: 2026-2030.
19. Friedewald WT, Levy RI, Fredrickson DS.Estimation of the concentration of low-density lipoprotein choles-terol in plasma without use of the preparative ultracen-trifuge.ClinChem 1972; 18: 499-502.
20. Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) [spe-cial communication]. JAMA 2001; 285:2486-2497.
21. American Diabetes Association. Diagnosis and classifi-cation of Diabetes Mellitus. Diabetes Care 2010; 33:s6 2-s69.
22. Wexler DJ, Grant RW, Meigs JB, Nathan DM, Cagliero E. Sex disparities in treatment of cardiac risk factors in patients with type 2 diabetes. Diabetes Care 2005; 28: 514-520.
23. Diabetes Prevention Program Research Group. Lipid, lipoproteins, C-reactive protein, and hemostatic factors at baseline in the diabetes prevention program.Diabe-tes Care 2005; 28: 2472-2479.
24. Sibley SD, Thomas W, de Boer I, Brunzell JD, Steffes MW. Gender and elevated albumin excretion in the Diabetes Control and Complications trial/ Epidemiol-ogy of Diabetes Interventions and Complications (DCCT/EDIC) cohort: role of central obesity. Am J Kidney Dis 2006; 47: 223-232.

25. Juutilainen A, Kortelainen S, Lehto S, Ronnemaa T, Pyorala K, Laakso M. Gender difference in the impact of type 2 diabetes on coronary heart disease risk. Diabetes Care. 2004 Dec; 27(12):2898-2904.
26. Walden CE, Knopp RH, Wahl PW, Beach KW, Strandness E Jr. Sex differences in the effect of diabetes mellitus on lipoprotein triglyceride and cholesterol concentrations. N Engl J Med. 1984 Oct 11; 311(15):953-959.
27. Bays H. Atherogenicdyslipidemia in type 2 diabetes and metabolic syndrome: current and future treatment options. Br J Diabetes Vasc Dis. 2003; 3(5): 356-360.