Original Article

Pattern of Dyslipidemia and Other Risk Factors for Coronary Artery Disease and Macrovascular Complications in Diabetic Patients

Muti ullah Khan, Muhammad Latif and Azhar Hussain

Objective: To determine the pattern of dyslipidemia and other risk factors and their association with macrovascular complications in our diabetic patients presenting to OPD (outpatients department) on routine follow up.

Methods: This study was done in medical outpatients department, Akhter Saeed teaching hospital, from December 2014 to August 2015. one hundred diabetic patients, male and female, coming for routine follow up were screened for macrovascular complications, and risk factors like obesity, hypertension, deranged glucose levels and lipid abnormalities were measured and analyzed.

Results: Of the one hundred patients recruited for this study, fifty three were females and forty seven were males. Male patients were more likely to be obese and overweight [5 (10%) and 11 (23%) respectively] than the females [2 (3%) and 10 (19%) respectively]. Males were also more likely to be hypertensive [24 (51%)] than females [23 (43%)]. The average BP (blood pressure) for males was (141±44 SD)/ (91±14 SD) mmHg, and (129±41 SD)/ (85±15 SD) mmHg for females. All the patients had fasting hyperglycemia, however females were having more deranged values [FBS (141±79 SD) mg/ dl for males and (151±91 SD) mg/ dl for females]. Male patients were found to have dyslipidemia predominantly in the form of high total and LDL cholesterol or low HDL cholesterol, while more of the females had hypertriglyceridemia. In this study, high LDL cholesterol or total cholesterol and low HDL cholesterol were found to be associated with hypertension and macrovascular complications. Of the 72 among all the 100 patients with evidence of macrovascular complications, high total cholesterol was seen in 58 (80%) patients while it was seen in 17 (61%) of the remaining patients. High BMI (Body Mass Index) was also independent risk factor for hypertension and coronary artery disease in age matched patients. Increased triglyceride levels did not show any clear correlation with macrovascular complications.

Conclusion: This study shows increased incidence of lipid abnormalities and other risk factors in diabetics especially in patients with evidence of macrovascular disease.

Keywords: Diabetes mellitus, dyslipidemia, macrovascular complications.

Introduction

Diabetes mellitus is a major health problem worldwide.[1] Among the most important complications of disease are the macrovascular complications leading to coronary artery disease (CAD), stroke and peripheral vascular disease and diabetic dyslipidaemia is believed to be a major cause of increased risk of such complications.[2] Patients with type 2 diabetes mellitus have a twofold to threefold increased incidence of diseases related to atheroma[3], the pathological mechanism for macrovascular complications. Thus lipid abnormalities, commonly seen in diabetic patients are major modifiable risk factor for these macrovascular complications and a potential target of preventive treatment. While several international studies have been conducted to prove the correlation between diabetes and dyslipidemia and between dyslipidemia and macrovascular complications, few if any such studies are available for Pakistan. Thus the purpose of current study was to identify the pattern of dyslipidemia and other risk factors, and their association with macrovascular disease in our diabetic patients coming to the OPD for routine visits.

Methods

iThe study was conducted at Akhter Saeed teaching hospital Lahore during the period of August 2014 to June 2015. A total of 100 patients known with type 2 diabetes between the ages of 30 and 60 years coming to outpatients department for routine visits were selected for the study. Informed consent was taken for all the patients.

Detailed physical examination was performed. Blood pressure was recorded with patients in resting state for at least ten minutes. Anthropometric measurements including height and weight were taken and BMI was calculated. Evidence of macrovascular complications was sought by examination of peripheral pulses, neurological examination and by history or ECG evidence of coronary artery disease. Blood samples were taken after at least 8 hours of fasting and sent for routine blood counts, glucose, renal profile, liver function tests, plasma lipids total cholesterol (TC), low density cholesterol (LDL-C), high density cholesterol (HDL-C), and triglycerides (TG). Patients with recent myocardial infarction (MI), renal failure, hepatic dysfunction and other causes of dyslipidemia like nephrotic syndrome or hypothyroidism were excluded from the study.

Results

Of the one hundred patients recruited for this study, fifty three were females and forty seven were males. Male patients were more likely to be obese and overweight [5 (10%) and 11 (23%) respectively] than the females [2 (3%) and 10 (19%) respectively]. Males were also more likely to be hypertensive [24 (51%)] than females [23 (43%)]. The average BP for males was 141 (±44 SD)/ 91 (±14 SD) mmHg, and 129 (±41 SD)/ 85 (±15 SD) mmHg for females. All the patients in the study were found to have fasting hyperglycemia, however females were having more deranged values [FBS 141 (±79 SD) mg/ dl for males and 151 (±91 SD) mg/ dl for females] (table i). Male patients were found to have dyslipidemia predominantly in the form of high total and LDL cholesterol or low HDL cholesterol, while more of the females had hypertriglyceridemia.

In this study, high LDL cholesterol or total cholesterol and low HDL cholesterol were found to be associated with hypertension and macrovascular complications. Of the 72 among all the 100 patients with evidence of macrovascular complications, high total cholesterol was seen in 58 (80%) patients while it was seen in 17 (61%) of the remaining patients (table ii). High BMI was also independent risk factor for hypertension and coronary artery disease in age matched patients. Increased triglyceride levels did not show any clear correlation with macrovascular complications. The number of patients was too small for calculation of individual risk factors separately in male and female patients.

Table-1: Baseline patient characteristics.

Paramters	Obesity			BP	TL	Chol. Mg/dl(±SD)			Fating
	Ave. BMI (kg/m2.)	Overweight No. (%)	Obese No.(%)	sys/ dias ave (±SD)		LDL-C	HDL-C	Trig.Mg/dl	Glucose
Male	24	11(23)	5 (10)	141(± 44) / 19 (±14)	207(±21)	140 (±17)	37(±4)	171 (±39)	141 (±79)
Female		10 (19)	2 (3)	129(± 41) / 85 (±15)	201(±17)	133 (±16)	36(±5)	176(±42)	151 (±91)

Table-2: Prevalence of macrovascular complications. CAD; coronary artery disease, PVD; .

Type of complications	Number of Patients (%)		
	Males	Females	Total
Any type of macrovascular complication	37 (78)	35 (66)	72 (10)
CAD	16 (34)	16 (30)	32 (32)
PVD	23 (49)	26 (49)	49 (49)
Stroke	3 (6)	10 (2)	4 (4)

Discussion

Diabetes mellitus is a major health problem. In the second half of the 20th century it became obvious that a relentless increase in Type 2 diabetes mellitus (T2DM), affecting the economically affluent countries, is gradually afflicting also the developing world, and hence has been labeled a global pandemic. Based on current trends, the International Diabetes Federation projects that 438 million individuals will have diabetes by the year 2030.[4] WHO ranks Pakistan 7th on diabetic prevalence list.[5] This metabolic disorder causes marked increase in mortality and morbidity compared to non-diabetic person. Those with type 2 diabetes who present in their 40s and 50s have a twofold increased total mortality.[6] The majority of diabetic patients have type 2 diabetes (about 90%) which is frequently associated with insulin resistance, hypertension and lipid disorders. Obesity is a major

environmental factor predisposing to type2 diabetes. Among the major complications of the disease are the macrovascular complications leading tocoronaryartery disease (CAD), stroke and peripheral vascular disease. Dyslipidaemia, frequently associated with diabetes is believed to be a major cause of increased risk of such complications.[7,8] Patients with type 2 diabetes mellitus have a twofold to threefold increased incidence of such complications.

Severalstudies have been conducted for determining the pattern of dyslipidemia and risk of macrovascular complications in diabetic patients, with variable results. These variations probably reflect regional variations or different parameters selected in each study. Despite these differences in the results, almost all studies show clear association of diabetes with abnormal lipid profiles and the presence of macrovascular complications compared with the non-diabetic population. While abundant data is available on this topic from other countries like UK (Turner et al2)and India (Khadke et al4), little is available for our country. We could find only one such study about the pattern of dyslipidemia in diabetic patients and their association with macrovascular complications.

Turner et al[2] report from UKPDS 23 (United Kingdom Prospective Diabetes Study), that increased total and LDL cholesterol as well as low HDL cholesterol was associated with increased risk for CAD in patients with type-II diabetes, even more than that for general population. They did not find any clear association of raised triglyceride levels with cardiovascular events. This is in accordance with our Study. However in contrast to our study, they did not find increased BMI or other measures of obesity to be associated with increased risk. The incidence of overweight and obesity was found to be high in our patients and it was also found to be an independent risk factor for hypertension and CAD, but not by turner et al.[2] Although obesity is a risk factor for coronary artery disease and hypertension in non-diabetic patients[14], it is also a risk factor for diabetes, and once diabetes develops it was not found to be significant risk factor of CAD in other studies. Hypertension is an extremely common comorbidity of diabetes affecting 40-60% of people with diabetes,[9] almost twice as frequently in diabetic as in non-diabetic persons.[13] Hypertension is also a major risk factor for cardiovascular events, such as myocardial infarction and stroke as well as for microvascular complications such as retinopathy and nephropathy.[12] Our study also shows similar results. We found 24 of the 47 male (51%) and 23 of 53 female (43%) patients to be hypertensive. Khadkeet al[4] show increased prevalence of lipid abnormalities in diabetic patients compared to normal population. Another study conducted in Pakistan also showed clearly increased incidence of dyslipidemia in diabetic patients compared with normal controls.[9] Other studies show clustering of several cardiovascular risk factors including obesity, hypertension and dyslipidemia in type 2 diabetic patients.[10]

In one similar study conducted in Pakistan, Alamgiret al[11] showed association of various lipid abnormalities with poor glycemic control in diabetic patients. They also found that high total and LDL cholesterol as well as low HDL cholesterol were associated with macrovascular complication including CAD, stroke and peripheral vascular disease. However, in their study, CAD and stroke was more common type of macrovascular disease than peripheral vascular disease. While in our study, it can be appreciated that patients presented with peripheral vascular disease as the most predominant form of the macrovascular disease. Another study conducted in Karachi also showed similar results, but that was an observational study with much emphasis on clinical manifestations of complications depending upon history only and without in-depth evaluation of patients or critical analysis of results Khuwajaet al.[16]

Ever since the Framingham heart study identified the important risk factors associated with CAD,[15] there has been a great stress to reduce the burden of CVD (Cardio Vascular Disease) by modifying these risk factors.[17] Several of these risk factors are associated with diabetes and their risk is increased several times when associated with diabetes mellitus. Thus identifying these risk factors in diabetics and timely intervention can prevent significant number of coronary events in these patients.[18]

Conclusion

This study shows increased incidence of lipid abnormalities and other risk factors in diabetics especially in patients with evidence of macrovascular disease. Hence routine screening and timely treatment for these risk factors can prevent burden of macrovascular complications.

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