Original article:

CORRELATION BETWEEN LIPID PROFILE WITH DURATION,HBa1c VALUES,BMI IN TYPE 2 DM PATIENTS

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ABSTRACT:

The prevalence of Diabetes is increasing at an alarming rate all over the world.among the non communicable diseases diabetes is second highest burden secondary to cardiovascular disease in India. Type 2 diabetes is commonly associated with obesity, hypertension & cardiovascular diseases. Dyslipidemia is one of the major factors for cardiovascular diseases. In diabetes mellitus total Cholesterol, Triglycerides, Low Density Lipoprotein are elevated & High Density Lipoprotein is decreased. Hbaic is widely used as a measure of mean Glycemia, a measure of risk factor for development of diabetic complications.

Aim & Objective: The aim of the study is to measure lipid profile in all diabetic patients & to compare the values between patients having disease of less than 5 years with patients having disease of more than 5 years & with patients having BMI more than & less than 25 & also to compare patients having Hba1c of less than or more than 6.6.

MATERIALS AND METHODS: A total of 100 adult patients diagnosed to have diabetes mellitus were subjected to detailed history followed by clinical examination , BMI measured by standard protocol, laboratory workup including glycemic status and lipid profile after getting informed consent

RESULTS: Hba1c &BMI showed Direct & significant correlation with Total Cholesterol,Triglycerides, LDL & VLDL & Inverse correlation with HDL.There was no difference in BMI ,Glycemic status & lipid profile between male & female patients.

CONCLUSION: These findings suggest that Hba1c & BMI can be used as a good parameter for predicting the Lipid profile in both sexes thereby useful in prevention of any future cardiovascular events.

Keywords: Type 2 diabetes, cholesterol,LDL_c,TGL,VLDLc, Body Mass Index(BMI)

INTRODUCTION

Diabetes mellitus is a global endemic with rapidly increasing prevalence in both developing & developed countries[1].India is declared as the Diabetic Capital of the world by WHO[2]. The prevalence of Diabetes is rapidly rising all over the globe at an alarming rate. Diabetes is second only to cardiovascular disease as a health burden in india[3].Type II Diabetes Mellitus is commonly associated with Obesity, Ethnicity, Sedentary Lifestyles ,Sex , Family history, Hypertension, Smoking & Alcohol consumption[3].However there is now an overwhelming evidence from experimental, epidemiological & intervention studies that obesity is a major risk factor for Type II diabetes Mellitus among all risk factors.Obesity is defined as a Body Mass Index (BMI)

of >30 kg/m^2, according to WHO criteria. Obesity & overweight are significant public health problems worldwide, affecting an estimated one billion persons and contributing to Hypertension, Diabetes Mellitus, Cardiopvascular Disease & Death[5].

Worsening of glycemic control deteriorates lipid & lipoprotein abnormalities in Diabetes Mellitus[4].American Asociation of Clinical Endocrinologists recommend Hba1c level of less than 6.6.The pathogenesis of heart disease in Diabetic patients is complex,but serum lipids are frequently abnormal & likely to contribute to the risk of Cardiovascular disease[5]. Elevated levels of Triglyceride,Total Cholesterol & LDL are documented as risk factors of atherogenesis[5]. In type II Diabetes Mellitus lipid abnormalities are almost the rule[7,8]. 70 to 97%of adults with Type II Diabetes Mellitus have one or more lipid abnormalities[9,10]. The pattern of lipid profile in Type II Diabetes Mellitusis called Diabetic Dyslipidemia or atherogenic Dyslipidemia comprising of raised triglycerides, reduced HDL, & excess small dense LDL particles[11].

Dyslipidemia worsens with Duration of Disease despite treatment & may be the cause for Diabetic Complications. International studies report that increasing age & progression of disease is a risk factor for Dyslipidemia, Decreased Insulin levels, & enhanced insulin resistance in Type II diabetes Mellitus[6].

For a 1% reduction in LDL there is an equivalent reduction in Cardiovascular Disease[12].The main step in the direction of reducing the risk of Cardiovascular Diseaserelated with Diabetes in detection & treatment of Dyslipidemia[13].According to the American Diabetes Association, LDL lowering followed by lowering of Triglyceride and then followed by raising HDL is the order of priority[14].It is well known that Diabetic Dyslipidemia patients have an excess risk of Cardiovascular morbidity & mortality because the lipid particles in these patients are more atherogenic than in the general population[15]. Hence it is important to screen & manage Dyslipidemia in Diabetics in order to reduce morbidity & mortality from Coronary artery disease[15].This study was conducted to know the impact of duration of illness, BMI, Glycemic status on Lipid profile in Type II Diabetic patients

AIM OF THE STUDY

1. To compare the mean levels of lipid profile of type 2 diabetic based on bmi (bmi= <25 & >25)materials and methods

2. To compare the mean levels of lipid profile of type 2 diabetic based on glycemic status(hba1c= < 6.6 & > 6.6)

3. To compare the mean levels of lipid profile of type 2 diabetic based on duration of disease (< 5 years & > 5 years)

SUBJECTS

The present study was conducted on 100 type ii diabetic patients which included both sexes irrespective of the duration of the disease or bmi or their glycemic status after obtaining their informed written consent & their age group ranged from 30 to 70 years.59 patients suffering from diabetes mellitus for less than 5 years & 41 patients of more than 5 years, 34 patients having hba1c of less than 6.6 & 66 patients having hba1c of more than 6.6 & 49 patients having BMI of less than 25 & 51 patients having bmi of more than 25.the data collected from each patient included Age, Sex, Duration Of Disease, Body Mass Index(BMI), Fasting & Post Prandial Glucose Level, Hba1c, Total Cholesterol, Triglycerides, HDL BMI more than 25 was considered to be overweight. statistical analysis was performed using t-test.Significance was defined as p<0.05.Results were analyzed using SPSS software.

BLOOD COLLECTION

5 ml of blood was drawn from all the above subjects from the anterior cubital vein using sterile disposable syringe. While 1ml blood was collected for blood sugar estimation, 4 ml of serum for for lipid profile testing. Estimation of plasma Glucose was by Glucose Oxidase Peroxidase method, Total Cholesterol, Triglycerides by Enzymatic calorimetric method, HDL by

Phosphotungstic acid method ,VLDL Cholesterol & LDL Cholesterol were calculated using the Friedewald Equation, Liporotein (a) by Immunoturbidimetric Method & Hba1c by immunochromatographic method.

RESULTS

Of the 100 patients 42 patients were female and 58 were male ranging from the age group 30-70 years. According to NCEP-ATPIII guideline, Hypercholesterolemia is defined as TC >200 mg/dl, High LDL when value is >100 mg/dl, Hypertriglyceridemia as TAG >150mg/dl, & low HDL when value <40 mg/dl.Dyslipidemia was defined by prescence of one or more than one abnormal serum lipid concentration.Diabetes was defined as per American Diabetic Association (ADA)criteria. The mean Hba1c 6.9%, Total Cholesterol 173.3 mg/dl, TGL 156, HDL 41.3 mg/dl, VLDL 31.6 mg/dl, LDL 100.6 mg/dl was seen in patients having BMI of less than 25 & the mean Hba1c 9.4 %, Total Cholesterol 219.9 mg/dl, TGL236 mg/dl, HDL39.2 mg/dl, VLDL41.8 mg/dl, LDL 136.11mg/dl was seen in patients having BMI of more than 25.By comparing both the groups it is found that though the Hba1c & all the other lipid parameters were elevated in patients having BMI of more than 25 , all these parameters were positively & significantly elevated except HDL which was found to be decreased in patients having BMI of more than 25.The mean BMI 23.7, Total Cholesterol 173.9 mg/dl, TGL 146.8, HDL 41.9 mg/dl, VLDL 29.6 mg/dl, LDL 105.7 mg/dl was seen in patients having Hba1c of less than 6.6 & the mean BMI 27 Total Cholesterol 209.0 mg/dl, TGL223.5 mg/dl, HDL39.3 mg/dl, VLDL40.5 mg/dl, LDL 125.4 mg/dl was seen in patients having Hba1c of more than 6.6. By comparing both the groups it is found that though the lipid parameters were elevated in patients having uncontrolled glycemic status(Hba1c >6.6) , all these parameters were positively & significantly elevated except HDL which was found to be decreased in patients having uncontrolled glycemic status(Hba1c >6.6).

The mean Hba1c 8.03%, Total Cholesterol 194.5 mg/dl, TGL 118, HDL 41.3 mg/dl, VLDL 35 mg/dl, LDL 115 mg/dl was seen in patients having Diabetes for less than 5 years & the mean Hba1c 8.45%, Total Cholesterol 199.4 mg/dl, TGL177 mg/dl, HDL39.5 mg/dl, VLDL37.9 mg/dl, LDL 122mg/dl was seen in patients having Diabetes for more than 5 years. By comparing both the groups it is found that there was no significant difference in lipid levels with effect to duration though Hba1c, was found to be elevated.

DISCUSSION

In the present study , we have evaluated the pattern of lipid profile parameters in Diabetic subjects & its correlation with Hba1c. The levels of Hba1c & lipid profile parameters didn't differ significantly between male & female. The present study has shown a significant rise in total cholesterol, TGL, LDL in patients who were overweight which are well established risk factors for cardiovascular diseases, Hyperinsulinemia, Hypertension[17].Insulin impacts the liver apolipoprotein production which regulates the enzymatic activity of lipoprotein lipase & cholesterol ester transport protein.These could be the likely causes of of dyslipidemia in Diabetes Mellitus as reported by Goldberg[20].Insulin deficiency also reduces the activity of hepatic lipase & several other steps in the production of biologically active lipoprotein lipasemay also be altered in Diabetes Mellitus[21]. Both Lipid profile & body fat have been shown to be the important predictors for metabolic disturbances. Obesity is said to predispose individuals to Diabetes[18] while Dyslipidemia is associated with Obesity & Diabetes Mellitus[19]. By comparing the groups it is found that there was no significant difference in lipid levels with effect to duration of diabetes .This is in contrast to the study of Syed M Farid[22] in which lipid profile was found to be more abnormal with increase in duration of Diabetes Mellitus. On comparison with the groups it is found that though the lipid parameters were elevated in patients having uncontrolled glycemic status(Hba1c >6.6) , all these parameters were positively & significantly elevated except HDL which was found to be decreased in patients having uncontrolled glycemic status(Hba1c >6.6). A positive correlation between Hba1c[23].Khan et al also reported that severity of Dyslipidemia

increases in patients with higher Hba1c value[24]. Obesity , elevated levely of Hba1c and Dyslipidemia are independent risk factors for Cardiovascular disease.Reducing Body weight & improving Glycemic control can reduce the risk of cardiovascular events

CONCLUSION

There was no significant difference in glycemic status or lipid profile in males & females. BMI & Hba1c showed positive correlation with Total Cholesterol,LDL,TGL,VLDL & negative correlation found with HDL levels.These findings suggest that Hba1c & BMI can be used as a good parameter for predicting the Lipid profile in both sexes thereby useful in prevention of any future cardiovascular events.

COMPARISON OF THE MEAN LEVELS OF BIOCHEMICAL PARAMETERS OF TYPE 2 DIABETIC BASED ON BMI (BMI= <25 & >25)						
BMI	**Hba1c**	**TOTAL CHOLESTEROL**	**TGL**	**HDL**	**VLDL**	**LDL**
<25	6.9	173.3	156	41.3	31.6	100.6
>25	9.4	219.9	236	39.2	41.8	136.11
	0.000	0.000	0.006	0.238	0.019	0.000
SIG	**HS**	**HS**	**HS**	**NS**	**HS**	**HS**

COMPARISON OF THE MEAN LEVELS OF BIOCHEMICAL PARAMETERS OF TYPE 2 DIABETIC BASED ON GLYCEMIC STATUS(Hba1c= < 6.6 & > 6.6)						
Hba1c	**BMI**	**TOTAL CHOLESTEROL**	**TGL**	**HDL**	**VLDL**	**LDL**
< 6.6	23.7	173.9	146.8	41.9	29.6	105.7
> 6.6	27.0	209.0	223.5	39.3	40.5	125.4
	0.000	0.000	0.013	0.172	0.016	0.049
SIG	**HS**	**HS**	**HS**	**NS**	**HS**	**HS**

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DURATION OF DISEASE	Hba1c	TOTAL CHOLESTEROL	TGL	HDL	VLDL	LDL
<5 YEARS	8.03	194.5	178	41.3	35	115
> 5 YEARS	8.45	199.4	177	39.5	37.9	122
	0.320	0.610	0.227	0.304	0.506	0.442
SIG	NS	NS	NS	NS	NS	NS

COMPARISON OF THE MEAN LEVELS OF BIOCHEMICAL PARAMETERS OF TYPE 2 DIABETIC BASED ON DURATION OF DISEASE (< 5 YEARS & > 5 YEARS)

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