Asia Pacific Journal of Research
A peer reviewed international Journal
IMPACT FACTOR : 6.58
Print -ISSN -2320 - 5504
Online-E-ISSN - 2347 - 4793

PATTERN OF DYSLIPIDEMIA IN PRE-DIABETES AND DIABETES-A PILOT STUDY

Dr. MK Bhatnagar*, Dr. Akshay Goel**,Dr Rakesh Kumar Jagdish, Dr. Ritika Sud*******

**Professor of Medicine, Santosh Medical College & Hospital, Ghaziabad. Ex-Director Professor of Medicine, Lady Hardinge Medical College, New Delhi.*

***Senior Resident, Medicine, Lady Hardinge Medical College, New Delhi.*

****Assistant Professor of Medicine ,Santosh Medical College & Hospital ,Ghaziabad.*

*****Associate Professor of Medicine, Lady Hardinge Medical College, New Delhi.*

ABSTRACT

Lipids play a critical role in pathogenesis of macrovascular complications of diabetes. Pre-diabetes also been shown to be associated with increased risk of atherosclerosis. This study was planned to compare lipid profiles of pre-diabetes and diabetes. Total 60 cases were taken (30 Pre-diabetic and 30 Diabetic). Diabetics and pre-diabetics who met the criteria(for pre-diabetes FBS>100 to 125mg/dl and PPBS>140 to 199mg/dl,HbA1c 5.7 to 6.5%, for diabetes, FBS>125mg/dl and PPBS>200mg/dl,HbA1c>6.5%).

The fasting total cholesterol and triglyceride level of two groups were compared. The mean value of total cholesterol were – Prediabetics-170.57± 26.18mg/dl and diabetics 171.23± 33.79mg/dl , which was statistically not significant(p=0.746).The fasting value of triglyceride in pre-diabetics was 131.1± 29.36mg/dl and in diabetics 164.950± 73 mg/dl which is statistically significant(p<0.01).Thus we concluded that as pre-diabetes progress to diabetes ,the fasting triglyceride level rises significantly whereas total cholesterol is not much affected. This rise in triglyceride levels can be explained on the basis of increase in insulin resistance as the pre-diabetic progress to diabetic state. We suggest that the lifestyle modification, dietary restriction and treatment of dyslipidemia should be encouraged early in pre-diabetic state.

Keywords: Diabetes, Pre-diabetes, Diabetic dyslipidemia, Total cholesterol, Triglyceride.

Introduction:

Cardiovascular disease (CVD) is the leading cause of death in patients with type 2 diabetes mellitus (T2DM).[1] Dyslipidemia, frequently occurring in T2DM patients, plays a critical role in the acceleration of macrovascular atherosclerosis and contributes to the excess risk of CVD.[2] The dyslipidemia in T2DM is, in general, characterized by elevated triglycerides, reduced high-density lipoprotein (HDL) cholesterol, and predominant presence of small dense low density lipoprotein (sdLDL) particles. Apparently similar abnormalities in serum lipid profiles have also been observed in the pre-diabetic individuals, and the abnormalities are attributed to obesity, hyperinsulinemia and glucose intolerance.[3,4] Though pre-diabetes has been associated with an increased risk of CVD events compared to normal, the association is somewhat less than that for overt diabetes.[5,6] Apart from the differences in the plasma peak

levels of glucose and/or insulin, difference in lipid profiles has also been proposed as a possible explanation for this. However, there is lack of clarity with regard to the nature and extent of this difference.

Aim of the study:

To compare the lipid profiles of pre-diabetic and diabetic individuals.

Material and Methods:

Study Design: Observational Cross-sectional Study

Study Population: Study participants were divided into two groups – Pre-diabetes and Diabetes.

Inclusion Criteria:

- Fulfilling the diagnostic criteria for pre-diabetes or diabetes as mentioned below:

Pre-diabetes

- Fasting plasma glucose of 100 to 125 mg/dL (fasting is defined as no caloric intake for at least 8 hours)
- Two hour plasma glucose of 140 to 199 mg/dL during an oral glucose tolerance test
- HbA1c levels between 5.7 and 6.4%

Diabetes

- Fasting plasma glucose greater than or equal to 126 mg/dL
- Two hour plasma glucose of greater than or equal to 200 mg/dL during an oral glucose tolerance test
- HbA1c levels greater than or equal to 6.5%
- In a patient with classic symptoms of hyperglycemia, a random plasma glucose of greater than or equal to 200 mg/dL

Exclusion Criteria:

- Patients receiving any form of lipid-lowering therapy
- Those not willing to participate in the study

Sample Collection:

Venous samples from the patients were collected in standardized EDTA, fluoride and plain vials under aseptic conditions for carrying out the measurements of HbA1c, plasma glucose and fasting lipid profile.

Observations and Results:

The study included 30 pre-diabetic and 30 diabetic patients each.

Out of the 60 patients, 29 (48.33%) were males and 31 (51.67%) were females. Among the 30 pre-diabetics, 15 (50%) were males and 15 (50%) were females. Out of the 30 diabetics, 14 (46.67%) were males and 16 (53.33%) were females. There was no significant difference in the sex distribution between the pre-diabetes and diabetes groups ($p = 0.94$). The sex distribution of the study population is depicted in Figures 1 & 2.

ISSN (Print) : 2320-5504
ISSN (Online) : 2347-4793

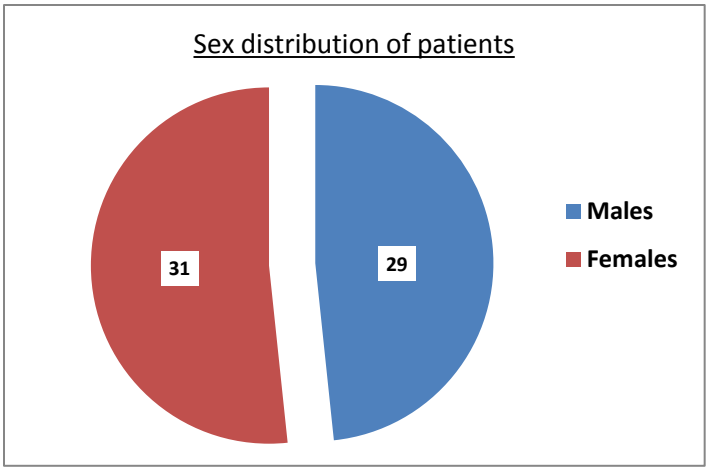

Figure 1: Sex distribution of the total patients studied

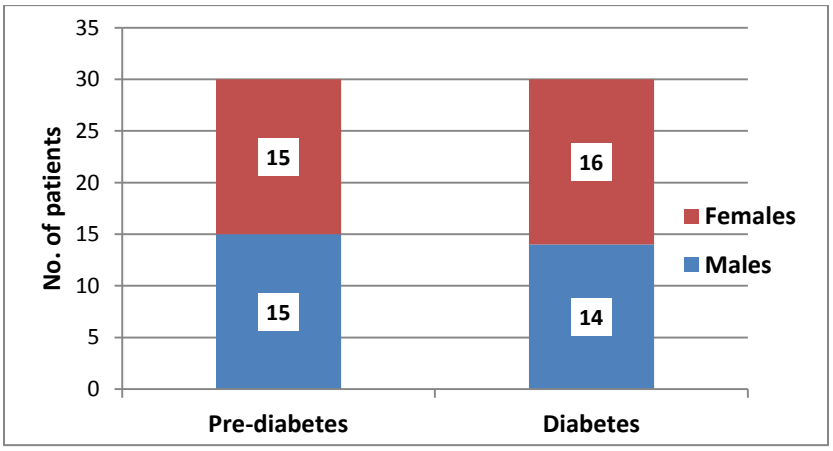

Figure 2: Sex distribution of the pre-diabetes and diabetes groups

The age distribution of the pre-diabetics and diabetics is shown below in figure 3.

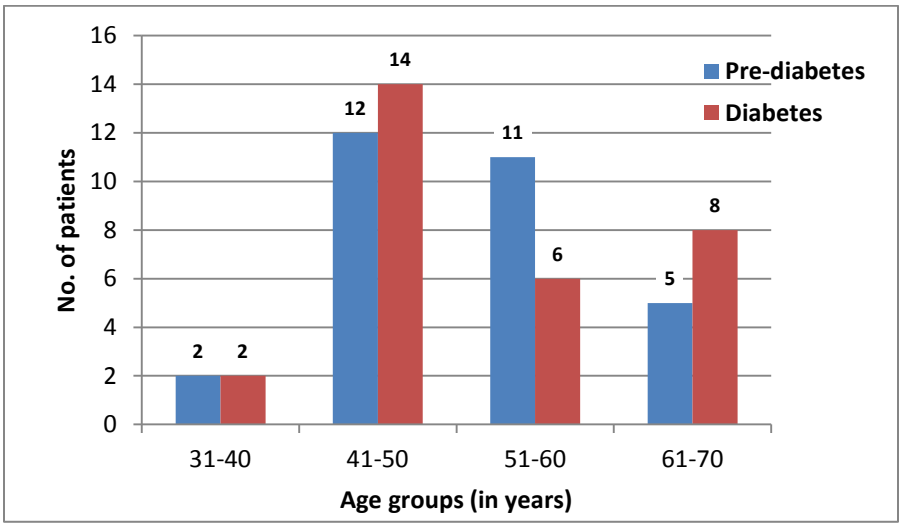

Figure 3: Age distribution of pre-diabetes and diabetes groups

The mean age of the pre-diabetics was found to be 52.37 ± 8.89 years. The diabetics were found to have a mean age of 52.8 ± 9.44 years. There was no significant difference in the age distributions of the pre-diabetics and diabetics in our study (p = 0.931). The mean age and standard deviation of the two groups has been represented in figure 4.

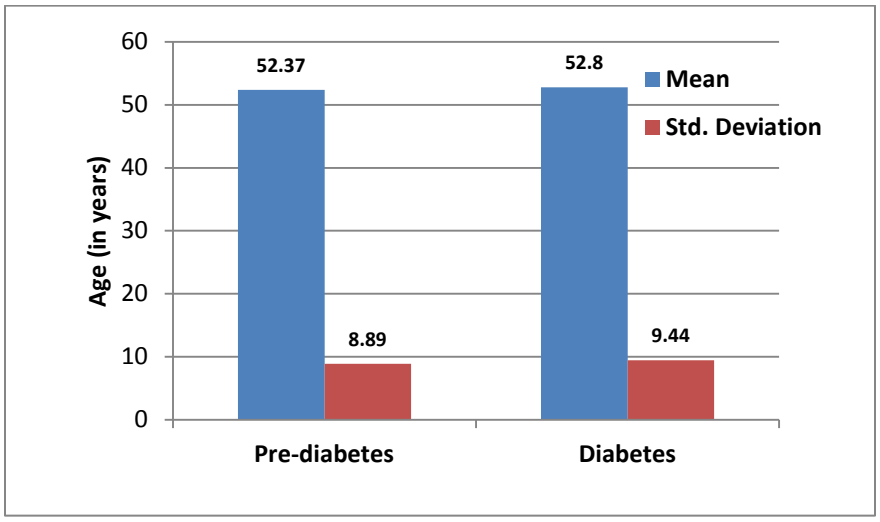

Figure 4: Mean age and standard deviation of pre-diabetes and diabetes groups

When the fasting lipid profiles (total cholesterol and triglycerides levels) of the two groups were compared, the following results were found. The mean value of total cholesterol in the pre-diabetics and diabetics was 170.57 ± 26.18 mg/dL and 171.23 ± 33.79 mg/dL respectively. This difference in the mean value of total cholesterol between the two groups was not found to be statistically significant (p = 0.746).

The mean value of fasting triglycerides in the pre-diabetics was 131.1 ± 29.36 mg/dL, whereas in the diabetic group it was found to be 164.9 ± 50.73 mg/dL. This mean value of triglyceride in the diabetics was found to be significantly higher compared to the pre-diabetics (p < 0.01). This has been depicted in figure 5.

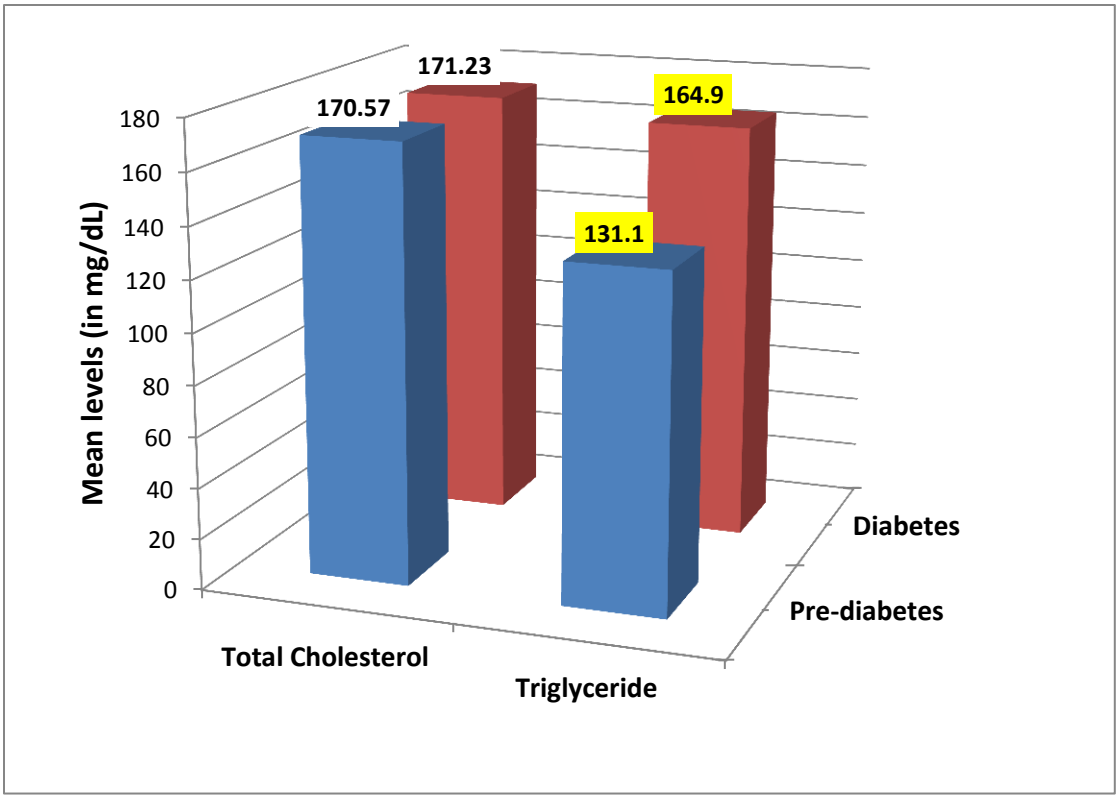

Figure 5: Comparison of total cholesterol and triglyceride levels between pre-diabetes and diabetes study groups

Discussion and Conclusion:

When age- and sex-matched pre-diabetics and diabetics were compared, the total cholesterol values did not vary significantly between them. But the fasting serum triglyceride values were found to be much higher in the diabetes group.

A likely explanation of this result is as follows. As we go from a state of pre-diabetes to diabetes, the glycemic status is worsening due to an increase in insulin resistance. It has been suggested that insulin resistance can play a pivotal role in the development of hypertriglyceridemia.[7] When adipocytes become insulin-resistant, plasma concentration of free fatty acids (FFAs) rises as a result of increased intracellular hydrolysis of triglycerides in adipocytes.[8] The elevated levels of plasma FFAs and resultant increased flux of FFAs to liver and muscle, inhibit for insulin to suppress hepatic glucose production and to stimulate skeletal muscle glucose uptake.[9] The increased flux of FFAs, glucose and insulin into liver can induce overproduction of triglyceride-rich VLDL ("large VLDL") particles.

This obvious rise in triglyceride levels as insulin resistance worsens may be one of the important factors responsible for the starkly high CVD risk in diabetics compared to pre-diabetics. However, larger studies are needed to confirm the same.

References:

1) Haffner SM, Lehto S, Rönnemaa T, Pyörälä K, Laakso M. Mortality from coronary heart disease in subjects with type 2 diabetes and in non-diabetic subjects with and without prior myocardial infarction. New England Journal of Medicine. 1998; 339:229-34.

2) Garg A, Grundy SM. Management of dyslipidemia in NIDDM. Diabetes Care. 1990; 16:434-44.

3) Shaw JT, Purdie DM, Neil HA, Levy JC, Turner RC. The relative risks of hyperglycemia, obesity and dyslipidemia in the relatives of patients of type II diabetes mellitus. Diabetologia. 1999; 42:24-7.

4) Haffner SM, Stern MP, Hazuda HP, Mitchell BD, Patterson JK. Cardiovascular risk factors in confirmed prediabetic individuals. Does the clock for coronary heart disease start ticking before the onset of clinical diabetes? Journal of the American Medical Association. 1990; 263:2893-8.

5) The DECODE Study Group, The European Diabetes Epidemiology Group. Glucose tolerance and cardio-vascular mortality: Comparison of fasting and 2-hour diagnostic criteria. Archives of Internal Medicine. 2001; 161:397-404.

6) The DECODE Study Group, The European Diabetes Epidemiology Group. Is the current definition for diabetes relevant to mortality risk from all causes and cardiovascular and no cardiovascular diseases? Diabetes Care. 2003; 26:688-96.

7) Schwartz SL. Diabetes and dyslipidemia. Diabetes, Obesity and Metabolism. 2006; 8:355-64.

8) Ginsberg HN. Insulin resistance and cardiovascular disease. Journal of Clinical Investigation. 2000; 106:453-8.

9) Kahn BB, Flier JS. Obesity and insulin resistance. Journal of Clinical Investigation. 2000; 106:473-81.

Correspondence Author

Professor Dr M K Bhatnagar,(MD,FICP,MNAMS)

Professor of Medicine

Santosh Medical College and University, Pratap Vihar,Ghaziabad 201009

Ex Director Professor of Medicine

Lady Hardinge Medical college ,New delhi