ORIGINAL ARTICLE

# EVALUATION OF PATTERN OF DYSLIPIDEMIA IN TYPE 2 DIABETICS IN SWAT

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## ABSTRACT

**Background:** Type 2 diabetes accounts for more than 90% cases of diabetes and is a major burden due to its rising prevalence and complications. The most important risk factor for these complications in diabetes is dyslipidemia. The objective of this study was to evaluate the pattern of dyslipidemia in patients with type 2 diabetes presenting in Saidu Teaching Hospital, Swat.

**Material & Methods:** The study comprised of 100 patients, 50 with diabetes and 50 non-diabetic controls. The serum cholesterol, triglycerides, high density lipoprotein cholesterol, low density lipoprotein cholesterol of diabetic and controls were compared.

**Results:** Type 2 diabetic subjects had significantly higher values of triglycerides, $p<0.001$ and low level of high density lipoprotein cholesterol, $p<0.001$, while low density lipoprotein cholesterol, $p=0.101$, and serum cholesterol, $p= 0.273$, had no statistical significant difference between the two groups.

**Conclusion:** The pattern of dyslipidemia observed in diabetic patients includes raised triglycerides, low high-density lipoprotein cholesterol and slightly raised low density lipoprotein cholesterol.

**KEY WORDS:** Dyslipidemia, Diabetes mellitus, Type 2 diabetes mellitus.

## INTRODUCTION

Diabetes mellitus (DM) is a major public health challenge in the 21st century with over 190 million worldwide suffering from the disease now, and with a potential to have 324 million by 2025. DM is a metabolic pathology characterized by systemic circulatory glucose accrual, accompanied by diminishing cellular glucose uptake and metabolism, as well as altered lipids and protein metabolism.[1] These abnormalities are the consequences of either inadequate insulin secretion or impaired insulin action or both. [2] The main types of diabetes are type 1 and type 2 diabetes. Type 1 diabetes results from an irreversible loss of pancreatic B-cells and type-2 diabetes is primarily caused by impaired insulin action, but the risk of developing of type 2 diabetes rises exponentially with increasing obesity and insulin resistance and therefore temporary restriction of glucose control in patients with type 2 diabetes is often achieved through weight loss and increased physical activity.[3]

The world faces a huge clinical and economical burden due to the explosive increase in diabetes that has occurred[4] over the past several decades owing to the advancing age of the population, a substantially increased prevalence of obesity, and decreased physical activity, all of which have been attributable to a western lifestyle.[5]

Type 2 diabetes accounts for more than 90 % of all cases of diabetes, and is a major burden due to its rising prevalence.

DM if left untreated diabetes can lead to serious problems like macrovascular and microvascular complications. The microvascular complications include retinopathy, nephropathy, and neuropathy (both distal polyneuropathy and autonomic neuropathy),[1] while the macrovascular complications of diabetes include angina, myocardial infarction, transient ischemic attack, and stroke.[6]

Dyslipidemia increases the risk of atherosclerosis which in turn increases the risk of cardiovascular disease, heart attack and stroke and according to US Center for Disease Control and Prevention it affects 70% to 97% of people with diabetes. If one has diabetes, lowering ones high triglycerides or cholesterol level is just as important as controlling blood sugar and blood pressure that is because people with diabetes are at high risk for dyslipidemia.[7]

The pattern of dyslipidemia frequently observed in people with diabetes includes raised triglycerides, decreased high density lipoprotein cholesterol (HDL-C) and slightly raised or normal plasma concentrations of low density lipoprotein cholesterol (LDL-C), with LDL-C, not being significantly different from that in non-diabetic individuals.[8,9] As a result some have argued that to reduce the risk of future cardiovascular events in people with diabetes it may be more important to modify HDL-C and triglycerides level than to lower total cholesterol or LDL-C levels while in a study of dyslipidemia in patients with type 2 diabetes, decreased HDL-C along with increased LDL-C levels were reported. So lipid management is critical in the diabetic patients.[10]

The present study was designed to evaluate lipid profile (serum cholesterol, triglycerides, HDL-C and LDL-C levels) and the pattern of dyslipidemia in type 2 diabetics in district Swat, Pakistan.

## MATERIAL AND METHODS

This was a cross-sectional study carried out in the Department of Physiology, Saidu Medical College, Swat, in collaboration with the Department of Medicine, Saidu Teaching Hospital, Swat. The study comprised of 100 subjects between 40-90 years of age, They were divided into two groups, 50 subjects with DM and 50 control without DM. Subjects taking medications known to affect lipid profile, with endocrinopathies (e.g. down syndrome, cushing syndrome, acromegally, thyrotoxicosis, etc) or any other major illness were excluded from the study. After obtaining informed consent, a detailed history, general physical and systemic examination was performed. Blood pressure was measured in the right arm in a sitting position Blood was drawn to estimate fasting lipid profile (serum cholesterol, triglycerides, HDL-C and LDL-C), random and fasting blood sugar.

Statistical analysis was done using SPSS version 16. Mean and standard deviation (SD) were determined for quantitative data. Comparative analysis between the two groups was done using two tailed student's t-test. P value $<0.05$ was considered statistically significant, while $p<0.001$ was taken as highly significant.

## RESULTS

There were a total of 100 subjects, 41% were males and 59% were females. Out of these 21(51.22%) males and 29(49.15%) female had diabetes. In diabetics group 94% patients had dyslipidemia while 42% in non-diabetics had dylipidemia.

**Table 1** Shows fasting and random blood sugar level in diabetic and control group. Fasting blood sugar level of diabetic was $218.5 \pm 74.9$mg/dl and that of control was $95 \pm 14$ mg/dl. Similarly random blood sugar level of diabetic was $304.7 \pm 79.2$ mg/dl and that of control was $140.8 \pm 20.45$ mg/dl. Both fasting and random was statistically highly significant ($p<0.001$) in diabetic as compared to control group.

**Table 2** shows that there was no statistically significant difference in systolic and diastolic blood pressure in diabetic and control group.

**Table 3** Shows lipid profile in both diabetic and control group. Triglyceride level in diabetic group was significantly lower than in the control group ($175.2 \pm 84.5$ mg/dl vs.$126.4 \pm 41.3$ mg/dl, $p< 0.001$). HDL-C level in diabetic group was also significantly lower as compared to control group

**Table 1: Blood sugar in diabetic and Control group.**

| | Diabetic (n=50) | Control (n=50) | p-value |
|---|---|---|---|
| Fasting blood sugar (mg/dl) | 218.5 ± 74.9 | 95.1± 14.1 | <0.001 |
| Random blood sugar (mg/dl) | 304.7 ± 79.2 | 140.84 ± 20.45 | <0.001 |

The values are expressed as mean ± SD (Standard Deviation).

**Table 2: Systolic and diastolic blood pressure in diabeic and Control group.**

| | Diabetic (n=50) | Control (n=50) | p-value |
|---|---|---|---|
| Systolic blood pressure (mm Hg) | 147 ± 25.5 | 141.7 ± 37.3 | 0.405 |
| Diastolic blood pressure (mm Hg) | 92.3 ± 12.3 | 87.5 ± 15.8 | 0.093 |

The values are expressed as mean ± SD (Standard Deviation).

**Table 3: Lipid profile in diabetic and non-diabetic group.**

| | Diabetic (n=50) | Control (n=50) | p-value |
|---|---|---|---|
| Serum Cholesterol (mg/dl) | 182.1 ± 52.5 | 170.6 ± 51.3 | 0.273 |
| Triglyceride (mg/dl) | 175.2 ± 84.5 | 126.4 ± 41.3 | <0.001 |
| HDL-C (mg/dl) | 28.4 ± 9.1 | 36.8 ± 12.2 | <0.001 |
| LDL-C (mg/dl) | 124.3 ± 50.8 | 108.2 ± 46.8 | 0.101 |

The values are expressed as mean ± SD (Standard Deviation).

(28.4±9.1 mg/dl vs. 36.8±12.2 mg/dl, p<0.001). While there was no statistically significant difference in diabetic patients and control groups regarding LDL-C and serum cholesterol level, (124.3±50.8 mg/dl vs.108.2±46.8 mg/dl, 0.101 and 182.1±52.5 vs.170.6±51.3 mg/dl, p=0.273 respectively).

## DISCUSSION

Type 2 diabetes accounts for more than 90% of all cases of diabetes in most countries and hence the major burden is due to its rising prevalence.[4] The most important risk factor for these complications in diabetes is dyslipidemia. The present study was designed to evaluate the pattern of dyslipidemia in our study population.

The pattern of dyslipidemia in our study showed significantly higher level of triglycerides, low level of HDL-C in diabetic group, while LDL-C and serum cholesterol were not significantly different in both groups.

The results in our study are similar to the results reported by Asia Pacific Cohort Studies Collaboration, that the pattern of dyslipidemia frequently observed in people with diabetes includes raised triglycerides, decreased levels of HDL-C and slightly raised or normal plasma concentrations of LDL-C.[11]

In our study dyslipidemia was present in 94% of patients with diabetes and 42% patients in control group. The results in our study are similar to the results reported by the U.S Centers for Disease Control and Prevention showing that dyslipidemia affects 70% to 97% of people with diabetes.[14]

In a report by Farmer[7] the role of dyslipidemia as causal factor in vascular disease associated with diabetes was previously downplayed because total cholesterol was frequently normal or minimally elevated in diabetic patients. Serum cholesterol in diabetic and control subjects showed no statistical difference. Our study also showed no significant difference between diabetic and control group regarding serum cholesterol.[1]

Data from the Paris Prospective Study[12] and the UKPDS shows that triglycerides in diabetic patients are higher than in the general population.[13] In our study triglycerides level were also significantly higher in diabetics as compared to non-diabetic group.

Several biochemical variables which might be relevant to microvascular or macrovascular disease are monitored at yearly intervals and lipid profile measurement is among them. The routine measurement of triglyceride and of total HDL-C and LDL-Cholesterol will allow us the assessment of these important risk factors. Regular screening of the population in middle age to detect diabetes before its complications ensue may be required, to prevent complications of diabetes.

## CONCLUSION

The pattern of dyslipidemia observed in diabetic patients included raised triglycerides, decreased levels of high density lipoprotein cholesterol and slightly raised low density lipoprotien cholesterol.

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