

## Association of Dyslipidemia with Diabetes Mellitus Type 2

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### Abstract

**Objective:** to investigate the association of dyslipidemia patterns among newly diagnosed young diabetic patients' and its role in cardiovascular diseases.**Study Design:** Cross sectional study.**Place and Duration:** Study was conducted at medical unit, Service Hospital Lahore and Bahawal Victoria Hospital Bahawalpur. Duration of study was February 2017 to February 2018.**Methodology:** All the patients were adult who were diagnosed with Diabetes Mellitus. Data collection was done via non probability consecutive sampling included patients. Main outcome variables are cholesterol level, HDL, LDL and triglycerides. SPSS version 24 was used to analyze data. P value  $\leq 0.05$  was taken as significant. **Results:** Triglycerides was noted as less than 180 mg/dl in 9.7% patients and more than 180 mg/dl in 90.3% patients. LDL was noted as less than 180 mg/dl in 41.9% patients and more than 180 mg/dl in 58.1% patients. HDL (males) was observed as more than 35 mg/dl in 21% patients and less than 35 mg/dl in 79% patients. Similarly 61.3% controls having  $<200$ mg/100ml cholesterol and 38.7% having  $>200$ mg/100ml cholesterol.**Conclusion:** Results of our study reveal that dyslipidemia is a known risk factor for causing cardiovascular diseases among diabetic patients; it should be addressed and managed accordingly at the onset of diabetes. Aggressive management of dyslipidemia reduced the risk of cardiovascular diseases in diabetic patients.

**Keywords:** Dyslipidemia, Diabetes Mellitus, low density lipoproteins, high density lipoproteins, insulin.

### Introduction

Among the chronic diseases diabetes mellitus is the common cause of mortality worldwide. Prevalence rate of diabetes mellitus is 6.4% in 2010 means 285 million people<sup>1</sup>. According to a survey its prevalence rate increased to 7.7% in year 2030 which means 439 million people<sup>2</sup>. Diabetes is also a risk factor of coronary heart disease which is associated with many cardiovascular diseases or complications. It also known that dyslipidemia is a major cause of vascular complications in patients who were suffering from type 2 diabetes mellitus<sup>3</sup>.

Dyslipidemia affects approximately 73% of population and leads to 80% of death of diabetic patients which also involve the cardiovascular system<sup>4</sup>. In Asian population Indians have a higher risk of coronary heart disease as compared to white population. According to data of United Kingdom elevated low density lipoprotein c and decreased high density lipoprotein c both are indicators of coronary heart disease in diabetic patients<sup>5</sup>. Normal lipid concentration and composition of lipid particles are more harmful in diabetics than non diabetic subjects.

Risk of the coronary heart disease can be reduced by lowering the lipid concentration in diabetic patients; it is as beneficial as in non diabetic patients<sup>6</sup>. Term dyslipidemia refers to the abnormality of lipid production which means deficiency or overproduction of lipid. In laboratory investigations elevation of total serum cholesterol shows dyslipidemia which may include "good" HDL concentration and "bad" triglycerides and LDL lipoprotein and very low density lipoprotein concentrations in blood circulation<sup>7</sup>.

Estimation of dyslipidemia depends upon socioeconomic status, ethnic and cultural standard of population. Atherogenic dyslipidemia is a predisposing risk factor for CVS diseases<sup>8</sup>. Without any risk factor like smoking, hyperlipidemia and hypertension diabetes alone is strongly responsible for high rate morbidity and mortality<sup>9,10</sup>. Addition of this risk factor is a big danger for human health and economic burden for family and health system. We conducted this study to evaluate the association of dyslipidemia and diabetes type 2.

### Methodology

This cross sectional study was conducted in department of medicine Service Hospital Lahore and Bahawal Victoria Hospital Bahawalpur from February 2017 to February 2018. Study was started after ethical approval from hospital officials of ethical committee and written informed consent from patients. Patients admitted in medical unit of hospital and diagnosed as diabetes mellitus, age 40-70 years without complications and laboratory investigations show dyslipidemia were selected for study. A total of 120 patients were included in the study 60 were diabetics and 60 controls. Patients of diabetes type I, complications of diabetes mellitus and with co-morbid diseases were excluded in the study. Laboratory investigations were total cholesterol, triglycerides, HDL, LDL that is performed for both control and case groups. All data was noted on pre designed performa.

Data was entered and analyzed by using SPSS version 24. Mean and standard deviation were calculated for quantitative data like age and frequency percentages were calculated for qualitative data like in patients like cholesterol more than and less than 200 mg/dl, triglycerides, HDL and LDL. Chi square test was applied to see association among variables. P value  $\leq 0.05$  was considered as significant.

## Results

One hundred and twenty four patients were included in the present study, divided into two groups; n=62 patients type 2 diabetes and n=62 were controls. n=8 (12.9%) type 2 diabetes patients having <200mg/100ml cholesterol and n=54 (87.1%) having >200mg/100ml cholesterol. Triglycerides was noted as less than 180 mg/dl in n=6 (9.7%) patients and more than 180 mg/dl in n=56 (90.3%) patients. VLDL was observed as less than 180 mg/dl in n=8 (12.9%) patients and more than 180 mg/dl in n=54 (87.1%) patients. LDL was noted as less than 180 mg/dl in n=26 (41.9%) patients and more than 180 mg/dl in n=36 (58.1%) patients. HDL (males) was observed as more than 35 mg/dl in n=13 (21%) patients and less than 35 mg/dl in n=49 (79%) patients. While, n=38 (61.3%) controls having <200mg/100ml cholesterol and n=24 (38.7%) having >200mg/100ml cholesterol. Triglycerides was noted as less than 180 mg/dl in n=27 (43.5%) patients and more than 180 mg/dl in n=35 (56.5%) patients. VLDL was observed as less than 180 mg/dl in n=25 (40.3%) patients and more than 180 mg/dl in n=37 (59.7%) patients. LDL was noted as less than 180 mg/dl in n=55 (88.7%) patients and more than 180 mg/dl in n=7 (11.3%) patients. HDL (males) was observed as more than 35 mg/dl in n=49 (79%) patients and less than 35 mg/dl in n=13 (21%) patients. The differences were statistically significant. P-value  $\leq 0.05$  considered as significant. (Table. I).

**Table. I**

| Variable             | Type 2 diabetes<br>n=62 | Controls<br>n=62 | P-value |
|----------------------|-------------------------|------------------|---------|
| <b>Cholesterol</b>   |                         |                  |         |
| <200mg/100ml         | n=8 (12.9%)             | n=38 (61.3%)     | 0.000   |
| >200mg/100ml         | n=54 (87.1%)            | n=24 (38.7%)     |         |
| <b>Triglycerides</b> |                         |                  |         |
| Less than 180 mg/dl  | n=6 (9.7%)              | n=27 (43.5%)     | 0.000   |
| More than 180 mg/dl  | n=56 (90.3%)            | n=35 (56.5%)     |         |
| <b>VLDL</b>          |                         |                  |         |
| Less than 180 mg/dl  | n=8 (12.9%)             | n=25 (40.3%)     | 0.001   |
| More than 180 mg/dl  | n=54 (87.1%)            | n=37 (59.7%)     |         |
| <b>LDL</b>           |                         |                  |         |
| Less than 180 mg/dl  | n=26 (41.9%)            | n=55 (88.7%)     | 0.000   |
| More than 180 mg/dl  | n=36 (58.1%)            | n=7 (11.3%)      |         |
| <b>HDL</b>           |                         |                  |         |
| More than 35 mg/dl   | n=13 (21%)              | n=49 (79%)       | 0.000   |
| Less than 35 mg/dl   | n=49 (79%)              | n=13 (21%)       |         |

## Discussion

In a study conducted by Padmini O et al<sup>11</sup> reported that diabetes mellitus type 2 and dyslipidemia have great association. Low density and high density cholesterol therapy is necessary to avoid cardiovascular complications. Results of our study show similar results that in diabetic type 2 patients dyslipidemia is the major cause of cardiovascular diseases. This study is comparable with our study. Another study was conducted by Vijayaraghavan K et al<sup>12</sup> on this topic and concluded that type 2 diabetes highly associated with atherogenic property of lipids. Raised level of triglyceride and low level of high density triglycerides are risk factors of cardiovascular diseases.

Another study was conducted on this topic in by Daniel MJ et al<sup>13</sup> and reported that low density lipoprotein C is highly associated with development of atherosclerosis in type 2 diabetic patients. Coronary heart disease can be avoided in diabetic patients by controlling high and low density cholesterol. In previous few years prevalence rate of diabetes increased to dramatical values. This study is also comparable with our results.

Mooradian AD et al<sup>14</sup> conducted a study on this topic and reported that hyper lipidemia is a strong risk factor for patients of diabetes mellitus. Station therapy is necessary for control of cholesterol level which reduced the cardiovascular risk. He reported that every diabetic patient with dyslipidemia is a candidate of statin therapy. Findings of this study are also similar to our study results. Mortality rate and cardiovascular diseases in diabetic hyperlipidemia patients is increasing day by day.

Another clinical trial was conducted by Siddiqui AH et al<sup>15</sup> and reported that to avoid complications of coronary artery and other vascular system along with strict glycemic control hyperlipidemia management cannot be neglected. Like previous studies on this topic our study also concluded that control of lipid level in diabetic patients reduce the risk of coronary artery diseases significantly.

In a study Ahmad N et al<sup>16</sup> compared patients with good glycemic control with poor glycemic control in terms of lipid profile. A total of 78 patients included in study that were diabetic and hypertriglyceridemia was

diagnosed, out of them 46 patients have poor glycemic control means HbA1c is more than 8%. This study concluded that good glycemic control have strong association with lipid level control mechanism. This study can be compared with our study.

Laakso M et al<sup>17</sup> conducted a study on glycemic control and its effects on other systems and reported that good glycemic control cannot be ignored in diabetic patients (HbA1c less than 6.1%). Aggressive management of hyperlipidemia and hypertension is also helpful for better outcomes in later age. Many cardiovascular diseases can be avoided by controlling hyperglycemia and hyperlipidemia. Many studies other than our study reported such type of conclusion.

A local study by Naheed T et al<sup>18</sup> also conducted on this topic, he observed similar outcomes but on basis of duration of diabetes. According to his results serum cholesterol was  $191.72 \pm 5.72$  in patients who were suffering from more than ten years. Patients with shorter duration of diabetes were having HDL level  $36.25 \pm 0.45$ , triglyceride level was  $191.83 \pm 8.05$  and LDL was  $127.1 \pm 3.99$ . He reported strong association between duration of diabetes and hyperlipidemia.

In another study by Watts GF et al<sup>19</sup> reported that increase in HDL and triglyceride level and decrease in LDL level reduce the risk of coronary disease incidence in diabetic patients. This definite reduction in cardiovascular risk make the lipid lowering therapy cost effective which also considered as economic burden for country and decrease the ranking of health system. Conclusion of this study is also similar to our results.

In his study Besseling J et al<sup>20</sup> also reported similar findings as in previous studies that diabetes type 2, hyperlipidemia and cardiovascular diseases have close relationship. Increase in hyperlipidemia increase the risk of cardiovascular disease especially coronary artery diseases. Aggressive management of hyperglycemia and dyslipidemia reduce the risk of many cardiovascular diseases in diabetic patients.

## Conclusion

Results of our study reveal that dyslipidemia is a known risk factor for causing cardiovascular diseases among diabetic patients; it should be addressed and managed accordingly at the onset of diabetes. Aggressive management of dyslipidemia reduced the risk of cardiovascular diseases in diabetic patients.

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