Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i3.4955

INVESTIGATING THE RELATIONSHIP BETWEEN LIPID PROFILES AND POTENTIAL RISK REDUCTION OF ATHEROSCLEROTIC CARDIOVASCULAR DISEASE IN DIABETIC INDIVIDUALS.

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Abstract:
Objectives: To assess the effectiveness of Lipid therapy in lowering atherosclerotic cardiovascular disease (ASCVD) risk in Diabetic individuals
Materials and Methods: This prospective cohort study was conducted at Department of Medicine, Khyber Teaching Hospital, Peshawar from July, 2023 to December, 2023 in which a total of 99 patients were enrolled after fulfilling the inclusion criteria. 5 ml blood was taken from all the patients and sent for lipid profile tests to check total cholesterol, LDL, HDL, and Tg. All the patients were then prescribed Statin therapy. All the patients were followed after 6 month of treatment to see the incidence of atherosclerotic cardiovascular disease (ASCVD).
Results: In this study, 99 patients, with a mean age of 51.64±12.52 years, were enrolled. Prior to treatment, the mean levels of LDL, HDL, and triglycerides were 114.42±9.96 mg/dL, 43.46±6.71 mg/dL, and 129.66±22.09 mg/dL, respectively. The mean HbA1C (%) value was 8.05±0.96. Among our study participants, 8 individuals (8.1%) experienced ASCVD. There is week positive correlation between ASCVD and LDL cholesterol, HDL cholesterol and Triglycerides in DM patients with statin medication after 6 month.
Conclusion: The study's findings concluded that people with a high risk of heart disease could see benefits from using statins. Further studies was recommended in order to see the effect of statin in lowering LDL cholesterol more clearly.

Key words: Atherosclerotic Cardiovascular Disease, Diabetes, LDL, HDL.

INTRODUCTION:

Type 2 diabetes mellitus (T2DM) is strongly associated with a heightened risk of atherosclerotic cardiovascular disease (ASCVD).(1) ASCVD encompasses conditions caused by atherosclerosis, which is the buildup of plaque in the arteries, leading to narrowed and hardened arteries.(2) This

increases the risk of heart attack, stroke, and peripheral artery disease. Individuals with T2DM are at increased risk of developing ASCVD due to various factors, including insulin resistance, inflammation, dyslipidemia (abnormal lipid levels), and high blood pressure.(3) Hyperlipidemia, characterized by elevated levels of lipids (fats) in the blood, is also commonly seen in individuals with T2DM. These comorbidities can significantly increase the risk of cardiovascular events and other complications in people living with diabetes. Managing blood sugar levels, along with addressing other risk factors like high cholesterol and blood pressure, is crucial in reducing the risk of these complications.(4, 5) Epidemiological studies consistently show that cardiovascular complications are a leading cause of mortality among individuals with diabetes. About around two-thirds of deaths in people with diabetes are attributable to cardiovascular complications.(6)

The global rise in T2DM represents a significant public health challenge with far-reaching consequences.(7) The impact extends beyond individual health to encompass broader societal and economic dimensions. Based on information provided by the International Diabetes Federation (IDF), there are presently 425 million adults worldwide diagnosed with diabetes mellitus (DM).(8) Projections indicate that by 2045, this figure is expected to escalate to 629 million. Moreover, the IDF approximates that 352 million individuals are in jeopardy of developing Type 2 diabetes mellitus (T2DM).(9) Individuals diagnosed with T2DM are susceptible to developing a condition known as diabetic dyslipidemia. This condition increases their risk of encountering both macrovascular complications such as stroke, peripheral vascular disease, and coronary artery disease (CAD), as well as microvascular complications like nephropathy, neuropathy, and retinopathy. A recent survey discovered that over 30% of people in Pakistan have a chance of dying within the next ten years, which is about 7.5% each year.(10) This comprehensive approach often involves aggressive management of blood sugar levels, blood pressure, and cholesterol, as well as lifestyle modifications such as dietary changes and increased physical activity. As a result, there has been a reduction in morbidity and mortality related to atherosclerotic cardiovascular disease (ASCVD) among this population. These findings underscore the importance of proactive and multifaceted management strategies in mitigating the cardiovascular risks associated with T2DM.(11) Atherosclerosis and coronary heart disease (CHD) are significantly influenced by levels of low-density lipoprotein cholesterol (LDL-C). LDL-C is often referred to as "bad" cholesterol. Lowering LDL-C levels through lifestyle changes and medications has been shown to reduce the risk of atherosclerosis and CHD events, emphasizing the importance of managing cholesterol levels in preventing cardiovascular disease.(12) The literature offers a plethora of information regarding the various advantages associated with lowering LDL-C levels in individuals with diabetes.(13) The use of statins in individuals with DM and atherosclerotic cardiovascular disease ASVCD is well-established and widely recommended. Statins are a class of medications that effectively lower cholesterol levels, particularly low-density lipoprotein cholesterol (LDL-C), which plays a key role in the development of atherosclerosis. The rationale of this study is to explore the correlation between lipid profiles and the potential reduction of risk for atherosclerotic cardiovascular disease in individuals with diabetes.

Objective:

To assess the effectiveness of Lipid therapy in lowering atherosclerotic cardiovascular disease (ASCVD) risk in Diabetic individuals.

MATERIALS AND METHODS:

Study Design: Prospective cohort study.

Study setting: Department of Medicine, Khyber Teaching Hospital, Peshawar Pakistan.

Duration of the study: Duration of the study was 6 month (July, 2023 to December, 2023).

Methods:

Department of Medicine, Khyber Teaching Hospital, Peshawar from July, 2023 to December, 2023 and got ethical approval from the hospital's ethical committee. In this study, 99 patients were enrolled, and information about their age, health history, how long they've had diabetes, the medicines they

use, and their lifestyle was gathered. To make sure the results were accurate, blood samples were taken after people hadn't eaten overnight. The participants also had tests to check the fat levels in their blood, like total cholesterol and others. People with high fat levels were given a medicine called statin. After six months, they checked again to see if anyone had heart problems. The inclusion criteria for this study encompassed patients diagnosed with diabetes mellitus (DM), aged between 18 to 65 years, and included both males and females. Conversely, the exclusion criteria involved individuals with a prior history of cardiovascular diseases, pregnant women, participants with significant chronic conditions other than diabetes such as chronic kidney disease (CKD), liver disease, or active malignancy. Additionally, individuals currently using lipid-lowering medications like statins, fibrates, or PCSK9 inhibitors, as well as current smokers, were excluded from the study. They asked questions using a form they made.

RESULTS:

Ninety-nine patients, with mean age of 51.64±12.52 years, took part in the study. On average, these patients had been living with diabetes for about 7.28±2.33 years. Before treatment, the average levels of LDL, HDL, and triglycerides were 114.42±9.96 mg/dL, 43.46±6.71 mg/dL, and 129.66±22.09 mg/dL, respectively. The mean HbA1C (%) value was 8.05±0.96 (Table 1). Within our study group, 8 patients (8.1%) developed ASCVD. The correlation between ASCVD and LDL cholesterol, HDL cholesterol, and triglycerides in patients with diabetes receiving statin medication after six months is presented in Table 4.

Table 1: Mean age and Duration of DM of all enrolled Patient *(n=99)*

Variables	Mean±SD
Age (Years)	51.64±12.52
Duration of DM (years)	7.28±2.33

Table 2: lipid profile of the patients before therapy

Variables	Mean±SD
LDL cholesterol (mg/dL)	114.42±9.96
HDL cholesterol (mg/dL)	43.46±6.71
Triglycerides (mg/dL)	129.66±22.09
HbA1C (%)	8.05±0.96

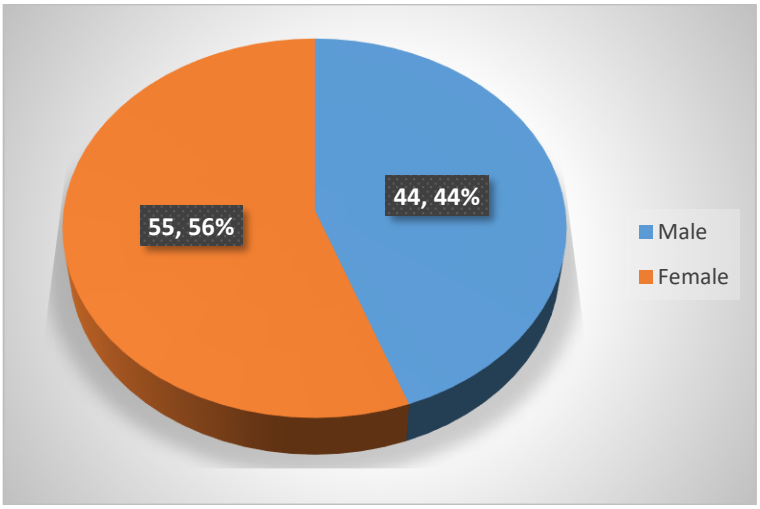

Fig 1: Frequency of gender

Table 3: Frequency of patients on the basis of ASCVD (*n=90)*

ASCVD	Frequency	Percentage
YES	8	8.1
NO	91	91.9
Total	99	100.0

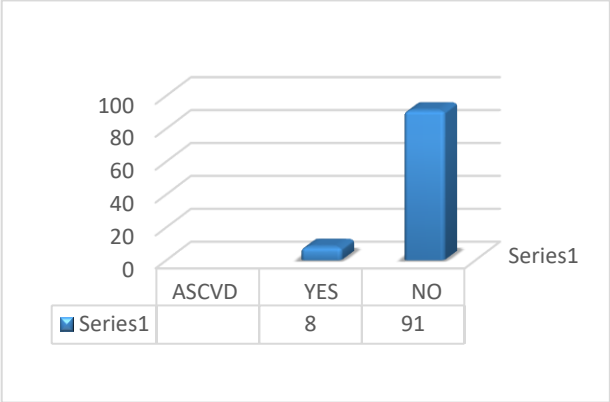

Fig 2: Frequency of ASCVD

Table 4: Correlation of ASCVD with LDL cholesterol, HDL cholesterol and Triglycerides in DM patients with statin medication after 6 month.

Variable	R Value	P Value
LDL cholesterol (mg/dL)	0.08	0.42
HDL cholesterol (mg/dL)	0.009	0.93
Triglycerides (mg/dL)	0.043	0.67

Discussion: The study of correlation between lipid profiles and cardiovascular risk in diabetes patients is extensive and critical for understanding the mechanisms underlying ASCVD. Diabetes is indeed a significant risk factor for ASCVD. People with diabetes are more prone to developing atherosclerosis. Assessing the effectiveness of lipid therapy specifically in this population could provide valuable insights into optimizing their cardiovascular health. The main aim of the present study was to assess the effectiveness of Lipid therapy in lowering ASCVD risk in Diabetic individuals. Our study patients were treated by statin and after follow up we have found that only 8.1% patients have developed ASCVD. By inhibiting an enzyme involved in cholesterol production in the liver, statins effectively reduce the amount of LDL cholesterol circulating in the bloodstream. Lowering LDL cholesterol levels is important because high levels of LDL cholesterol are associated with an increased risk of atherosclerosis and cardiovascular disease, including ASCVD.

According to the American Diabetes Association's Standards of Medical Care in Diabetes for 2019, LDL cholesterol levels below 100 mg/dL are indeed considered a risk factor for atherosclerotic cardiovascular disease (ASCVD) in individuals with diabetes.(14) This underscores the importance of aggressively managing cholesterol levels, particularly LDL cholesterol, in diabetic patients to reduce their risk of developing cardiovascular complications.(15) Statins are often utilized to help achieve and maintain LDL cholesterol levels within target ranges as part of comprehensive management strategies for diabetic individuals at risk of ASCVD. Achieving and maintaining LDL cholesterol levels below 70 mg/dL may require more aggressive interventions, such as higher doses of statins or combination therapy with other lipid-lowering medications.

In our study, we have found that the mean LDL cholesterol level was 114.42±9.96 mg/dL, and triglyceride levels were 129.66±22.09 mg/dL before the treatment which aligns with findings from several earlier studies.(16, 17) and after treatment by statin the mean LDL level was 79.65±8.91

mg/dL and the mean triglycerides level was 117.07±8.35 mg/dL. Our study was supported by the study of Khalid, M. R. in which statin was used as therapy to lower the LDL level in order to lower the chances of ASCVD disease. In our study we have found a correlation coefficient (R value) of 0.08. This R value of 0.08 between ASCVD and LDL cholesterol suggests a very weak positive correlation. This means that there may be a slight tendency for higher levels of LDL cholesterol to be associated with a slightly higher risk of ASCVD, but the relationship is likely not very significant. In the present study the HBA1c was found to be 7.93±0.84. This elevated levels of HbA1c were correlated with higher lipid profiles. This observation is consistent with previous research, which also demonstrated a significant correlation between lipid profiles and HbA1c levels in diabetic patients with cardiovascular disease (CVD).(18) our study was also supported by the study of Muhammad Rahman Khalid et al. (17) In our study, we observed a decrease in disease occurrence among patients who use statins. Statins are pivotal in preventing ASCVD, underscoring the importance of targeting specific conditions that elevate cardiovascular risk to enhance preventive measures and alleviate the burden of cardiovascular diseases. Numerous guidelines exist for primary prevention of atherosclerotic cardiovascular disease (ASCVD) with statin use, yet few have focused on specific conditions that heighten ASCVD risk. To foster a healthier aging populace amid increasing life expectancy, it's vital to offer precise directives on the prudent utilization of statins to avert initial, potentially life-threatening ASCVD events. A recent study conducted in Pakistan revealed that the use of statins was associated with a low rate of prescribing potentially inappropriate medications (PIMs), which was only 9%.(19) This indicates a relatively low occurrence of prescribing medications that may not be suitable or optimal for patients receiving statin therapy.

Such findings are significant as they underscore the cautious prescribing practices among healthcare professionals when it comes to statin medications. It suggests that healthcare providers are mindful of potential drug interactions, contraindications, and adverse effects when prescribing medications alongside statins. This attention to detail is crucial for optimizing patient safety and ensuring the effectiveness of statin therapy in managing cardiovascular risk factors.

Conclusion: It was concluded that in Pakistan, people with type 2 diabetes often have high LDL and low HDL cholesterol levels. Many of them are at high risk of heart disease and could improve their health by taking statins. However, a lot of them aren't taking these medicines.

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