ORIGINAL ARTICLE

Lipid Profile in PTS of Type 02 Diabetes Mellitus with & without Hypertension

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ABSTRACT

Introduction: Diabetes causes hyperglycemia, glucose, lipid, and protein metabolic issues owing to insufficient insulin production or activity resulting in dyslipidemia and hypertension. Dyslipidemia raises triglycerides, free fatty acids, and serum HDL cholesterol, causing cardiovascular events including high blood pressure.

Objective: The current study aimed to evaluate the serum lipid profiles of type 02 diabetics with and without hypertension.Study layout The research strategy is experimental, using a comparative study method.

Methodology: Mercy Teaching Hospital and Prime Hospital, Peshawar, performed the study. 6-month research. Peshawar's Prime and Mercy Teaching Hospitals conducted lab tests from July to December 2021. Descriptive-analytic research was our objective. Cases and controls were chosen among 200 type 02 diabetics. Cases comprised type 02 diabetics with hypertension; controls had none. Blood cholesterol, triglyceride, LDL, and HDL were measured. Statisticians utilised SPSS 24. Comparing groups' means using a student T-test.

Result: Patients averaged 51.33 6.35 years old. Our patients were mostly 41-50. 82 (41%) men and 112 (59%) women participated in our research. Mean blood cholesterol, triglycerides, and low-density lipoprotein (LDL) values in cases and controls were 211.40 101.64 mg/dL vs 158.88 31.84 mg/dL, 307.95 167.17 mg/dL vs 154.39 59.12 mg/dL, and 115.57 82.26 mg/dL vs 94.40 Serum cholesterol, triglyceride, and LDL values were significant (p0.01).

Serum HDL in controls (44.23 6.41mg/dL) was greater than in controls (41.13 4.96mg/dL) but not statistically significant (p-value > 0.05).

Conclusion: Our study found that hyperlipidemia is common in type 2 diabetes mellitus patients with hypertension,However the mechanism of this connection is uncertain.

Keywords: Diabetes mellitus type 2 , Dyslipidemia, hypertension, Peshawar, Pakistan

INTRODUCTION

Type 2 diabetes is defined by hyperglycemia as a result of aberrant insulin production or action. Diabetes is a disease that is caused by microorganisms. It's possible to have Type 1 and Type 2 diabetes, both of which are caused by autoimmune pancreatic beta cell loss. Eyes, kidneys, nerves and the heart and blood arteries are all damaged by chronic hyperglycemia in people with diabetes. Carbohydrate, lipid, and protein metabolism are all affected by diabetes. Cardiovascular disease is the leading cause of death among type 2 diabetics who have dyslipidemia. Atherogenic lipids in type 2 diabetics increase their risk of cardiovascular disease. Atherogenesis is accelerated by conditions such as diabetes, dyslipidemia, insulin resistance, and hypertension. 4. 5. Retinal lipid infiltration, macular edoema, and blindness may be caused by diabetes with severe hyperlipidemia. 6. Body fat distribution and lipid profile are connected. It's possible that excess body fat and a high lipid profile point to diabetes. They have hypertension. Goals Diabetics with and without hypertension had their lipid profiles in this research compared. Methodology A lack of insulin production or action, or both, is the root cause of the persistent hyperglycemia and lipid, protein, and carbohydrate metabolic abnormalities that accompany diabetes. Many health complications may result from diabetes mellitus as a result of a lack of insulin production or adequate insulin use, which causes the blood glucose level to rise. Diabetes affects 10.7 percent of Americans, yet only 6.2 million people have been diagnosed. Males are less likely to suffer from diabetes than females, according to the National Diabetes Survey of Pakistan (NDSP), 2016-2017 (NDSP). It is the leading cause of death in the United States. Diabetes problems are exacerbated by hypertension and hypercholesterolemia in 50% of adult diabetics. Classifications of diabetes include type 1, type 2, and type 3.

Sample Size calculation: The sample size was determined using an open epi calculator, the prevalence of low HDL in 11% of type 02 diabetes patients, a 95% confidence interval, and a 5% margin of error: $n=z^2(p)/(1-p)/c^2$ The study utilised 200 patients and controls. Control group diabetics were hypertension-free. Type 02 diabetics with hypertension were studied.

Sample Collection Procedure: In the evening, 6 mL of fasted blood was collected in heparinized fluoride oxalate vials at 100 rpm for five minutes. The supernatant was separated for testing. The samples were analysed within 72 hours. Total plasma cholesterol was measured using ferric perchlorate. HDL (high-density lipoprotein) LDL cholesterol precipitated with phosphtungstate and magnesium.

Enzymatic colorimetric triglyceride determination. LDL cholesterol formula: Triglyceride-HDL-cholesterol (76)-Total cholesterol-Triglyceride

Statistical Analysis: The Statistical Package for Social Sciences (SPSS) was used to input and analyse the data (SPSS v20). The mean and standard deviation of quantitative data are shown, while the frequency and percentage of categorical variables are calculated. The difference between and among groups was measured using an independent sample T test. Blurry vision and impaired vision were judged statistically significant at a p-value of 0.05 or below
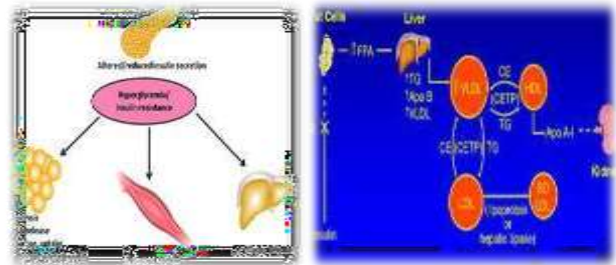

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Figure 1: Pathophysiology of type-2 diabetes mellitus
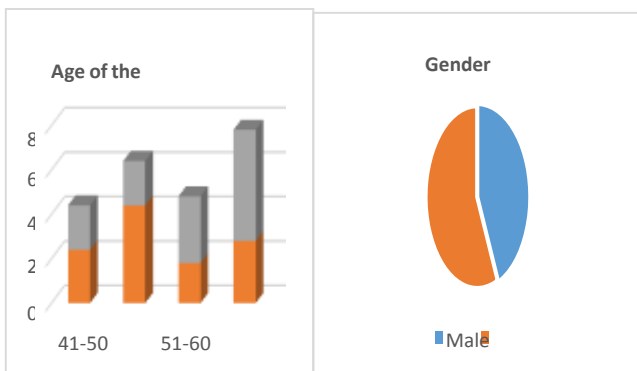Figure 2: Pathophysiology of Type 02 diabetics Dyslipidemia

Figure 3: Age-wise Distribution of Participants
Figure 4: Gender-wise Distribution of Participants

MATERIALS AND METHODS

Researchers conducted a research on patients in the Outpatient Department (OPD) of Mercy Teaching Hospital and Prime Hospital in Peshawar. It took six months to complete the research. Peshawar Medical College's teaching hospitals, Prime and Mercy, did lab work from July 2021 to December 2021. To accomplish our goal, we used a descriptive analytical analysis. Diabetes type 02 (cases) and control (non-diabetics) participants were included in the research. There were type 02 diabetics who had high blood pressure, and there were type 02 diabetics who had normal blood pressure. There were patients in both groups included in the estimation of blood lipid parameters such as cholesterol, triglyceride, low density lipoproteins (LDL), and high density lipoproteins (HDL). In order to do statistical analysis, SPSS version 24 computer software was used. To find out whether there were any significant differences between the groups, we computed the means and used an independent student T-test.

RESULT

The mean age of the patients was 51.33 ±6.35 years. Majority of our patients were in age group of 41-50years. Our study included 82 (41%) male and 112 (59%) female patients. The mean serum cholesterol, triglycerides and low-density lipoprotein (LDL) levels in cases and controls were 211.40 ± 101.64 mg/dLvs 158.88 ± 31.84 mg/dL, 307.95 ± 167.17 mg/dL vs 154.39 ± 59.12 mg/dL and 115.57 ± 82.26 mg/dL vs

Table 1: Gender Distribution of Demographic Data

S.No	Age (Years)	Frequency (n) (%)	Gender (n)	Mean Age (Years)
1	41-50	69 (34.5)	Male = 82 (41%)	
2	51-60	71 (35.5)	Female = 118 (59%)	51.33 ±6.35
3	61-70	51 (25.5)		
4	71-80	09 (4.5)		

Table 2: Type 2 diabetes with and without hypertension

Diabetes mellitus type 2 patients with hypertension			
Diastolic	Frequency (%)	Mean	SD
90-95	53 (53%)		
96-100	42 (42%)	96.8	3.09
> 100	5 (5%)		
Diabetes mellitus type 2 patients with hypertension			
Systolic	Frequency(%)	Mean	SD
145-150	26 (26%)		
151-155	36 (36%)		
156-160	18 (18%)	156.03	5.92
161-165	19 (19%)		
166-170	1 (1%)		

94.40 ± 25.89 mg/dL, respectively. The serum cholesterol, triglyceride and LDL levels were found to be statistically significant (p-value <0.01). However, on the other hand, serum HDL level in controls (44.23 ± 6.41mg/dL) was higher than in controls (41.13 ± 4.96mg/dL) and was statistically not significant (p-value > 0.05).

Diabetes mellitus type 2 patients without hypertension			
Diastolic	Frequency(%)	Mean	SD
71-75	48 (48%)		
76-80	42 (42%)		
86-90	10 (10%)	76	3.32
91-95	0 (0)		
Diabetes mellitus type 2 patients without hypertension			
Systolic	Frequency(%)	Mean	SD
100-110	6 (6%)		
111-120	35 (35%)		
121-130	38 (38%)	122.23	7.16
> 130	11 (11%)		

Table 3: Serum Cholesterol Levels in Participants of Various Age Groups (n=200)

S.No	Age (Years)	Serum Cholesterol level of the participants			Total
		Desirable (Less than 200 mg/dl)	Boarder line (200-239 mg/dl)	High (Greater than 240 mg/dl)	
1.	41-50	50	14	5	69
2.	51-60	55	8	8	71
3.	61-70	37	7	7	51
4.	71-80	7	0	2	9

Table 4: Different Age Groups' Serum Triglyceride Levels

S.No	Age (Years)	Serum Triglyceride level of the participants			Total
		Less than 150 mg/dl (Desirable)	151-200 mg/dl (Boarder line)	More than 200 mg/dl (High)	
1.	41-50	31	10	28	69
2.	51-60	24	11	36	71
3.	61-70	18	9	24	51
4.	71-80	4	2	3	9

Table 5: Lipid Profile Mean Comparison in Cases and Controls (n=200)

Group Statistics					
Patient's Demographics		Number of Participants	Mean	Std. Deviation	p-value
Serum Cholesterol level of the participants	With Hypertension	100	211.40	± 100.64	<0.001
	Without Hypertension	100	158.88	± 31.84	
Triglyceride level of the participants	With Hypertension	100	307.95	± 167.17	<0.001
	Without Hypertension	100	154.39	± 59.12	
HDL (high-density lipoprotein) level of the participants	With Hypertension	100	41.13	± 4.96	0.093
	Without Hypertension	100	44.23	± 6.41	
LDL (low-density lipoprotein) level of the participants	With Hypertension	100	115.57	± 82.25	<0.002
	Without Hypertension	100	94.40	± 25.89	

DISCUSSION

Metabolic diseases cause hypertension. High cholesterol and blood pressure cause CVD. Being overweight or obese raises your chance of health issues and death. Hypertension and excessive cholesterol are common. Certain studies relate plasma lipid levels with blood pressure, however they aren't definitive. Hypertension,

diabetes, obesity, hyperlipidemia, and metabolic syndrome impact heart failure outcomes. Lipid levels differ in hypertension and Type 2 diabetes. We targeted 40-70-year-olds. 59% of NDSP 2016-2017 patients are female. Dyslipidemia raises blood pressure through damaging endothelial cells and reducing vasomotor activity (BP). Cross-sectional study links plasma lipids to hypertension in at-risk people. Johnson et al. found dyslipidemia and hypertension in 36% of type 2 diabetics. Cholesterol levels

Ni et alChinese. found that experimental group hypercholesterolemia was sometimes higher than in the control group. Hypertension and dyslipidemia doubled between 2000 and 2008, according to Tseng et al. Women had more comorbidities than males. Triglyceride consumption raises diabetics' blood pressure. Triglycerides were greater in Type 02 diabetics with hypertension. Type 2 diabetes causes hypertriglyceridemia and hypertension. Type 2 diabetics with high triglycerides may develop hypertension. 23. High LDL levels cause heart disease (bad cholesterol). Lowering LDL prevents CVDs. Despite normal LDL-cholesterol levels, cardiovascular disease is common, indicating additional lipids and risk factors must be addressed. Case LDL values were greater than the control group's. LDL levels differed between cases and controls. Alam et al.24 found Type 2 diabetics with hypertension had increased LDL values (LDL). Gordon et al. found non-significantly higher LDL cholesterol in type 2 diabetics with hypertension.

HDL causes atherosclerosis and cardiovascular disease, according experimental and registry studies. Our study27 linked HDL to high blood pressure in type 2 diabetes. Patients' HDL levels were lower than controls'.

Insignificant HDL values (cases vs control). Hypertensive individuals had lower HDL values than healthy controls 28.

CONCLUSION

According to the results of our research, the levels of blood cholesterol, triglycerides, and LDL in the two groups were significantly different. Dyslipidemia is a risk factor for the emergence of hypertension in type 02 diabetics, according to our study findings. However, our research demonstrated a non-significant drop in HDL levels in cases compared to control group patients, indicating a link between HDL and hypertension.

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