

## ORIGINAL ARTICLE

**Lipid Profile Abnormalities among Patients with Diabetes Mellitus Type II, Presented at Tertiary Care Hospital**NADEEM MEMON<sup>1</sup>, SHABNAM RANI<sup>2</sup>, RAJKUMAR<sup>3</sup>, DOLAT SINGH<sup>4</sup>, MAJIDA MEMON<sup>5</sup>, MUNEEER SADIQ<sup>6</sup><sup>1,2</sup>Assistant Professor of medicine, Muhammad Medical College MirpurKhas<sup>3</sup>Assistant Professor of medicine, Bhattai Dental and Medical College MirpurKhas<sup>4</sup>Assistant Professor of medicine, Indus Medical College, TM Khan.<sup>5</sup>Physiology resident, LUMHS/ Jamshoro<sup>6</sup>Assistant professor of medicine, Altibri medical college KarachiCorresponding author: Nadeem Memon, Email: [drnadeem55574@gmail.com](mailto:drnadeem55574@gmail.com)**ABSTRACT****Objective:** To determine the lipid profile abnormalities among diabetes patients presented at tertiary care Hospital.**Methods:** This cross-sectional study was done at medicine out patient's department (OPD) at Muhammad Medical College Mirpur-Khas, from September 2020 to September 2021. Patients of type II diabetes mellitus, presented at medicine OPD, aged more than 40 years, diabetes duration more than three years and both genders were included. A five ml blood sample was obtained in fasting from each case and sent to the Hospital laboratory to assess the HbA1c and lipid profile. All the data was collected via a structured study proforma, and the analysis was done using SPSS version 20.**RESULTS:** In this study, 67 known diabetic patients were studied to observe the frequency of lipid profile abnormalities. Patient's mean age was 51.64±10.32 years, mean BMI was 25.20±3.23 kg/m<sup>2</sup> and mean HbA1c was 7.84±2.94%. Males were in majority 61.2% and females were 38.8%. Out of all 56.7% patients had lipid profile abnormalities. There was a positive correlation between hba1c and triglyceride level and a significant positive correlation between hba1c and total cholesterol level ( $r = 0.431$ ,  $p = 0.001$ ). Frequency of lipid profile abnormalities was statistically insignificant according to gender and duration of disease ( $p > 0.05$ ).**Conclusion:** Lipid profile abnormalities were observed to be highly frequent among patients with type II diabetes mellitus. The early identification and treatment of dyslipidemia in individuals with DM seems to be a significant aspect of lowering the risk of DM-related morbidity and mortality.**Keywords:** Diabetes type II, lipid profile, Hba1c**INTRODUCTION**

Diabetes mellitus is among the most prevalent health issues throughout the world. It is a significant long-term illness that has a severe impact on both people and communities as a major contributor to both morbidities and mortality.<sup>1</sup> In accordance to the International Diabetic Foundation, around 537 million individuals possess diabetes, and it is anticipated that this number will climb to 643 million in the year 2030.<sup>2,3</sup> Additionally, it has been observed that the individuals with a age range of 39 and 70 years old who living in the lower income nations have a high risk of developing diabetes. There seems to be the 6.9% of individuals in Pakistan those having diabetes, and it is estimated that such frequency will rise to approximately 8.2% in the year 2040.<sup>2,4,5</sup> Prior studies have looked for a correlation between the levels of glucose in the blood and the characteristics of the serum lipid profile.<sup>6</sup> According to the evidence of recent studies, the factor of body fat most directly responsible for the rising incidence of such a disease is one of the body composition factors.<sup>6,7</sup> It is well recognized how T2DM occurs. It is a widely held belief that, under typical conditions, there is a virtuous circle that connects the action of insulin and its secretion. Whenever this feedback loop is broken, insulin sensitivity and insulin secretion are both impaired, which leads to abnormally high blood glucose levels.<sup>8</sup> Although the resistance of the insulin and dysfunction of the beta-cells are the primary characteristics of type 2 diabetes, an altered lipid profile has been linked to IR.<sup>8,9</sup> Furthermore, insulin resistance is the primary factor in a number of other metabolic illnesses, as well as it has been shown that insulin resistance is linked to having a higher VLDL levels, higher level of the serum triglycerides (TG), and a lower concentration of the HDL.<sup>8</sup> As a consequence, the lipid profile is highlighted in practically all follow-up programs for type 2 diabetes because it is a significant risk factor.<sup>8,10</sup> As a result, lipid abnormalities are common in diabetes mellitus, and the chronic hyperglycemia that is not under control can result in a wide range of complications like micro- and macro-vascular, including nephropathy, retinopathy, neuropathy, and the cardiovascular disease (CVD) among diabetes individuals.<sup>6,11</sup> Furthermore, it is believed that serum lipid abnormalities

increase the risk of cardiovascular diseases, and the assessment of lipid profile concentrations in diabetes patients is now regarded to become a standard component of the therapy.<sup>12</sup> Therefore, this study has been done to evaluate the lipid profile abnormalities among diabetes patients presented at tertiary care Hospital.

**MATERIAL AND METHODS**

This cross-sectional study was done at medicine out patient's department (OPD) at Muhammad Medical College Mirpur-Khas. Study duration was one year, from September 2020 to September 2021. All the individuals of type II diabetes mellitus, presented at medicine OPD, aged more than 40 years, diabetes duration more than three years and both genders were included in the study. Patients with thyroid disorder, chronic liver disease, renal impairment, pregnant women, patients already on therapy for dyslipidemia, and those who were not agreeing to participate in the study, were excluded. After taking a brief medical history and clinical examination, an informed consent was obtained from each patient following the discussion of the study's aims and objectives. The study was done after receiving ethical approval. The participant's height and weight were used in the calculation of their body mass index (BMI) in kilograms per meter square (kg/m<sup>2</sup>). A five ml blood sample was obtained in fasting from each case and sent to the Hospital laboratory to assess the HbA1c and lipid profile. Lipid profile abnormalities were defined as, TC become more than 200 mg/dl and/or LDL more than 130 mg/dl, or triglycerides more than 150 mg/dl, and/or HDL-C less than 40 mg/dl for males and less than 50 mg/dl for females.<sup>12,13</sup> All the data was collected via a structured study proforma, and the analysis was done using SPSS version 20.

**RESULTS**

In this study, 67 known diabetic patients were studied to observe the frequency of lipid profile abnormalities. Patient's mean age was 51.64±10.32 years, mean BMI was 25.20±3.23 kg/m<sup>2</sup>, mean total cholesterol was 174.32±49.66 mg/dl, mean triglycerides were 169.98±50.12 mg/dl, mean LDL cholesterol was 108.66 ± 31.45 mg/dl, mean HDL cholesterol was 40.64 ± 5.32 mg/dl,

mean Hba1c was 7.84+2.94% and mean FBS was 186.63+57.44 mg/dl. Males were in majority 61.2% and females were 38.8%. Among 61.2% of the cases, the family history of diabetes was positive. Most of the cases 41.8% had diabetes duration of 6–8 years, 38.8% had diabetes duration less than or equal to 5 years, followed by 14.9% had diabetes duration of 11–15 years; and only 4.5% had diabetes duration of more than 15 years. Table.1

In this study, out of all 56.7% patients had lipid profile abnormalities and in 43.30% of the diabetic patients had normal lipid profile. Fig:1

There was a positive correlation between hba1c and triglyceride cholesterol level ( $r = 0.226, p = 0.65$ ). Fig:2

There was a significant positive correlation between hba1c and total cholesterol level ( $r = 0.431, p = 0.001$ ). Fig:2

The frequency of lipid profile abnormalities was statistically insignificant according to gender and duration of disease ( $p > 0.05$ ) as shown in the table.2

Table 1: Descriptive analysis of demographic study variables n=67

Variables	Statistics		
Age (years)	51.64+10.32 years		
Weight	77.43+10.02 kg		
Height	148+31.29 cm		
BMI	25.20+3.23 kg/m <sup>2</sup>		
Cholesterol	174.32+49.66 mg/dl		
Triglyceride	169.98+50.12 mg/dl		
LDL	108.66 ± 31.45 mg/dl		
HDL	40.64 ± 5.32 mg/dl		
Hba1c	7.84+2.94%		
FBS	186.63+57.44 mg/dl		
Gender	Males	41	61.2%
	Females	26	38.8%
Family history	Positive	41	61.2%
	Negative	26	38.8%
Duration of diabetes	< 5 years	26	38.8%
	6 to10 years	28	41.8%
	11 to15 years	10	14.9%
	More than15 years	3	04.5%

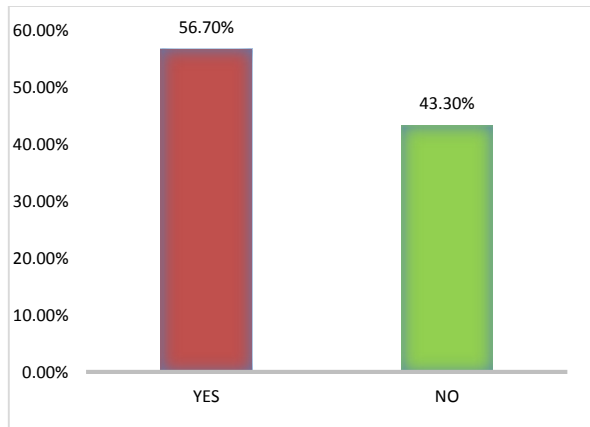


Fig. 1: Frequency of lipid profile abnormalities n=67

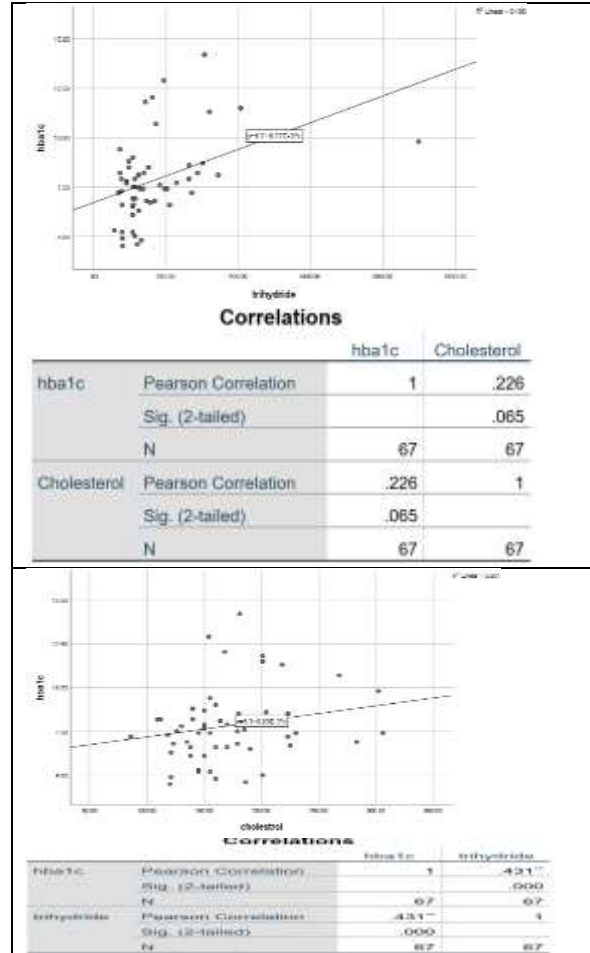


Fig. 2: Correlation of Hb1c with total cholesterol and triglycerides n=67

Table 2: Frequency of lipid profile abnormalities according to gender and duration of diabetes n=67

Variables	Lipid abnormalities		p-value	
	Yes	No		
Gender	Males	22	19	0.526
	Females	16	10	
Duration of diabetes	< 5 years	13	13	0.308
	6-10 years	15	13	
	11-15 years	7	3	
	>15 years	3	0	

### DISCUSSION

Diabetes mellitus seems to be a commonest metabolic condition marked by total or partial impairments secretion of the insulin and/or action coupled with persistent hyperglycemia and irregularities in carbohydrate, metabolism of proteins and cholesterol.<sup>6</sup> Current study has been done to evaluate the lipid profile abnormalities among diabetes patients, their overall average age was 51.64+10.32 years, and males were in the majority 61.2% and females were 38.8%. On the other hand, Shumaila et al<sup>14</sup> reported that the average age of the patients was 41.54 ± 9.07 years, and consistently, they found males in the majority 75 (74.74%) and females were 62 (45.26%). Similarly, Ozder A et al<sup>6</sup> reported that the females mean age was 55.5±9.2 years and males mean age was 54.8±12.6 years, while inconsistently they found females in majority compared to males.

In this study, the mean BMI was 25.20+3.23 kg/m<sup>2</sup>, mean total cholesterol was 174.32+49.66 mg/dl, the mean triglycerides were 169.98+50.12 mg/dl, the mean LDL cholesterol was 108.66

$\pm 31.45$  mg/dl, the mean HDL cholesterol was  $40.64 \pm 5.32$  mg/dl, the mean Hba1c was  $7.84 \pm 2.94\%$  and the mean FBS was  $186.63 \pm 57.44$  mg/dl. These findings are nearly identical to those of Shumaila et al.<sup>14</sup>, who discovered a mean BMI of  $27.53 \pm 3.03$  kg/m<sup>2</sup>. On the other hand, Ozder A et al.<sup>6</sup> demonstrated that the mean BMI was  $28.59 \pm 3.25$  kg/m<sup>2</sup>, mean total cholesterol was  $227.6 \pm 57.7$  mg/dl, mean LDL and HDL was  $136.5 \pm 43.7$  mg/dl and  $31.5 \pm 6.7$  mg/dl respectively, while mean TG was  $221.6 \pm 101.1$  mg/dl in females and mean total cholesterol was  $219.1 \pm 34.7$ , mean LDL and HDL was  $125.7 \pm 21.4$  mg/dl and  $30.2 \pm 7.4$  mg/dl respectively, while mean TG was  $250.0 \pm 100.7$  mg/dl in males.

In this study, 56.7% of the diabetic patients had abnormal lipid profiles, while 43.30% had normal lipid profiles. On the other hand, Javed RA et al.<sup>15</sup> reported that, there were 246 individuals examined, 183 (74%) of whom were found to have dyslipidemia. Although Goel S et al.<sup>1</sup> reported that the lipid profile abnormalities were among 83% of the diabetes patients and these findings of lipid profile abnormalities were higher as compared to this study. In another study by Sultana MS et al.<sup>16</sup> also found higher frequency of lipid profile abnormalities 94% amongst 300 individuals having type II diabetes who participated in their study. In the line of this study Bhambhani GD et al.<sup>17</sup> reported that the, 72% of individuals with type 2 diabetes had abnormally high levels of serum cholesterol. Above studies showed higher frequency of dyslipidemia as compared to our study, and may be because of difference in the study sample size of the studies and in our study almost half of the patients were observed with normal weight.

In this study, there was a positive correlation between hba1c and total cholesterol level ( $r = 0.226$ ,  $p = 0.65$ ), and a significant positive correlation between hba1c and total cholesterol level ( $r = 0.431$ ,  $p = 0.001$ ). On the other hand, Goel S et al.<sup>1</sup> analyze the correlation between FBS and lipids and they found there was a non-significant correlation of FBS with TC, TG and LDL-C. Furthermore, in this study, the frequency of lipid profile abnormalities was statistically insignificant according to gender and duration of disease ( $p > 0.05$ ). Consistently, Javed RA et al.<sup>15</sup> also reported that the occurrence of dyslipidemia was statistically insignificant according to gender. In the study by Sultana MS et al.<sup>16</sup> also observed that there was not significant difference in serum TC, TG and LDL-C according to gender ( $p > 0.05$ ) while HDL was statistically ( $p < 0.05$ ). Although Goel S et al.<sup>1</sup> reported that there were noticeable disparities between the sexes in the prevalence of lipid abnormalities in several aspects of the parameters of lipids, while with the exception of HDL, they did not have a statistically significant association.<sup>1</sup> The relationship between glucose levels and lipid profile is a multifactorial one, meaning that it is connected to numerous other factors, such as age, duration, severity, and conditions that are associated with it. Although differing levels of insulin resistance in individuals of various ages and genders, as well as the direct impact of the status of hormones on the enzymes that are involved in acid-base regulation and the metabolism of lipoprotein.<sup>18,19</sup> Due to the occurrence of dyslipidemia among diabetic individuals, the cardiovascular risk and other morbidities substantially increased. Therefore, by effectively managing and controlling both hyperglycemia and dyslipidemia, such hazards could be decreased.<sup>20,21</sup>

## CONCLUSION

In accordance to the study conclusion, lipid profile abnormalities were observed to be highly frequent in the cases of type-II diabetes mellitus. The identification and treatment of dyslipidemia in individuals with DM seems to be a significant aspect of lowering the risk of DM-related morbidity and mortality. The present study had a lot of limitations, the most notable of which were its small sample size, the absence of a control group, and the fact that it was conducted only at one health facility. To observe the true relationship of diabetes with lipid profile,

however, additional large-scale studies are suggested, excluding all other potential causes of dyslipidemia, to observe the true link between diabetes and lipid profile.

## REFERENCES

- Goel S, Garg PK, Malhotra V, Madan J, Mitra S. Dyslipidemia in Type II Diabetes Mellitus-An assessment of the main lipoprotein abnormalities. *Bangladesh Journal of Medical Science*. 2016;11;15(1):99-102.
- Butt MD, Ong SC, Wahab MU, Rasool MF, Saleem F, Hashmi A, Sajjad A, Chaudhry FA, Babar ZU. Cost of Illness Analysis of Type 2 Diabetes Mellitus: The Findings from a Lower-Middle Income Country. *International Journal of Environmental Research and Public Health*. 2022 Oct 2;19(19):12611.
- Thomas, R.; Halim, S.; Gurudas, S.; Sivaprasad, S.; Owens, D. IDF Diabetes Atlas: A review of studies utilising retinal photography on the global prevalence of diabetes related retinopathy between 2015 and 2018. *Diabetes Res. Clin. Pract.* 2019;157:107840.
- Akhtar S, Nasir JA, Abbas T, Sarwar A. Diabetes in Pakistan: a systematic review and meta-analysis. *Pakistan journal of medical sciences*. 2019 Jul;35(4):1173.
- Gillani AH, Aziz MM, Masood I, Saqib A, Yang C, Chang J, Mohamed Ibrahim MI, Fang Y. Direct and indirect cost of diabetes care among patients with type 2 diabetes in private clinics: a multicenter study in Punjab, Pakistan. *Expert review of pharmacoeconomics & outcomes research*. 2018;2;18(6):647-53.
- Ozder A. Lipid profile abnormalities seen in T2DM patients in primary healthcare in Turkey: a cross-sectional study. *Lipids in health and disease*. 2014;13(1):1-6.
- Unalacak M, Kara IH, Baltaci D, Ozgur E, Bucaktepe PGE: Effects of Ramadan fasting on biochemical and hematological parameters and cytokines in healthy and obese individuals. *Met Syndr Disord* 2011;9(2):157-161.
- Sadeghi E, Hosseini SM, Vossoughi M, Aminorroaya A, Amini M. Association of lipid profile with type 2 diabetes in first-degree relatives: a 14-year follow-up study in Iran. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*. 2020;13:2743.
- Goldstein BJ. Insulin resistance as the core defect in type 2 diabetes mellitus. *Am J Cardiol*. 2002;90(5):3-10
- Choi SH, Ginsberg HN. Increased very low density lipoprotein (VLDL) secretion, hepatic steatosis, and insulin resistance. *Trends Endocrinol Metab*. 2011;22(9):353-363
- Folli F, Corradi D, Fanti P, Davalli A, Paez A, Giaccari A, Perego C: The role of oxidative stress in the pathogenesis of type 2 diabetes mellitus micro- and macrovascular complications: avenues for a mechanistic-based therapeutic approach. *Curr Diabetes Rev*. 2011;7(5): 313-24.
- Alberti KG, Eckel RH, Grundy SM, et al. Harmonizing the metabolic syndrome: a joint interim statement of the international diabetes federation task force on epidemiology and prevention; national heart, lung, and blood institute; American heart association; world heart federation; international atherosclerosis society; and international association for the study of obesity. *Circulation*. 2009;120(16):1640-1645
- Nigatie M, Melak T, Asmelash D, Worede A. Dyslipidemia and Its Associated Factors Among Helicobacter pylori-Infected Patients Attending at University of Gondar Comprehensive Specialized Hospital, Gondar, North-West Ethiopia: A Comparative Cross-Sectional Study. *Journal of Multidisciplinary Healthcare* 2022;15:1481
- SHUMAILA SN, SHEHBAZ M, ALAM MF. Frequency of Dyslipidemia in Chronic Kidney disease patients presenting at Bahawal Victoria Hospital, Bahawalpur. *PJMHS*;2020;14;4:1042-45
- Javed RA, Bhatti A, AMIN M. Dyslipidemia in type 2 diabetes mellitus in normal and underweight patient. *Pak J Med Health Sci*. 2016 ;1;10(2):568-70.
- Sultana MS, Akhter Y, Parvin M, Alam MM, Naznin L, Wahab MA. Lipid profile pattern in type 2 diabetes mellitus patients. *Journal of Armed Forces Medical College, Bangladesh*. 2018;14(2):177-9.
- Bhambhani GD, Bhambhani RG, Thakor NC. Lipid profile of patients with diabetes mellitus: a cross sectional study. *Int J Res Med Sci* 2015;3:3292-5.
- Billah MM, Rana SM, Akter N, Hossain MS. Analysis of serum electrolyte and lipid profile in young Bangladeshi female with Type II Diabetes. *Cogent Biology*. 2018 Jan 1;4(1):1431474.
- Schwab KO, Doerfer J, Hecker W, Grulich-Henn J, Wiemann D, Kordonouri O, Beyer P, Holl RW, DPV Initiative of the German Working Group for Pediatric Diabetology. Spectrum and prevalence of atherogenic risk factors in 27,358 children,

- adolescents, and young adults with type 1 diabetes: cross-sectional data from the German diabetes documentation and quality management system (DPV). *Diabetes care*. 2006 Feb 1;29(2):218-25.
- 20 Ahmad M, Ijaz I, Rasheed N. Correlation between Glycated Hemoglobin and Dyslipidemia in Type-2 Diabetes Mellitus. *Journal of Islamabad Medical & Dental College*. 2016;5(4):161-4.
- 21 Windler E. What is the consequence of an abnormal lipid profile in patients with type 2 diabetes or the metabolic syndrome? *Atheroscler Suppl*. 2005;6(3):11-14