ORIGINAL RESEARCH PAPER

General Medicine

STUDY OF PREVALENCE OF DYSLIPIDEMIA IN NEWLY DIAGNOSED TYPE 2 DIABETES MELLITUS PATIENT AT TERTIARY CARE CENTER

KEY WORDS: Dyslipidemia, Diabetes Mellitus, DMT2

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ABSTRACT

Introduction: Diabetes Mellitus (DM) is a chronic condition that is spreading silently. Diabetes is more common in developing nations, and India is quickly becoming the world's diabetic capital, with prevalence rates second only to China. The growing incidence is due to population ageing and obesity. Type 2 diabetes is a chronic condition marked by hyperglycemia and dyslipidaemia as a result of underlying insulin resistance. Dyslipidemia, defined as a shift in lipid levels that can have serious health repercussions, is another risk factor for type 2 diabetes patients who are more prone to develop cardiovascular diseases. As a result, early detection and care are required to decrease morbidity and death. **Material and methods:** This is a cross sectional study, conducted at Narayan Medical College and Hospital, Sasaram with the study period of 24 months. Study participants were selected in Medicine out-patient department and admitted patients in general medicine ward on inpatient basis. Patients recently detected with diabetes mellitus type 2 seeking medical help for the first time with the age more than 30 years were included in the study. A detail history and clinical examination were done and Fasting blood sugar, Post prandial blood sugar, HbA1c, Lipid Profile were recorded. **Result:** Lipid profile parameters (Total cholesterol, total glyceride, LDL) have a positive correlation with Blood sugar levels and BMI. Whereas, HDL has a negative correlation with blood sugar level and HbA1c. **Conclusion:** According to the findings of this study, the prevalence of dyslipidemia among newly diagnosed type 2 diabetes patients was significantly higher in both male and female respondents. Gender, age, BMI, lack of physical activity, and smoking or cigarette use, all elevated the risk ratio of dyslipidemia.

INTRODUCTION

Diabetes mellitus (DM) is a chronic disease that produces hyperglycemia due to an imbalance in insulin production. Diabetes mellitus (DM), one of the largest global public health challenges, impacted 463 million people worldwide in 2019 and is expected to affect 642 million by 2040, according to estimates. It is the most prevalent non-communicable illness worldwide. In 2019, it is anticipated that more than 463 million adults would have diabetes, with the majority of these individuals (80%) residing in developing nations, with the highest concentrations occurring in China and the Indian subcontinent. 4.8 million people died from diabetes worldwide in 2019. Every country is seeing an increase in the number of diabetics. Diabetes is not properly recognised in 50% of cases. There are 77 million diabetics in India now between the ages of 20 and 79. It has been shown that type-2 diabetes mellitus (T2DM), which accounts for more than 90% of all cases of diabetes globally existed.[1,2]

Glycated haemoglobin (HbA1c) is an important measure for diabetes therapy. Extensive outcome studies have discovered a link between HbA1c and diabetes complications. Major recommendations strongly advocate the use of HbA1c for diabetes monitoring. Also, the American Diabetes Association (ADA) recommended HbA1c values of 6.5% or less for diabetes diagnosis and 5.7–6.4% for those at high risk of contracting the condition.[3]

Metabolic syndrome refers to a group of disorders that include high blood pressure, elevated glucose levels, and abnormal cholesterol or triglyceride levels. The metabolic syndrome is characterised in particular by the inability of the body's cells to absorb glucose from the blood. Understanding the metabolic syndrome, which has been shown to be responsible for T2DM forecasting, has gotten a lot of attention in recent years. The most common primary metabolic

syndrome that develops in T2DM is dyslipidemia, which is characterised by hypertriglyceridemia, reduced HDL cholesterol levels, and an increased concentration of small dense low-density lipoprotein (LDL) particles. Dyslipidemia, a common complication in type 2 diabetes patients, is characterised by an altered lipid profile because insulin resistance or insufficiency affects critical enzymes and metabolic pathways involved in lipid metabolism. Dyslipidemia is growing more common (80% to 90%) in developing countries such as Ethiopia, Kenya, Sri Lanka, India, and Bangladesh.3, 4 Experts from all around the world have been studying the association between T2DM and dyslipidemia for years in order to determine the role and impact. A number of community-based studies have found that blood pressure, fasting blood glucose, BMI, age, insufficient physical activity, dietary habits, smoking/tobacco use, and other lifestyle changes are the key risk factors for increasing the prevalence of dyslipidemia among T2DM patients.[5]

According to studies, the prevalence of dyslipidemia and other metabolic syndromes in T2DM patients in many Asian countries is growing.6 However, very few studies are conducted to assess the prevalence of dyslipidemia in T2DM patients. In the wake of the rising incidence of diabetes in country, there is an urgency to initiate investigation towards evaluating the prevalence and associated risk factors of dyslipidemia among newly diagnosed T2DM patients. To improve the treatment approaches to dyslipidemia for better management and to understand the magnitude of dyslipidemia in newly diagnosed T2DM patients and fill the gap of knowledge, this study aimed to evaluate the prevalence of dyslipidemia in newly diagnosed type 2 Diabetes Mellitus patient at tertiary care center.
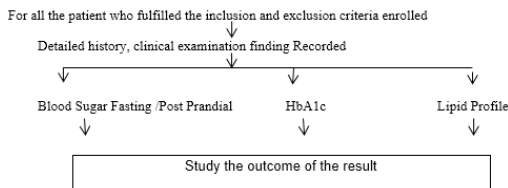
MATERIALS AND METHOD

A cross sectional study has been conducted among admitted patients for 24 months, those who fulfilled the inclusion and exclusion criteria.

INCLUSION CRITERIA:
1. Patients recently detected with diabetes mellitus type 2 seeking medical help for the first time.
2. Age >30 years.

EXCLUSION CRITERIA:
1. Patient having diabetes mellitus type 2.
2. A case of diabetes mellitus type 1. (Exclude using C-Peptide)
3. Gestational diabetes mellitus.
4. Patient who developed diabetes secondary to other cause like pancreatitis, pancreatomy, cystic fibrosis, haemochromatosis, endocrinopathies, drugs or chemical induced
5. Patients who use to consume alcohol regularly
6. Age < 30 years.
7. Patients who were mentally impaired and or unable to give consent were also excluded.

For all the patient who fulfilled the inclusion and exclusion criteria enrolled

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Detailed history, clinical examination finding Recorded

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Blood Sugar Fasting /Post Prandial   HbA1c   Lipid Profile

↓   ↓   ↓

Study the outcome of the result

OBSERVATION AND RESULT
In this study, of the 120 patients, 9.2% of the patients belonged to the 31-40 years group, 31.7% of the patients belonged to the 41-50 years group, and 42.5% of the patients belonged to the 51-60 years group. 16.6% of patients belonged to the age group ≥60 years. . The mean age was 52.94±8.4. Out of 120 patients, 54% of them were females and 46% of them were males. 10% of them were normal weight, 31.6% of them were overweight and 58.4% of them were obese.

TABLE 1– MEAN DESCRIPTIVES OF THE VARIABLES IN THE STUDY

VARIABLES	N	Range	Minimum	Maximum	Mean	Std. Deviation (±)
FASTING SUGAR (mg/dl)	120	253	126	379	188.55	±45.190
PP SUGAR(mg/dl)	120	291	202	493	268.18	±59.547
HBA1C	120	94.9	7.1	16.2	11.162	±5.7150
TC (mg/dl)	120	416	153	569	226.85	±55.435
TG (mg/dl)	120	630	110	740	224.87	±97.685
LDL (mg/dl)	120	138	77	215	121.58	±32.255
HDL (mg/dl)	120	38	28	66	46.14	±8.488

TABLE 2 – CORRELATION OF LIPID PROFILE WITH FBS

LIPID PROFILE PARAMETERS	FBS (Fasting Blood Sugar)	
	r – correlation coefficient	p-value
Total Cholesterol	0.379	<0.001
Triglyceride	0.618	<0.001
HDL	-0.461	<0.05
LDL	0.506	<0.001

Table 2 shows correlation of lipid profile parameters with Fasting blood sugar. TC, total glyceride, LDL have a positive correlation with fasting blood sugar whereas, HDL has a negative correlation with fasting blood sugar. This means that when HDL decreases, fasting blood sugar increases.

TABLE 3 – CORRELATION OF LIPID PROFILE WITH PPBS

LIPID PROFILE PARAMETERS	PPBS (Post Prandial Blood Sugar)	
	r – correlation coefficient	p-value
Total Cholesterol	0.355	<0.001
Triglyceride	0.552	<0.001
HDL	-0.391	<0.05
LDL	0.446	<0.001

Table 3 shows correlation of lipid profile parameters with post prandial blood sugar.TC, total glyceride, LDL have a positive correlation with post prandial blood sugar whereas, HDL has a negative correlation with post Prandial blood sugar. This means that when HDL decreases, post prandial blood sugar increases.

TABLE 4 - CORRELATION OF LIPID PROFILE WITH HBA1C

LIPID PROFILE PARAMETERS	HBA1C	
	r– correlation coefficient	p-value
Total Cholesterol	0.506	<0.001
Triglyceride	0.645	<0.001
HDL	-0.207	<0.05
LDL	0.876	<0.001

Table 4 shows correlation of lipid profile parameters with HBA1C . TC, total glyceride, LDL have a positive correlation with fasting blood sugar whereas, HDL has a negative correlation with HBAIC. This means that when HDL decreases, hba1c increases.

TABLE 5 – BMI DISTRIBUTION OF THE PATIENTS

CHARACTERIST	CATEGORY	N	PERCENTAGE
BODY MASS INDEX (kg/m2)	18.5-24.9(Normal)	12	10
	25-29.9(Overweight)	38	31.6
	>30 (Obese)	70	58.4
	TOTAL	120	100

TABLE 6 – CORRELATION OF LIPID PROFILE WITH BMI

LIPID PROFILE PARAMETERS	BMI (Basal Metabolic Index)	
	r– correlation coefficient	p-value
Total Cholesterol	0.877	<0.001
Triglyceride	0.086	<0.001
HDL	-0.077	<0.05
LDL	0.267	<0.001

Table 6 shows correlation of lipid profile parameters with BMI. TC, total glyceride, LDL have a positive correlation with BMI whereas, HDL has a negative correlation with BMI . This means that when HDL decreases, BMI increases.

DISCUSSION
Chronic hyperglycemia has been shown to cause difficulties in diabetic patients through a variety of pathways including dyslipidemia, platelet activation, and altered endothelium metabolism. The appearance of dyslipidemia is widespread in T2DM patients, and it is one of the most common lipid abnormalities in T2DM patients. According to several studies, type 2 diabetes is characterised by elevated TG, small dense LDL-C, and reduced HDL-C cholesterol, which is a key risk factor for CVD.

This study was conducted at Narayan Medical College and Hospital in Jamuhar, Sasaram. This is a cross-sectional

research that looks at dyslipidemia in newly diagnosed diabetes patients and its prevalence. The criteria employed in the current investigation were BMI, fasting blood sugar, PP blood sugar, HBA1C, total cholesterol, total triglycerides, HDL, and LDL.

In the present study, the mean values (table 1) of the FBS (188.55) and PPBS (268.18), the mean Hba1C (11.162) The mean of the TC (226.85), TG (224.87), LDL (121.58) are raised HDL (46.14) level lowered in the study participants and also found significant correlation between lipid profile with the PPBS(table 3), FBS(table 2), HbA1C(table 4). These results are in agreement with the previous studies.

A study done by Ahamad et al found prevalence of dyslipidemia high in both male (72.6%) and female respondents (75.7%) and also estimated that the prevalence rate of lipid profiles was also in alarming conditions that were LDL (50%), TG (57.60%), HDL (74.20%), and TC (52.30%), respectively. A recent study in the southern region of Bangladesh showed that the prevalence of LDL, TG, HDL, and TC was at high level in association with the dyslipidemia. [7]

A study done by Bello-Ovosi et al[9] found prevalence of dyslipidemia in type 2 diabetes mellitus patients was 69.3%. This is consistent with a prevalence of 34.4-94.0% reported from several studies across the globe. Studies in Nigeria have also reported a prevalence ranging from 70% in Ibadan, to 89.0% in Lagos, and 90.7% in Nnewi. [8-12]

A study done by Venkatesh et al[11] showed that the mean values of TC, VLDL-C and LDL-C were higher in T2DM patients than the normal range and HDL-C was low in T2DM patients. Also a study done by Yuthika Agrawal et al[12] showed that the mean plasma glucose levels, HbA1c, TC and TG were significantly raised in the diabetics as compared to those in the controls. Another study done by Singh Y et al found that the mean value of plasma glucose levels, HbA1c, TC and TG were elevated in the cases (T2DM patients) as compared to the controls and HDL-C was lower in cases (T2DM patients). [10]

This divergent range of global and regional prevalence of dyslipidemia among type 2 DM is attributed to the varying dyslipidemia cut-off thresholds used in most of the studies. While some studies use the National Cholesterol Education Program- Adult Treatment Panel III (NCEP-ATP III) threshold for dyslipidemia with a tighter cut-off, others used the WHO dyslipidemia threshold. [12]

The present study also found that increased age was positively associated with dyslipidemia. In the present study, age distribution in which 9.2% patients were in the age group of 31-40, 31.7% of the patients were in the age group of 41-50, 42.5% of the patients were in the age group of 51-60 years and 16.6% of patients were in the age group more than 60 and mean age 52.94% overall in the present study. This result is in line with other studies. [13-17] Haile K., et al[18] found that similar finding that increase in age, the chances of dyslipidemia.

P. Narindrarangkura et al[19] colleagues discovered an increase in dyslipedemia beyond the age of 50, which is also related with type 2 diabetes. This might be ascribed to work-related stress and a lack of physical activity. Despite no evidence has been shown that age has a direct influence on serum lipid profiles, inherited genetic traits, insulin resistance, and degenerative processes may be linked to age.

In the present study Mean age when with the sex is compared was found that males 55.70% and in females it is 50.53%. This shows that males were most commonly affected, and this is in line with the previous studies.

A risk factor for dyslipedemia is older age. According to research done by Bin Saleh et al[8]. in 1981, there is a risk factor for dyslipedemia, which can result in atherosclerosis, around the age of 50. Dyslipedemia typically affects adults in their fifth and sixth decades of life, according to a Chinese research. They highlighted that dyslipedemia is a risk factor for heart disease.

Study done by Bin Saleh et al[8] also found that high BMI is also the risk factor for the dyslipedemia. In the present study, we found only 10% of them were normal weight, 31.6% of them were overweight and 58.4% of them were obese (table 5,6). Bin Saleh et al[8] found increased BMI in the dyslipedemia patients. High BMI is a major contributor to dyslipedemia since it raises the risk for developing type 2 diabetes mellitus.

Limitations :
However, This study might have some of drawbacks. In order to investigate the prevalence of dyslipidemia, this was a single evaluation research using blood samples taken from individuals with newly diagnosed T2DM. Second, the impact of serum lipids was not assessed when evaluating dietary diversity. Lastly, self-reported bias in this study may have been caused by the questionnaire survey. Ultimately, this cross-sectional study focuses on the causal linkages, risk factors, and prevalence of dyslipidemia.

SUMMARY AND CONCLUSION
Conclusion:
In conclusion, this study found that the prevalence of dyslipidemia among newly diagnosed type 2 diabetes patients was significantly higher in both male and female respondents. Gender, age, lack of physical exercise, over weight and an elevated risk ratio of dyslipidemia are all associated variables. In order to reduce the prevalence of dyslipidemia in newly diagnosed patients with diabetes, these findings may be helpful in establishing practical measures and increasing awareness of improved lipid profile management. This study emphasises the urgent need for lipid profile screening, medication and the adoption of diabetes education so that T2DM patients are aware of dyslipidemia.

REFERENCES:
1. Nsiah K., Shang V. O., Boateng K. A., & Mensah F. O. (2015). Prevalence of metabolic syndrome in type 2 diabetes mellitus patients. International Journal of Applied and Basic Medical Research, 5(2), 133
2. Zheng Y., Ley S. H., & Hu F. B. (2018). Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. Nature Reviews Endocrinology, 14(2), 88–98.
3. Balkau B. (2004). Smoking, type 2 diabetes and metabolic syndrome. Diabetes & metabolism, 30(2), 110–111.
4. Wilson P. W., D'Agostino R. B., Parise H., Sullivan L., & Meigs J. B. (2005). Metabolic syndrome as a precursor of cardiovascular disease and type 2 diabetes mellitus. Circulation, 112(20), 3066–3072.
5. Lorenzo C., Okoloise M., Williams K., Stern M. P., & Haffner S. M. (2003). The metabolic syndrome as predictor of type 2 diabetes: the San Antonio heart study. Diabetes care, 26(11), 3153–3159
6. Mithal A., Majhi D., Shunmugavelu M., Talwarkar P. G., Vasnawala H., & Raza A. S. (2014). Prevalence of dyslipidemia in adult Indian diabetic patients: A cross sectional study (SOLID). Indian journal of endocrinology and metabolism, 18(5), 642
7. Ahmmed MS, Shuvo SD, Paul DK, Karim MR, Kamruzzaman M, Mahmud N, Ferdaus MJ, Elahi MT. Prevalence of dyslipidemia and associated risk factors among newly diagnosed Type-2 Diabetes Mellitus (T2DM) patients in Kushtia, Bangladesh. PLOS Global Public Health. 2021 Dec 7;1(12):e0000003.
8. Saleh FS, Alharbi WS, Alanazi GB, Aldughaither A. Prevalence and Regulation of Dyslipidemia Among Adults With Type 2 Diabetes From Three Primary Health Care Centers in Riyadh. Cureus. 2022 Aug 1;14(8).
9. Bello-Ovosi BO, Ovosi JO, Ogunsina MA, Asuke S, Ibrahim MS. Prevalence and pattern of dyslipidemia in patients with type 2 diabetes mellitus in Zaria, Northwestern Nigeria. The Pan African Medical Journal. 2019;34.
10. Singh Y, Vohra DK, Khan MM, Singh G. Prevalence of dyslipidemia in newly diagnosed patients of type-2 diabetes mellitus at tertiary care centre of West Uttar Pradesh: A single centre study. Panacea Journal of Medical Sciences, January-April, 2019;9(1):33-36.
11. Venkatesh SK, Sudheer K. M. V., Mohana Krishna T. Lipid profile analysis of type 2 diabetic patients in Bengaluru population, India. Int J Res Med Sci 2018;6(6):2049-53
12. Agrawal Yuthika, Goyal Vipin, Chugh Kiran, Shanker Vijay, Singh Anurag Ambroz. Types of dyslipidemia in Type 2 diabetic patients of Haryana region. Sch J App Med Sci 2014;2(4D):1385-92.
13. Omotoye FE, Fadupin GT. Evaluation of Lipid Profile of Type 2 Diabetic Patients Attending an Urban Tertiary Health Facility in Nigeria. Indian J Nutri. 2017;4(2):159.
14. Okafor CI, Fasanmade OA, Oke DA. Pattern of dyslipidemia among Nigerians with type 2 DM. Niger J of Clinical Pract. 2008;11(1):25-31.
15. Jisieike-Onuigbo NN, Unuigbe EI, Oguejiofor CO. Dyslipidemias in type 2

diabetes mellitus patients in Nnewi South-East Nigeria. Ann Afr Med. 2011;10(4):285-289

16. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). JAMA. 2001 May 16;285(19):2486-97

17. World Health Organization. Cardiovascular disease risk factors: new areas for research, report of a WHO scientific group. 1994 Geneva. Accessed 12 August 2018.

18. Haile K., & Timerga A. (2020). Dyslipidemia and its associated risk factors among adult type-2 diabetic patients at Jimma University Medical Center, Jimma, Southwest Ethiopia. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, 13, 4589

19. Narindrarangkura, Ploypun et al. "Prevalence of dyslipidemia associated with complications in diabetic patients: a nationwide study in Thailand." Lipids in health and disease vol. 18,1 90. 6 Apr. 2019, doi:10.1186/s12944-019-1034-3