

# PREVALENCE OF DYSLIPIDEMIA IN NEWLY DIAGNOSED TYPE 2 DIABETES PATIENTS AT DIAGNOSED AT KGNTH BANNU

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## ABSTRACT

**Background:** Dyslipidemia is one of the major risk factors for cardiovascular disease in diabetes mellitus. Dyslipidemia was highly prevalent in all the geopolitical zones with the consistent pattern being low HDL-Cholesterol and high LDL-Cholesterol. The prevalence of dyslipidemia ranged from 60% among apparently healthy to 89% among diabetic. To determine Frequency of dyslipidemia in newly-detected type-2 diabetics.

**Material & Methods:** This cross sectional descriptive study was conducted at department to general Medicine, Khalifa Gul Nawaz Teaching Hospital, Bannu over 189 patients of type-2 diabetics from January 2017 to November 2017 lipid profile was carry out, once the patients were diagnosed. To find out dyslipidemia.

**Results:** Out of 189 patients, 123 were males and 66 females with age range of 35-80 years (Means 57.61 years  $\pm$  10.25 SD). Over all frequency of dyslipidemia in newly-detected type-2 diabetics (T2DM) were observed in 71.4%

**Conclusion:** The present study provides evidence to suggest that lipid variables are associated with each other in T2DM patient among the population in this part of the world which aggravates the atherogenic process.

**KEY WORDS:** Dyslipidemias; Prevalence; Diabetes mellitus.

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## INTRODUCTION

Dyslipidemia is one of the major risk factors for cardiovascular disease in diabetes mellitus. Early detection and treatment of dyslipidemia in type-2 diabetes mellitus can prevent risk for atherogenic cardiovascular disorder. The rationale of this study was to detect the lipid abnormality in diabetic patients.<sup>1</sup>

Nigerian Journal of Clinical Practice showed that Dyslipidemia was highly prevalent in all the geopolitical zones of Nigeria with the consistent pattern being low HDL-Cholesterol and high LDL-C.<sup>2</sup> Overall, the prevalence of dyslipidemia ranged from 60% among apparently healthy Nigerians to 89% among diabetic Nigerians, A study conducted in

Nishtar Hospital Multan, by Ahmad et al showed that 21% patient with type-2 diabetes had raised serum cholesterol (>200mg/dl) and 34.2% patient have raised triglycerides in serum (>150mg/dl).<sup>3</sup> Abadel-Aal NM, Ahmad AT et al in Saudi med journal showed that over 90% of patient with type 2DM had one or more types of dyslipidemia. The most common dyslipidemia in our study was high LDL-cholesterol and high triglycerides as reported in the literature. The frequency of hypercholesterolemia was 77.2%, low high – density lipoprotein (HDL) was 83.9% high low-density lipoprotein (LDL) was 91.5%, and hypertriglyceridemia was 83.1%. Females had greater abnormalities in lipid profiles.<sup>4</sup> Innumerous studies carried out by the Diabetics Association of Pakistan, 10% of the general population aged 30 years or above is said to be suffering from Diabetes mellitus type-2 with the prevalence estimated 9.2% in men and 11.16% in women.<sup>5</sup> The most common pattern of dyslipidemia in patient with type-2 diabetes is elevated triglyceride level and decreased HDL cholesterol level. The mean concentration of LDL cholesterol in those with type 2 diabetes is not significantly different from that in those individuals who do not have diabetes. However, qualitative changes in LDL cholesterol may be present.<sup>6</sup> The

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study by Jisieike-Onuigbo NN Nnewi South-East Nigeria. Department of Medicine showed prevalence of dyslipidemia (at least one abnormal lipid profile) was 90.7%. The 24.1% has single dyslipidemia while 66.6% had combined dyslipidemia. Reduced HDL constituted the highest single abnormality (62%) followed by hypertriglyceridemia (56.5%), hypercholesterolemia (53.7%) and high LDL in (44.4%). The duration of DM was not significantly associated with dyslipidemia.<sup>7</sup> Prevalence of dyslipidemia in type 2 diabetics in Jayarama N1 et al study carried in southern India was 92.4%. Among males it was 95.4 % and in females it was 86.75 %. Most common pattern of dyslipidemia in both males (44.2%) and females (42.97%) was combined dyslipidemia. Combined dyslipidemia with high TG and HDL (20.43%) was most common in males and combined dyslipidemia with high LDL and low HDL (21.68%) was most common in females. Second most common pattern of dyslipidemia among males (31.2%) and females (29.7%) was isolated dyslipidemia. Isolated dyslipidemia with low HDL level was the most common affecting 17.09% males and 12.85% females with dyslipidemia.<sup>8</sup> Krishnaswami Vijayaraghavan Cardiovascular Division, Scottsdale Healthcare Research Institute, Scottsdale, AZ, USA mentioned in his article that Type 2 diabetes is associated with a characteristics atherogenic lipid pattern of elevated serum TGs low serum HDL-C levels, and a preponderance of small, dense LDL particles. Disturbance of lipid metabolism linked to insulin resistance may be the primary event in the development of type 2 diabetes.<sup>9</sup> The prevalence of dyslipidemia is high in most developed countries and increasing in developing countries including Pakistan. Studies have shown that effective treatment of dyslipidemia reduces the rate of morbidity and mortality. Therefore, estimation of the prevalence of dyslipidemia ensures proper planning of health actions for both primary and secondary prevention of Type -2 Diabetes mellitus. In this regard, the current study is formulated to find the prevalence of dyslipidemia in newly detected type-2 diabetes mellitus in our local population at present.

## **MATERIAL AND METHODS**

This descriptive study was conducted after approval from hospital ethical and research committee from January 2017 To November 2017 in over 189 patients. All in- patients and out- patients with newly detected DM type-2 were considered. The purpose and benefits of study were explained to the patients and a written informed consent was obtained. All patients were subjected to detailed history and examination. Diagnosis of diabetes and mellitus in new patients were based on the diagnostic guidelines according to American Diabetes Association (ADA). While dyslipidemia were defined using the National Cholesterol Educational Programme (NCEP-ATP III) criteria as follows: TC is  $>5.2$  mmol/L, LDL -C  $>3.4$  mmol/L,

HDL-C  $<1.03$  mmol/L for males,  $<1.3$  mmol/L for females and TG  $> 2.3$  mmol/L. Total cholesterol was determined using the ferric perchlorate method. HDL-C was determined after precipitation of LDL-C with phosphotungstate and magnesium and LDL-C were calculated from Friedwald's formula:  $LDL-C = TC - HDL-C - (TG/5)$ . TG was measured using the colorimetric enzymatic method. American Diabetes Association (ADA) treatment guideline recommend that the following lipid criteria, met for patient with diabetes: low density lipoprotein-cholesterol (LDL-C)  $< 2.6$  mmol/L (100mg/dl), triglycerides  $< 1.7$  mmol/L (150 mg/dl) for both gender and high density lipoprotein- cholesterol (HDL- C)  $> 1.0$  mmol/L (40 mg/dl) in men and  $> 1.3$  mmol/L (50 mg/dl) in women. Lipid level others than the normal range in one or more of the above found on laboratory tests was considered dyslipidemia.

Patient with acute metabolic complications, diabetes ketoacidosis, Hyperglycemic hyperosmolar syndrome, acute illnesses, acute myocardial infarction, cerebrovascular accidents, acute infections, oral contraceptives and anti-coagulants, depending on alcohol according to the ICD-10 criteria, Hypothyroidism, Liver disorders (Clinical findings/  $>3-4$  times upper limit of normal LFT), Renal diseases (of non-diabetic etiology), known inherited disorder of lipid, Patients having secondary dyslipidemia, Pregnancy and beta-blockers were excluded as these patients effect our results.

Strict exclusion criteria were followed to control confounders and bias in study results.

## **RESULTS**

In this study, 189 patients having newly detected type-2 diabetic mellitus had observed, in which 123 (65.1%) were male and 66(34.4%) were female patients. Male to female ratio was 1.88:1.

Patients age was divided in four categories, out of which most presented in older age in this study i.e. 56-70 years which were 110(58.2%) while 23 (12.5%) patients were in the age range of less than or equal to 40 year, 49(25.9%) were of age range 41-55 years and 7(3.7%) presented at age more than 70 years. The study included age ranged from 35 up to 80 years. Average age was 57.61 years  $\pm$  10.25SD.

Over all frequency of dyslipidemia in newly-detected type-2 diabetics were observed in 135(71.4%) while 54(28.6%) were free of dyslipidemia.

The descriptive statistics of BMI and pattern of dyslipidemia in newly detected type 2 diabetics are shown in Table 1.

Age wise distribution of dyslipidemia in newly-detected type-2 diabetics was found majority in older age group and this rate decreases as the age decrease in our study but it was insignificant with p-value=0.507 in Table 2

**Table 1: Pattern of dyslipidemia.**

	N	Minimum	Maximum	Mean	Std, Deviation
BMI(Kg/m <sup>2</sup> )	189	21.00	35.00	26.9524	3.24248
TGs (mg/dl)	189	60.00	310.00	127.8148	54.72049
LDL-C (mg/dl)	189	42.00	272.00	152.2222	55.54156
HDL (mg/dl)	189	20.00	65.00	44.3598	6.32856

**Table 2: Age wise distribution of dyslipidemia.**

Age (in year)	Dyslipidemia		Total	p-value
	Yes	No		
<=40.00	15 65.2%	8 34.8%	23 100.0%	0.507
41.00 - 55.00	39 79.6%	10 20.4%	49 100.0%	
56.00 - 70.00	76 69.1%	34 30.9%	110 100.0%	
71.00+	5 71.4%	2 28.6%	7 100.0%	
Total	135 71.4%	54 28.6%	189 100.0%	

The majority of males detected with types 2 diabetics having dyslipidemia as that of female patients but statically in significant with p-value=0.143 in Table 3

**Table 3: Gender wise distribution of dyslipidemia.**

Gender	Dyslipidemia		Total	p-value
	Yes	No		
Male	89 72.4%	34 27.6%	123 100.0%	0.411
Female	46 69.7%	20 30.3%	66 100.0%	
Total	135 71.4%	54 28.6%	189 100.0%	

## DISCUSSION

Diabetes mellitus is a prominent global health issue and is a leading cause of morbidity and mortality worldwide.<sup>10</sup> According to the United Kingdom National Health Services (UK NHS), 3.9 million people are living with diabetes, a number that has doubled since 1996, and when 1.4 million people had the disease. It is estimated that, by 2025, five million people will have diabetes in the UK.<sup>11</sup> There are 47 million people throughout the world with a prevalence of 10% of which 90% is type 2 diabetes.<sup>12</sup>

Estimates of the prevalence of the disease in the Arab world are even higher. A recent WHO report

from the Eastern Mediterranean region estimated the prevalence of diabetes to be between 3.5% and 30%. Bahrain, Kuwait, Lebanon, Oman, KSA and the United Arab Emirates report the highest prevalence of diabetes in this region.<sup>10</sup> In this study male to female ratio of stroke is 1.88: 1 which is higher than that observed by Khawaja and Shakoor 1.5: 1 and Raza and Imran 1.6: 1.11. Higher ratio in male patients is due presence of other risk factor like diabetes and smoking and most of patients belong to older age group.<sup>13-16</sup>

Marwat MA, et al, 82 patients with stroke were admitted. Out of 88 patients, hypertension was the most common risk factor (75%) followed by diabetes mellitus (54.5%) Cerebral infarction was seen among 50% of the whole population of the study, while intracerebral hemorrhage was seen among 29% patients.<sup>17</sup> In a study by Aly Z, et al, 398 patients were studied for the presence of risk factors of stroke and they observed that hypertension (69.1%), stress (55.8%) hypercholesterolemia (36.7%), age (33.7%), diabetes (33.4%), smoking (29.1%), and family history of stroke (29: 1%) were identified as major risk factors.<sup>18</sup>

Lower adipose lipoprotein lipase (LPL) activity is dependent upon insulin and is rate limiting for triglyceride degradation.<sup>19</sup> Serum LDL Cholesterol is higher because VLDL is precursor of LDL and raised VLDL may lead to in-creased LDL levels associated with decreased LDL catabolism. LDL receptor is up regulated by insulin but in Type 2 Diabetes Mellitus due to insulin resistance, there is less uptake of LDL.<sup>20</sup>

The decrease in HDL level is statistically highly significant in Type 2 Diabetes Mellitus subjects when compared to controls ( $p < 0.01$ ). This decrease may be due to enhanced activity of LCAT (Lysocleithin Acyl Transferase) which also causes hypertriglyceridemia. In LDL rich cholesterol and phospholipids, the enhanced LCAT activity promotes the transfer of activated fatty acids to cholesterol resulting in formation of lysocleithin, which in turn causes triglyceride formation. This enhanced activity impairs the formation of HDL from LDL and hence HDL Cholesterol is reduced significantly in Type 2 Diabetes Mellitus.<sup>21</sup> The findings in present study are similar to various other studies conducted in different parts of the world.<sup>19,22-24</sup>

In our study dyslipidemia was present in 72.28% of patients with diabetes. The results in our study are similar to the results reported by the U.S Centers for Disease Control and Prevention showing that dyslipidemia affects 70% to 97% of people with diabetes.<sup>25</sup>

The result of the present study indicates that the most common recognized abnormality was hypertriglyceridemia. Other researchers also associated the high triglyceride level to the poor glycaemia control of diabetes and obesity.<sup>26,27</sup> This hypothesis is supported by the reduction of the triglyceride level with the improvement of glycaemia control i.e. FBS and PPBS. Abbate and Brunzell reported that the increase in triglycerides in poorly controlled patients was related to the decrease of activities of adipose tissue and muscle lipoprotein lipase activity.<sup>28</sup>

A study by Packard et al, reported that reduced HDLC as a powerful predictor for premature coronary heart diseases.<sup>29</sup> Goldberg reported that hyperglycemia progressively increases the transfer of cholesterol esters from HDL-C to VLDL-C particles, hence, denser LDL particles acquire a large proportion of these HDL esters, further diminishing the HDL-C level. In addition, HDL-C is a ready substrate for hepatic lipase which converts it into smaller particles, which are readily cleared from the plasma.<sup>18,30</sup>

## CONCLUSION

Several biochemical variables which might be relevant to vascular disease are monitored at yearly intervals and lipid profile measurement is among them. The routine measurement of triglyceride and of total HDL-C and LDL-Cholesterol will allow us the assessment of these important risk factors. Regular screening of the population in middle age to detect diabetes before its complications ensue may be required, to prevent complications of diabetes.

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**CONFLICT OF INTEREST**

Authors declare no conflict of interest.

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None declared.

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