

Association of HDL and Triglyceride levels with Fatty Liver Disease in Type 2 Diabetes

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ABSTRACT

Background: Diabetes is a metabolic disease. Fatty liver disease is a common association of type 2 diabetes. We carried out this study to determine the association of HDL and triglyceride levels in patients with type 2 diabetes

Methods: Study was conducted in OPD of GTTH. 100 patients were included in this study. All were type 2 diabetic and had fatty liver disease on ultrasound. All patients had their fasting lipid profile done after 14 hours fast

Results: Out of total 100 patients 55 were females and 45 were males. Patients were between 25 – 69 years of age. Mean age was 45.23 years. 2% patient had normal triglyceride levels, 8% had borderline high and 90% had high TG's. Only 3% of patients had normal HDL whereas 97% had low HDL. 95% had a high LDL and 100% had high total cholesterol

Conclusion: Fatty liver disease in type 2 diabetes is strongly associated with high levels of dangerous lipids and low level of useful HDL.

Keywords: HDL, fatty liver, diabetes, Triglyceride

INTRODUCTION

Fatty liver disease or Nonalcoholic fatty liver disease (NAFLD) is an emerging epidemic in Western World and across the globe. Almost One third of world's population is estimated to have NAFLD¹. It is associated with insulin resistance and regarded as hepatic component of metabolic syndrome. It is also associated with increased risk of type 2 diabetes¹. Fatty liver is more prevalent in diabetics irrespective of blood glucose control². 80% of Type 2 diabetics have fatty liver disease as compared to age and gender matched nondiabetics³. In fatty liver disease, dyslipidemia is more atherogenic, characterized by high serum triglycerides, increased small, dense low-density lipoprotein (LDL) and decreased HDL cholesterol.⁴⁻⁶ . A number of studies are carried out to determine association of lipid abnormalities with fatty liver disease or diabetes separately but a very few are carried out to know the association between all three ie diabetes, fatty liver and lipids. This study is designed to see the association of fatty liver disease in diabetics with different lipid fractions like triglycerides, HDL, LDL and cholesterol.

MATERIALS AND METHODS

This was a descriptive study conducted at Diabetic OPD at Ghurki trust teaching hospital (GTTH) between December 1st 2106 – April 30th2017. 100

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patients were included in the study.

Inclusion Criteria: Type 2 diabetic patients of any age who were willing to participate in the trial and

- had a recent ultrasound done either 3 months prior to visit or after the visit showing fatty liver
 - is willing to undergo fasting lipid profile after 14 hours fast
 - Having diabetes as evidenced by any one of the following
1. Patients who were newly diagnosed as type 2 diabetes on basis of HbA1c >6.5%, or Fasting blood glucose > 126 mg/dl or random more than 200 mg/dl on more than 2 occasions on different days or a single random blood glucose of > 200 mg/dl along with typical symptoms of diabetes (Polyuria, polydypsia and polyphagia)
 2. Patients who were already known diabetics having raised HbA1c on or off anti diabetics, or having normal HbA1c on anti diabetics

Exclusion Criteria

1. Patients with type 1 diabetes
2. Patient claims himself/herself as diabetic but has no evidence in form of blood tests and is not willing to get them either
3. Patient not willing to undergo abdominal ultrasound
4. Patient not willing to get a fasting lipid profile
5. Patient having some end stage cancer, end stage chronic disease like heart failure, chronic liver disease, renal failure
6. Patients with a history of alcoholism

The patients were selected and the study explained to them. Written informed consent was

taken. Lipid profile was done after overnight fast. The reference lipid levels were taken in accordance with Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) report²⁰. The data was entered in SPSS version 21. Means were calculated and the values were analyzed

RESULTS

One hundred patients who were type 2 diabetics and had fatty liver disease on ultrasound examination. They were between 25 – 70 years of age. Mean age was 45.23 years. Age distribution is shown in figure 1. 55% (55 patients) were females and 45% were males as shown in figure 2

Figure 1: Age distribution

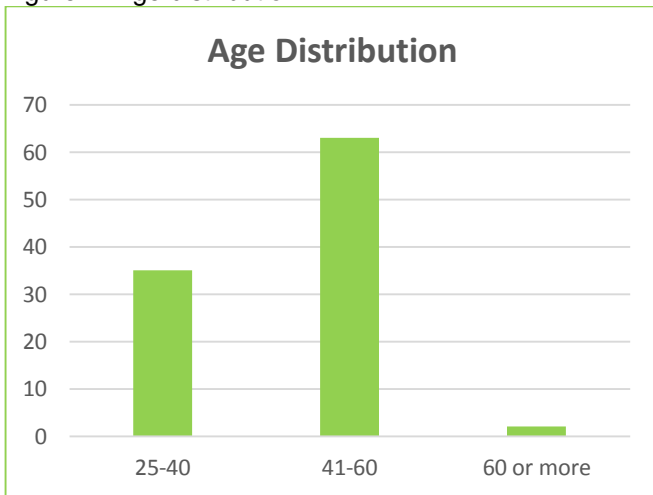
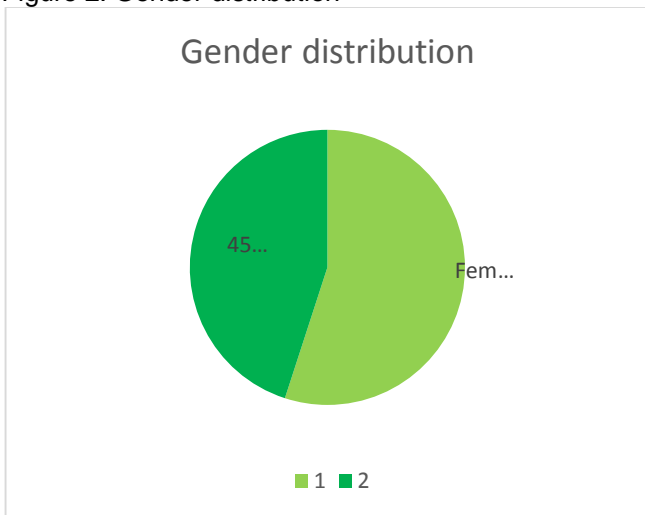


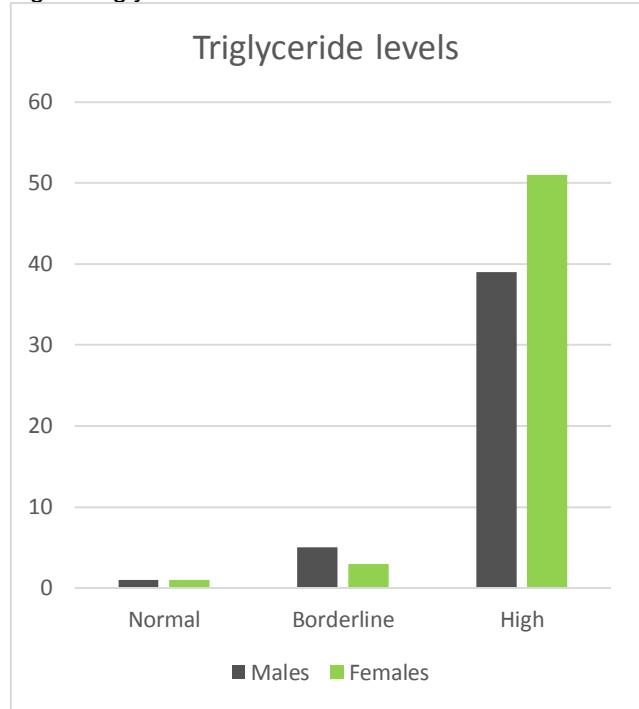
Figure 2: Gender distribution



2% patient had normal triglyceride levels, 8% had borderline high and 90% had high TG's. If see differences among gender, in males 1 (2%) patient

had normal, 5(11.1%) had borderline high and 39(86.6%) had high triglyceride levels and in female 1(1.8%) patient had normal, 3(5%) had borderline high and 51(92.7%) had high triglycerides (Figure 3)

Fig.3: Triglyceride Level



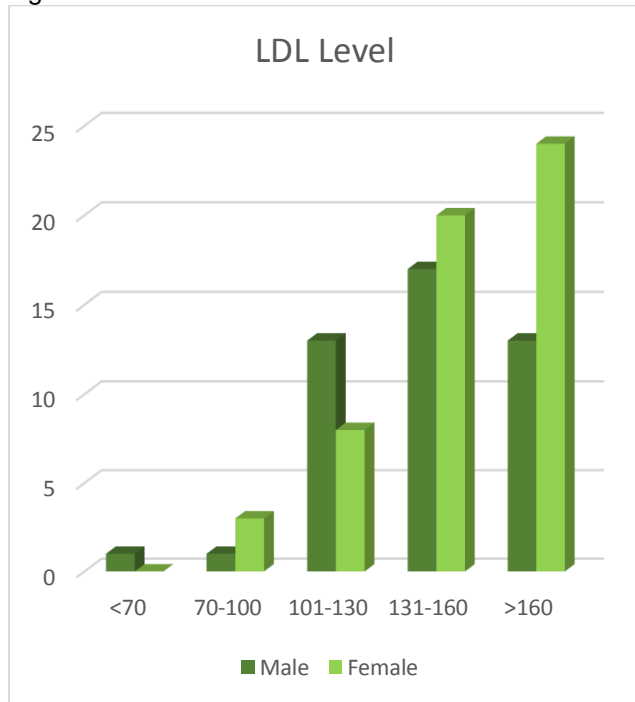
Only 3% of patients had normal HDL whereas 97% had low HDL. No female had normal HDL all 55 patients (100%) had low HDL, whereas 3 (6.66%) male patients had normal HDL and 42 (93.3%) had low HDL (table 1)

Table 1: HDL Levels

	Less than normal ¹	Normal ²
Females	55	0
Males	42	3
1	<=40 in males, <= 50 in females	
2	>40 in males, > 50 in females	

LDL levels were <100mg/dL in 5(5%) patients, between 100–130mg/dl in 21(21%) patients, between 131–160mg/dL in 37(37%) and more than 160 mg/dL in 37% of patients. Out of 55 females no patient had LDL <70mg/dl, 3(5.4%) had LDL between 71- 100 mg/dl, while 8(14.5%), 20(36.3%) and 24(43.6%) patients had LDL between 101-130mg/dL, 131-160mg/dL and >160mg/dL. In males 1(2%) patient had LDL <70mg/dl, 1(2%) had LDL between 71-100 mg/dl, while 13(28.8%), 17(37.7%) and 13(28.8%) patients had LDL between 101-130 mg/dL, 131-160mg/dL and >160mg/dL. This is shown in figure 4

Fig. 4: LDL Levels



Total Cholesterol was normal in 0% of patients, 50 patients (50%) had borderline high whereas 50 patients (50%) had high cholesterol. This is shown in table 2

Table 2: Total cholesterol

Cholesterol level	Males	Females
<130	0	0
131-200	29	21
>200	16	34

DISCUSSION

NAFLD or fatty liver disease is being recognized as a major health burden in Western world but the prevalence is on an increase in developing countries as a result of affluence and changes from traditional to westernized lifestyle including sedentary life style and increasing refined foods and fats in diet. Fatty liver disease occurs approximately in 20% of obese and 5% of overweight people. But if the patient is having associated diabetes type 2, there is 2.6 times increased incidence⁷. In another study the prevalence of ultrasound confirmed fatty liver disease in type 2 diabetics was 69.4%⁸.

In the present study we included those type 2 diabetics who had ultrasound confirmed fatty liver disease with an average age of 45.23 years and 55% of patients were females. Most of the patients had deranged lipid profiles.

Out of patients included in the study only 2% patient had normal triglyceride levels, 8% had borderline high and 90% had high triglycerides. In males 86.6% had high whereas in females 92.6% had high triglyceride levels. According to different studies raised triglycerides are the most prevalent abnormalities in fatty liver disease¹¹⁻¹².

In a study by Mahaling DU et al who studied triglyceride levels in fatty liver disease found that 67.14%⁹. In another study there was difference in mean TG levels in diabetics with and without fatty liver (196.50±19.50 vs 175.45± 15.30)¹⁰

Low HDL levels are the second most common lipid abnormalities in fatty liver disease¹². In our study only 3% of patients had normal HDL whereas 97% had low HDL. No female had normal HDL all 55 patients (100%) had low HDL, whereas 3(6.66%) male patients had normal HDL and 42 (93.3%) had low HDL.

In a study by Mahaling DU et al low HDL levels were present in 62.85%⁹. In another study by Trojak A et al showed a strong co relation of low HDL with type 2 diabetes and fatty liver disease¹³. Several other studies show a low HDL level in fatty liver¹⁴ and in diabetes¹⁵. In our study all females and more than 90% of males had low HDL and this difference may be due to the reason that the patients we had were having both diabetes and fatty liver disease.

LDL levels are less significantly raised in fatty liver disease as compared to TGs and low HDL. In our study LDL levels were < 100 mg/dL in 5 (5%) patients, between 100–130mg/dl in 21 (21%) patients, between 131–160mg/dL in 37 (37%) and more than 160 mg/dL in 37% of patients. Out of 55 females no patient had LDL < 70 mg/dl, 3(5.4%) had LDL between 71- 100 mg/dl, while 8(14.5%), 20(36.3%) and 24(43.6%) patients had LDL between 101-130 mg/dL, 131-160 mg/dL and > 160mg/dL. In males 1(2%) patient had LDL <70mg/dl, 1 (2%) had LDL between 71- 100 mg/dl, while 13 (28.8%), 17(37.7%) and 13 (28.8%) patients had LDL between 101-130 mg/dL, 131-160 mg/dL and > 160mg/dL. In case of total Cholesterol, no patient had normal values, 50 patients (50%) had borderline high whereas 50 patients (50%) had high cholesterol. Although low density lipoprotein cholesterol levels may not be very different in patients with NAFLD, but the subpopulation of LDL with small, dense LDL particles are more in amount as compared to other type of LDL particles and these are more atherogenic¹⁶. It is proven in various studies that fatty liver is associated with significantly increased levels of highly atherogenic oxidized LDL levels^{17,18,19}.

In a study by Mahaing et al cholesterol and LDL levels were 45.71%, 34.28% respectively⁹ but these

patients only had fatty liver disease and no diabetes. Our patients had fatty liver as well as diabetes and most of them had high LDL and cholesterol

Fatty liver disease is becoming a common disease. It is associated with dyslipidemia and if another risk factor for dyslipidemia is added such as diabetes the incidence of dyslipidemia is much increased. This can lead to advanced atherosclerosis and high risk of cardiovascular disease. More studies specially including diabetics without fatty liver disease and patients with fatty liver disease without diabetes should be included to know the exact patterns of dyslipidemias and to determine that if risk factors for dyslipidemia are increased the number of patients effected are increased or not?

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