



NON ALCOHOLIC FATTY LIVER DISEASE AND ITS CORRELATION WITH CORONARY ARTERY DISEASE, IN PATIENT WITH TYPE 2 DIABETES

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ABSTRACT

Non-alcoholic fatty liver disease (NAFLD) is a condition characterized by excess accumulation of fat in the liver occurring in people who consume little or no alcohol. The amount of excess fat deposited in the liver in this condition usually exceeds 5-10% by weight and is recognized by accumulation of triglyceride within the cytoplasm.

Aims & Objectives To estimate the prevalence of non-alcoholic fatty liver disease (NAFLD) in type 2 diabetic patients and to study its correlation with coronary artery disease and coronary risk factors. To study the correlation between fatty liver and coronary artery disease in

Methods This was a cross-sectional study conducted in Osmania General Hospital, Hyderabad. A Total of 150 patients above the age group of 30yrs who were already diagnosed of type 2 diabetes mellitus and on treatment for T2 DM were recruited from Osmania Medical College and hospital for the present study.

Results A total of 150 cases, it was observed that 54% of the diabetic patients had fatty liver and 46% had no fatty liver disease.

Conclusion The prevalence of NAFLD in type 2 diabetics is high, NAFLD is associated with metabolic syndrome, Coronary Artery Disease. In NAFLD other components of metabolic syndrome like HTN, dyslipidemia should be looked for.

KEYWORDS : Non Alcoholic Fatty Liver Disease, Correlation with Coronary Artery Disease, Type 2 DM

INTRODUCTION

NAFL is defined as the presence of hepatic steatosis with no evidence of hepatocellular injury in the form of ballooning of the hepatocytes or no evidence of fibrosis. The risk of progression to cirrhosis and liver failure is minimal. NASH is defined as presence of hepatic steatosis and inflammation with hepatocyte injury with or without fibrosis. This can progress to cirrhosis, liver failure and rarely liver cancer. NASH cirrhosis means. The presence of cirrhosis with current or previous histological evidence of steatosis or steatohepatitis¹

The incidence of NAFLD remains unknown because no prospective studies have been conducted. Although NAFLD has been reported worldwide, it is difficult to determine the true prevalence because of problems in interpreting data from various studies due to referral bias, population heterogeneity, study design, imaging modality used and use of liver biopsies.²

The prevalence of the major risk factors for NAFLD like type 2 diabetes mellitus, obesity, dyslipidemia and metabolic syndrome is increasing globally and the Asia-Pacific region is at forefront of the current pandemic. On the basis of studies available till date the estimated prevalence of NAFLD in the general population across Asia using ultrasonography varies from 5%-40%.³

Several studies done till date on NAFLD and Coronary artery disease(CAD) have shown that steatosis is associated with an increased prevalence and incidence of CAD and cardiovascular mortality. Moreover the common cause of death in patients with NAFLD was CAD followed by extra hepatic malignancy and finally cirrhosis and its complications.⁴

NAFLD is a growing public health problem worldwide. The clinical impact of NAFLD on CAD risk deserves particular attention in view of the implications for screening and surveillance strategies in the growing number of NAFLD patients⁵.

This study was aimed at estimating the prevalence of fatty liver in type 2 diabetic patients using ultrasonography and to also to study the correlation between coronary risk factors, coronary artery disease and fatty liver.

AIM & OBJECTIVES

To estimate the prevalence of non-alcoholic fatty liver disease (NAFLD) in type 2 diabetic patients and to study its correlation with

coronary artery disease and coronary risk factors. The prevalence of non-alcoholic fatty liver disease (NAFLD) in type 2 diabetic patients using ultrasonography. To see if there is any correlation between risk factors for coronary artery disease and fatty liver like age, sex, hypertension, obesity, dyslipidemia and metabolic syndrome. The correlation between fatty liver and coronary artery disease in type 2 diabetics. To compare the above risk factors in coronary artery disease patients with and without fatty liver.

MATERIALS AND METHODS

This was a cross-sectional study conducted in Tertiary Care Hospital, Hyderabad. A Total of 150 patients above the age group of 30yrs who were already diagnosed of type 2 diabetes mellitus and on treatment for T2DM were recruited for the present study.

INCLUSION CRITERIA

Patients above the age of 30yrs who were already diagnosed cases of type 2 diabetes mellitus and on treatment for it were taken.

EXCLUSION CRITERIA

Significant alcohol consumption as defined as > 21 drinks per week in men and > 14 drinks per week in women over a period of 2 years. Hepatitis B positive status. Hepatitis C positive status. Chronic liver disease due to any cause.

RESULTS

TABLE : 1 - Prevalence of fatty liver disease in study population

| Fatty Liver | No. of Cases | Percentage (%) |
|------------------------------|--------------|----------------|
| Fatty liver diseases present | 81 | 54 |
| No fatty liver disease | 69 | 46 |

In the present study it was observed that 54 % of the diabetic patients had fatty liver and 46% had no fatty liver disease on ultrasonography.

TABLE : 2 - Comparison of baseline characteristics in type 2 Diabetic patients across fatty liver and no fatty liver groups

| Age group in years | No fatty liver | | Fatty liver | |
|--------------------|----------------|------|-------------|------|
| | No | % | No | % |
| 30-40 | 10 | 14.5 | 9 | 11.1 |
| 41 -50 | 19 | 27.6 | 30 | 37 |
| 51 -60 | 31 | 44.9 | 40 | 49.4 |
| 61 -70 | 9 | 13 | 2 | 2.5 |

| | | | | |
|-----------|--------------|-----|--------------|-----|
| Total | 69 | 100 | 81 | 100 |
| Mean ± SD | 51.15 ± 9.08 | | 49.67 ± 7.25 | |
| T value | 1.04 | | P=0.29 | |

In the present study it was observed that 44.9% of cases with no fatty liver disease and 49.4% of cases with non- alcoholic fatty liver disease and were in the age group of 51- 60 yrs followed by 27.6 % with no fatty liver disease and 37 % of cases with non- alcoholic fatty liver disease were in the age group of 41 - 50 yrs. The mean age group in patients with no fatty liver disease was 51.15 yrs and in patients with non alcoholic fatty liver disease was 49.67 yrs there was no significant difference in the mean age between two groups p>0.05.

TABLE:3 – CAD with fatty liver disease

| CAD | No fatty liver | | Fatty liver | |
|---------|----------------|------|-------------|------|
| | No | % | No | % |
| Absent | 43 | 62.3 | 33 | 40.7 |
| Present | 26 | 37.7 | 48 | 59.3 |
| Total | 69 | 100 | 81 | 100 |

In the present study it was observed that 74 out of 150 patients had history of CAD, in patients with fatty liver disease 59.3% of patients had history of CAD compared to 37.7% in patients without fatty liver. There was a significantly higher occurrence of CAD in patients with fatty liver compared to patients without fatty liver p=0.008.

TABLE:4 – Lipid profile and fatty liver disease in CAD patients.

| variable | No Fatty liver | Fatty liver | t value | P value |
|-------------------|----------------|---------------|---------|---------|
| | Mean ± SD | Mean ± SD | | |
| Total Cholesterol | 176.38 ±20.21 | 188.1 ±29.9 | 1.78 | 0.07 |
| Triglycerides | 149.07 ±31.64 | 168.87 ±27.34 | 2.81 | 0.006 |
| HDL-Cholesterol | 47.4 ±7.18 | 43.5 ± 5.53 | 2.61 | 0.011 |
| LDL-Cholesterol | 99.1 ± 20.5 | 110.8 ±29.84 | 1.77 | 0.08 |

In the present study it was observed that the mean total cholesterol in patients with CAD and fatty liver was 188.1 compare to mean total cholesterol of 166.72 in patients with CAD and without fatty liver there was no statistical significance in the mean cholesterol between 2 groups (p=0.07), mean triglycerides in patients with CAD and fatty liver was 168.87 which was significantly (p=0.006) higher than mean triglycerides of 149.07 in patients with CAD and without fatty liver, mean HDL cholesterol in patients with fatty liver and CAD was 43.5 which was significantly (p=0.011) lower than mean HDL Cholesterol of 47.4 in patients with CAD with without fatty liver, mean LDL cholesterol in patients with fatty liver and CAD was 110.8 compared to mean LDL cholesterol of 99.1 in patients with CAD and without fatty liver there was no statistical significance in the mean LDL cholesterol between 2 group (p=0.08), which indicates a significant higher level of serum triglycerides and a lower protective HDL cholesterol in patients with CAD and fatty liver.

TABLE :4 – Comparison of base line parameters in CAD patients (N=74) with and without fatty liver Hypertension and fatty liver disease in CAD patients.

| HTN | No fatty liver | | Fatty liver | |
|---------|----------------|------|-------------|------|
| | No | % | No | % |
| Absent | 43 | 62.3 | 33 | 40.7 |
| Present | 26 | 37.7 | 48 | 59.3 |
| Total | 69 | 100 | 81 | 100 |

In the present study it was observed that out of 74 CAD patients, 54 patients were hypertensive, in patients with CAD and no fatty liver disease 34.6% of patients had no hypertension and 65.4% patients presented with hypertension compared to 22.9% non-hypertensive patients and 77.1% hypertensive patients in CAD with non-alcoholic fatty liver disease. There was no statically significant difference in distribution of hypertensive patients was observed among two groups p>0.05.

DISCUSSION
PREVALENCE OF NON-ALCOHOLIC FATTY LIVER DISEASE IN TYPE 2 DIABETICS

Several studies have shown a positive relationship between abnormal glucose tolerance and NAFLD. In a study done by AK Agarwal where 124 diabetic patients were evaluated for the presence of fatty liver, the prevalence was found to be 57.2%. The presence of fatty liver in this study was estimated using ultrasonography. Similarly⁶.

In a study done the prevalence of fatty liver was significantly higher in patients with diabetics (54.5%) when compared to those with pre-diabetes (IGT or IFG) (33%), isolated IGT (32.4%) , isolated IFG (27.3%) and normal glucose tolerance (22.5%) respectively. Ultrasound was used even in this study. A study done in Italy by Targher et al where 2839 diabetic patients with available liver ultrasound data were studied, 1974 (69.5%) patients were detected to have NAFLD⁷.

The prevalence of fatty liver in type 2 diabetic patients in the current study as detected by ultrasound abdomen was 54%. Most of the patients in the present study had mild fatty liver. This was comparable to the prevalence of fatty liver estimated in type 2 diabetic patients in other studies. Various other studies from India have shown the prevalence of NAFLD in diabetics to vary from 57% to 64%.This suggests that fatty liver is very common in type 2 diabetic patients and ultrasound is the most common imaging modality used⁸.

Non Alcoholic Fatty liver disease and age

Frith et al showed that prevalence of fatty liver increased with increasing age. The reason why the prevalence of NAFLD was more among the older age group as observed in these studies was that the risk factors for NAFLD such as hypertension, obesity, diabetes and hyperlipidemia were significantly more among older patients. It has also been observed that older age also increases the risk of developing related problems such as severe hepatic fibrosis, hepatocellular carcinoma⁹.

Non Alcoholic Fatty liver disease and Hypertension

The prevalence of hypertension was more among fatty liver group in the present study. Similar results were also observed in the studies done by Ak Agarwal et al and Targher et al. Patients with fatty liver tend to have hypertension may be as a part of metabolic syndrome.

Non Alcoholic Fatty liver disease and Hypertriglyceridemia

This can occur from the excessive importation of free fatty acids form adipose tissue, from diminished hepatic export of FFA secondary to reduced synthesis or secretion of VLDL, or from impaired beta oxidation of FFA. The major sources of triglycerides are from fatty acids stored in adipose tissue and fatty acids newly made within in the liver through de novo synthesis.¹⁰

Non-Alcoholic Fatty Liver Disease and Coronary Artery Disease

The prevalence of CAD was more among fatty liver group (59.3%) than those without fatty liver (37.7%) which was significant statistically. In study by Ak Agarwal et al also the prevalence of CAD was more among NAFLD group (60.5%) when compared to non-NAFLD group (45.25%). Study by Targher et al also showed that patients with NAFLD had remarkably higher prevalence of coronary, cerebrovascular and peripheral vascular disease than those without NAFLD.

Limitation of the Study

- The main limitation of the present study is that diagnosis of fatty liver was based on ultrasonography and not by liver biopsy. Liver biopsy is gold standard to differentiate simple steatosis for steatohepatitis.
- Since the study design is cross-sectional, this precludes the establishment of causal or temporal relations among NAFLD and CVD

CONCLUSION

1. The prevalence of NAFLD in type 2 diabetics is very high
2. NAFLD is associated with higher prevalence of metabolic

syndrome and coronary artery disease.

3. There is clustering of traditional coronary risk factors in patients with NAFLD.
4. When patient is detected to have fatty liver the other components of metabolic syndrome like diabetes, obesity, dyslipidemia, hypertension should be looked in for as a majority of them have one or more components of metabolic syndrome.

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