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Original Research Article

A Study of Clinical Profile and the Incidence of Non Alcoholic Fatty Disease in Patients with Type 2 Diabetes Mellitus

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Abstract

Background: People, who are overweight or obese, have diabetes, high cholesterol, or high triglycerides are more likely to develop NAFLD. NAFLD may also be caused by rapid weight loss and poor eating habits. The study's objectives were to determine the prevalence of non-alcoholic fatty liver disease in patients with diabetes mellitus as well as the clinical and biochemical alterations in this condition.

Methods: A total of 109 patients, 60 females and 49 males, older than 40 years, who attended the outpatient department of the Sri Krishna Medical College and Hospital in Muzaffarpur, Bihar, between February 2021 and July 2021 and had been diagnosed with type 2 diabetes mellitus for at least three years, were included in the current study. A thorough medical history was obtained, including information on the duration of diabetes and symptoms related to the hepatobiliary system. All systems had a thorough clinical examination, during which organomegaly, ascites, and symptoms of liver cell failure were sought after. The patient's height, weight, and body mass index were all noted. laboratory testing such as CBC, urine for albumin, sugar and deposits, random, fasting, and post-meal blood sugar, Blood urea, serum creatinine, and serum sodium and potassium electrolytes. LFT and fasting lipid profile were also done.

Results: 109 patients in all were enrolled in the trial once the selection criteria were used. Out of the 109 type 2 diabetics included in the study, 60 were female and 49 were male; the difference between the sexes was caused by the fact that alcohol consumption was used as an exclusion criterion, which resulted in a large number of males being left out. According to several reports, the prevalence of fatty liver in people with diabetes mellitus is higher than that of the general population. Numerous studies have shown that the prevalence of NAFLD in people with type 2 diabetes mellitus was up to 70%. Of the 109 diabetics included in this study, 53 (48.6%) of them had ultrasonographically detectable fatty liver.

Conclusion: Non-alcoholic fatty liver disease affects 48.6% of type 2 diabetics, making it a frequent condition in this population.

Keywords: Non-alcoholic Fatty Liver Disease, Biochecmical, Ultrasonographically, Type 2 Diabetics

Introduction

Non-alcoholic steatohepatitis (NASH), which results from the accumulation of fat in the liver and causes inflammation, as well as cirrhosis are all included in the broad category of liver illnesses known as non-alcoholic fatty liver disease (NAFLD) (irreversible, advanced fibrosis of the liver). All phases of liver disease may be affected by NAFLD [1,2]. Ludwig and colleagues first described NAFLD as an accumulation of fat vacuoles inside of the hepatocytes in 1980 [3]. NAFLD is defined by the American Association for the Study of Liver Diseases as an accumulation of fat in the liver that is greater than 5% to 10% by weight (as assessed by the percentage of hepatocytes that are fatty by light microscopy) [4]. Alcohol use should not exceed 20 g/day for diagnosis, and other steatosis causes should be ruled out [5].

Subjects with NAFLD have a higher mortality rate than the general population, and they are more likely to later develop diabetes and cardiovascular disease [6].

From a hepatic perspective, NAFLD/NASH is not a benign condition. Progressive liver biopsy revealed histologically advanced fibrosis in 32% of cases, the projected incidence of cirrhosis development is 20%, and the 10-year mortality rate from liver disease is 12%.

Hepatocellular carcinoma (HCC) and NAFLD/NASH are currently thought to be two of the most common causes of chronic liver disease, increasing indications for liver transplantation [7].

In view of the serious hepatic and extra hepatic consequence of NAFLD, there has been an explosion of interest to delineate this entity in the last 10 years.

The prevalence of diabetes, a prevalent metabolic illness that affects many individuals globally, is constantly increasing and has now reached gigantic proportions. Nearly every system in the body is impacted by diabetes mellitus, which also significantly increases morbidity and mortality. Obesity, hyperlipidemia, and diabetes mellitus have all been linked to NAFLD development, and more recent research has shown other risk factors.

Materials and Methods

The proposed study was conducted in Sri Krishna Medical College & Hospital, Muzaffarpur, Bihar from February 2021 to July 2021, among patients of age of more than 40 years and above, irrespective of sex.

For the study, we selected each successive NAFLD instance. The cases were chosen from the following patient groups at Sri Krishna Medical College & Hospital's Indoor Department and OPD for Medicine. Without any history of heavy alcohol consumption, fatty liver was discovered during an abdominal ultrasound. Men and women who use more than 20 grammes of alcohol per day (men) and less than 10 grammes per day (women) were excluded from this study, along with those with HBV and HCV infections (HBsAg, Anti HCV), Autoimmune hepatitis, Hemochromatosis, and Wilson's disease.

After diagnosing the cases as NAFLD the patients were subjected to the following proforma to bring out a clinical and biochemical profile of the patients.

The history taking, clinical examination and biochemical investigations of cases in the present study were done.

A thorough history was taken with special emphasis to exclude history of significant alcohol intake which was defined as intake less than 10 gm per day (in females) and less than 20 gm /day (in males).

Systemic data collection was carried out by review of all medical records.

Diabetes Mellitus was defined

I. FBS ≥ 126 mg/dl.
II. RBS ≥200mg/dl or higher.

Dyslipidemia and Insulin Resistance was defined according to ATP III guidelines.

Dyslipidemia was defined as presence of one of the following:

LDLc > 160 mg/dl, Total Cholesterol > 200mg/dl, Triglyceride > 150 mg/dl, HDLc < 40 mg/dl

Insulin resistance syndrome (IRS) was defined as presence of more than 3 of the following criteria.

1. Abdominal obesity, defined as a waist circumference > 102 cm (40in) in men and >88 cm (35in) in women.
2. Tryglyceride≥ 150 mg/dl.
3. HDL cholesterol< 40 mg/dl in men and < 50 mg/dl in women.
4. BP ≥ 130 /≥85 mm Hg.
5. FBS ≥ 110 mg/dl.

BMI (It was calculated and is defined as weight (kg)/height (m^2)

BMI (Normal) : 18.5-24.9.

BMI: 25-29.9 kg/m^2 was termed overweight

BMI: Equal or above 30kg/m^2 was termed obesity (as defined by WHO and CDC).

Different frequency tables were created using descriptive statistical analysis, and means and related standard errors were calculated. The chi-square test was used to calculate the connections between various factors and NAFLD. The Standard Normal deviation (Z-values) and accompanying p-values for the test of differences between various proportions were discovered using the test of proportion. The means will be compared using the t test. To assess each risk factor, the odds ratio (OR) with a 95% Confidence Interval (CI) was determined. After controlling for the confounding variables, multiple logistic regressions were performed to determine the odds ratio (OR). Confidence intervals will be at a 95 percent level, and significance was set at 0.05.

Results

In Muzaffarpur, Bihar, at SKMCH, this study was conducted. 109 patients in all were enrolled in the trial once the selection criteria were used. 49 men and 60 women with type 2 diabetes who participated in this study were included.

Table 1: Mean value of different parameters

Parameter	NAFLD Group (n=63)	Normal USG Group (n=66)	Statistical Significance at 5% Level
Duration ofdiabetes (yrs)	5.57 ± 3.19	5.48 ± 3.94	No significantdifference (P value=0.05)
BMI (kg/m^2)	24.97 ± 3.54	2.29 ± 2.05	Significant difference present(P value<0.05)
SGOT (IU/L)	25.02 ± 20.64	18.41 ± 11.97	Significant difference present(P value<0.05)
SGPT (IU/L)	29.00 ± 28.35	17.47 ± 10.02	Significant difference present(P value<0.05)
ALP (IU/L)	123.97 ± 66.13	106.52 ± 68.75	No significantdifference (P value=0.05)
Bilirubin (mg/dl)	1.10 ± 1.12	0.84 ± 0.36	No significant difference (P value=0.05)
Total cholesterol (mg/dl)	225.33 ± 43.95	192.67 ± 35.38	Significant difference present(P value<0.05

TGL (mg/dl)	235.82± 105.18	155.81 ± 61.08	Significant difference present(P value<0.05
HDL (mg/dl)	46.24 ± 8.03	49.21 ± 9.93	No significantdifference (P value=0.05)
LDL (mg/dl)	125.82 ± 11.66	111.45 ± 27.80	Significant difference present (P value<0.05

Table 2: Liver Enzymes Level

Enzyme Level (IU/L)	NAFLD Group (53)	Normal USG (56)	P Value
SGOT < 25 (83)	38	45	> 0.05
>25 (26)	15	11	
SGPT < 25 (58)	16	42	< 0.05
> 25 (51)	37	14	
ALP < 150 (68)	30	38	> 0.05
> 150 (41)	23	18	

Table 3: Lipid Profile parameters

Parameter (mg/dl)	NAFLD Group(53)	Normal USG(56)	P Value
TC < 200 (51)	16	35	<0.05
> 200 (58)	37	21	
TGL < 150 (55)	22	33	<0.05
> 150 (54)	31	23	
HDL < 50 (53)	30	23	>0.05
> 50 (56)	23	33	
LDL < 100 (35)	14	21	> 0.05
> 100 (14)	39	35	

The SGPT, Total Cholesterol, and Triglyceride levels between the NAFLD and NORMAL USG groups were statistically different at the 5% level (P=0.05). Other parameters that were compared between the two groups using the "chi square test" did not reveal any appreciable differences. However, mean LDL values were significantly greater in the NAFLD group than in the normal group.

Discussion

According to several reports, the prevalence of fatty liver in people with diabetes mellitus is higher than that of the general population. Numerous studies have shown that the prevalence of NAFLD in people with type 2 diabetes mellitus was up to 70%. Of the 109 diabetics included in this study, 53 (48.6%) of them had ultrasonographically detectable fatty liver. A study done by Daad H Akbar the prevalence rate of 55 % in number 119 cases [8] 100 cases were included in another investigation by Gupte P *et al,* and the prevalence rate was 49% [9,10]. This study group's prevalence of fatty liver is comparable to the prevalence seen in other investigations.

Ultrasonography revealed fatty liver in 35 (58.33%) of the 60 female type 2 diabetes and 17 (34.69%) of the 49 male type 2 diabetics. In this study, fatty liver disease was more common in women than men (M : F ratio is 1:1.57).

Numerous studies have revealed that in the general population, women are more likely than males to acquire fatty liver. Other research among type 2 diabetics revealed that females had a higher prevalence of the disease.

The mean age of the NAFLD group and the normal liver group did not differ significantly. Due to the fact that only participants older than 40 were recruited, the study population's mean age was higher. In USG, the mean time a person with NAFLD had diabetes was 5.47 3.19 years, whereas the mean time a person with a normal liver had diabetes was 5.47 3.94 years.

The existence of NAFLD and the length of diabetes were not observed to be associated statistically. The outcomes were comparable to those of the Saudi Arabian study (Daad H Akbar *et al*) [8].

The NAFLD group's mean BMI was substantially greater than that of the healthy group. Thirty of the 38 individuals with a BMI more than 25 kg/m^2 (78.94%) had NAFLD. In the study conducted in Saudi Arabia by Daad H. Akbar *et al*., obesity was found to be a separate factor in the development of NAFLD [8].

Compared to studies conducted in other nations, there were fewer people with a BMI of 30 kg/m^2 or above. The study group's low and intermediate socioeconomic position is probably to blame for this. People in our research group with high BMI exhibited a prevalence of fatty liver that was comparable to that seen elsewhere.

In contrast to prior research, the clinical symptoms and signs seen in the group with NAFLD in the current investigation were asymptomatic in 52.8% of cases, fatigued in 30.1%, uncomfortable in the right upper quadrant, and lacking in jaundice in cases 53. In instances 64 of the Saudi series [8], there was no weariness, no right upper quadrant discomfort, and no jaundice. In cases 75 of the Virginia series [11], there was no fatigue, no right upper quadrant discomfort, and no jaundice.

The incidence of symptoms varied slightly but not statistically significantly in our investigation. 42 patients in Australia were monitored for up to 21 years for the natural history of NASH [9]. The most prevalent reason for presentation was upper abdominal pain. According to numerous studies, a large majority of individuals (48% to 100%) do not exhibit any signs of liver disease, and just a tiny fraction (particularly in children [10]) does. These symptoms include vague stomach discomfort, pain in the right upper quadrant, lethargy, and malaise.

Out of 53 patients with NAFLD, 9 individuals (16.18%) developed hepatomegaly based on clinical examination and ultrasonography. Saudi series8 56 out of 64 (88%), Virginia series [11] 16 out of 76 (22%), Vaishnave series, 28 out of 113 (24.7%), Lal *et al*., 10 out of 25 (40%) and the current series 9 out of 53 (19%) all reported incidences of hepatomegaly.

In our investigation, the prevalence of NAFLD did not differ significantly according to the fasting sugar levels.

Numerous studies have demonstrated that there is no connection between blood sugar levels and the emergence of NAFLD. Additionally, the Saudi study estimated HbA1c, and glycemic control and NAFLD did not significantly correlate.

In terms of the number of individuals exhibiting elevated SGOT and Alkaline Phosphatase, there was no statistically significant difference between the two groups. The NAFLD group, however, exhibited a statistically significant greater value than the normal group when the mean enzyme levels were compared.

One of the most often reported and researched abnormalities in NAFLD are asymptomatic increase of transaminases.

The most typical anomaly is a two- to three-fold increase in plasma ALT and AST values [9,12]. V Ness and Diehl reported that 7% to 9% of all patients had liver biopsies for non-alcoholic steatosis or steatonecrosis, compared to 19% of patients (17 of 90) who had liver biopsy for examination of chronically increased plasma levels of ALT and AST [13-15].

Alkaline phosphatase levels are abnormal in fewer than half of patients.

According to another article, liver transaminases may be normal or only mildly increased [13]. Biochemistry, ultrasonography, and histology do not correlate well, and people with normal transaminase results can exhibit the whole range of NAFLD's histological manifestations.

According to some research, the liver enzyme levels in NAFLD patients fluctuate, with up to 78% of patients displaying normal values at any given moment. When levels rise, the rise is usually moderate and usually only affects either one or both of the enzymes alanine aminotransferase (ALT) and aspartate aminotransferase (AST). The AST:ALT ratio is typically lower than 1, yet it can change when cirrhosis is present.

The SGOT: SGPT ratio in the NAFLD group in this study was 0.8.

According to published research, the SGOT: SGPT ratio is less than 1 in cases of NAFLD. Five levels of ALT were shown to be greater than five levels of AST in two significant investigations, which contrast with the pattern of alcoholic hepatitis.

Although values < 1 suggest NAFLD, a ratio of ≥2 is strongly suggestive of alcoholic liver disease.

There was no statistically significant difference in the levels of bilirubin and total proteins between the two groups which were similar to the observations done elsewhere.

Historically, NAFLD patients were reported to have high levels of total cholesterol and triglycerides. Type 2 diabetics made up our study population, and they frequently have atherogenic dyslipidemias.

In terms of the percentage of people with elevated cholesterol as well as the mean values, the total cholesterol, or TGL, values were significantly higher in the NAFLD group. While both groups had a comparable number of people with elevated LDL, the NAFLD group's mean LDL was much greater.

The HDL values were similar in both groups with mean values being marginally lower in the NAFLD group.

The following values were recorded in different research. Another prevalent anomaly, hyperlipidemia (hypertriglyceridemia, hypercholesterolemia or both), has been noted in 20% to 81% of NAFLD patients [9,12,14]. At the Virginia NAFLD clinic, dyslipidaemia was present in 65% of cases of NAFLD. 11 Hypertriglyceridemia and fatty liver: lipoprotein profiles in hypertriglyceridemic patients with fatty liver and clinical diagnosis of fatty liver. The majority of these fatty liver patients also had hypertriglyceridemia. The majority of the research has shown that non-alcoholic fatty liver disease (NAFLD) has a stable course, but some subsets of the population may progress to more severe forms of the disease with inflammation called steatohepatitis, according to ongoing research. Additionally, a small minority of people with NAFLD may develop steatohepatitis.

Conclusion

Patients with type 2 diabetes mellitus have a significantly greater overall prevalence of NAFLD than those with other kinds of diabetes mellitus. It suggests that people with type 2 diabetes should receive extra care in order to prevent NAFLD.

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