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Original Research Article

Non-alcoholic fatty liver disease and type 2 diabetes mellitus a prospective observational study in coastal region of Andhra Pradesh

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ABSTRACT

Background: Non alcoholic fatty liver is the most common chronic liver disease in many parts of world including India. It is strongly associated with obesity, overweight and insulin resistance. Type 2 diabetes is common condition and it regularly coexists with NAFLD. We designed to study non alcoholic fatty liver among type 2 diabetes mellitus among people of costal Andhra Pradesh and impact of this disease on metabolic profile of patients.
Methods: As per selection criteria 160 patients with type 2 diabetes mellitus were enrolled for this study. A detailed history of patients was taken regarding demography of patients, duration of diabetes mellitus, drug history, alcohol consumption and symptoms of hepatic disorder.
Results: Out of that 86 (53.75%) patients were diagnosed to be non alcoholic fatty liver disease. There was significant difference between with NAFLD and without NAFLD groups regarding FPG (mg/dl) (144.12±10.54 vs. 122.48±11.67) (p=0.0001). AST/ALT ratio was significantly lower in patients with NAFLD then without NAFLD groups (0.81±0.19 vs. 1.16±0.31) (p=0.0001). Alkaline phosphotase (IU/l) was significantly higher in patients with NAFLD then without NAFLD groups (157.83±47.21 vs. 134.24±32.76) (p=0.0004).
Conclusions: In current study the prevalence of NAFLD was 53.75% among type 2 diabetes mellitus patients. There was female predominance in patients with NAFLD and T2DM but in non NAFLD with T2DM has male predominance. There was significant difference between with NAFLD and without NAFLD groups regarding BMI. Hepatic parameters like AST, ALT and Alkaline phosphotase was significantly higher and AST/ALT was significantly lower in patients with NAFLD then without NAFLD groups.

Keywords: Non-alcoholic fatty liver disease, Type 2 diabetes mellitus, Metabolic parameters

INTRODUCTION

Non alcoholic fatty liver (NAFLD) is the most common chronic liver disease in many parts of world including India. It is strongly associated with obesity, overweight and insulin resistance. It is presented as spectrum of liver pathology with different clinical prognosis. It ranges from simple hepatic steatosis to liver cirrhosis in the absence of alcohol typically a threshold of <20 g a day for women and <30 g a day for men is adopted. Type 2 diabetes is common condition and it regularly coexists with NAFLD. The coexistence of diabetes mellitus with NAFLD is associated with increased risk of complication of diabetes mellitus and more severe NAFLD, including cirrhosis, hepatocellular carcinoma and death.[1,2] Liver is major site of action of insulin and place of glucose utilisation so relation between type 2 diabetes mellitus, insulin resistance and NAFLD is expected.[3,4]

Leite et al from Rio de Janeiro, Brazil has concluded in his study that type-2 diabetic patients have a high prevalence of ultrasonographic NAFLD and its presence is associated with obesity, mainly abdominal, hypertriglyceridemia and high-normal ALT levels. The

prevalence of ultrasonographic NAFLD was 69.4% among type 2 diabetes mellitus patient.[5] Prashanth et al from India has reported that Eighty seven percent had NAFLD on histology with 62.6% steatohepatitis and 37.3% fibrosis.[6]

There are various studies available regarding Non alcoholic fatty liver (NAFLD) among type 2 diabetes mellitus patients but there is no study available in our geographical region. So we designed to study with an objective to know the prevalence and pattern of non alcoholic fatty liver (NAFLD) among type 2 diabetes mellitus among people of costal Andhra Pradesh and impact of this disease on metabolic profile of patients.

METHODS

Study design, location and duration

Current study is a prospective observational study that has been conducted in the department of general medicine Konaseema institute of medical science Amalapuram India from January 2010 to March 2021

Selection of patients

Patients of type 2 diabetes mellitus attending outpatient department of general medicine were included for this study as per following inclusion and exclusion criteria. A written informed consent was obtained from all patients before enrolling them for study.

Sample size

Based on exclusion and inclusion criteria 160 patients with type 2 diabetes mellitus were enrolled for this study during study period.

Inclusion criteria

Inclusion criteria for current study were; patients diagnosed cases of type 2 diabetes mellitus for more than 3 years duration, age above 35 years and patients of both sexes.

Exclusion criteria

Exclusion criteria for current study were; pre-existing hepatic disorder, cardiovascular disorder, use of hepatotoxic drugs, CKD and known alcoholics.

Procedure

A detailed history of patients was taken regarding demography of patients, duration of diabetes mellitus, drug history, alcohol consumption and symptoms of hepatic disorder. A detailed clinical examination of patients was done. Body mass index was calculated by body weight in kilograms divided by height of person in meters. For diagnosis of diabetes mellitus ADA Classification and diagnosis of diabetes: standards of medical care in diabetes, 2019 were used. For diagnosis of NAFLD quantitative ultrasound (QUS) parameters, including attenuation coefficient and backscatter coefficient (BSC), have been used for liver fat quantification by GE LOGIQ F8 USG machine. Blood sample was drawn from all the subjects following an overnight fast of 8 to 10 hours. Various parameter like, Fasting plasma glucose, post prandial plasma glucose, HDL-C, LDL-c, TG Total cholesterol, liver function test like SGOT,SGPT alkaline phosphotase, serum total bilirubin and serum total proteins were measured. hexokinase method was used for estimation of plasma glucose. For estimation of above parameters Transasia-EM 200 fully automated analyser was used.

Statistical analysis

Data were recorded in excel sheet and statistical Analysis was done with software SPSS-14 version. Qualitative data were calculated as percentage and proportions and were analyzed by Chi-square test. Quantitative data were expressed as mean ±SD and these data were analyzed by unpaired student t test.

RESULTS

As per selection 160 patients with type 2 diabetes mellitus were enrolled for this study. Out of that 86 (53.75%) patients were diagnosed to be non alcoholic fatty liver disease. As per (Table 1) the mean age of patients of type 2 DM with NAFLD was 53.10±12.48 years and the mean age of patients of type 2 DM without NAFLD was 47.45±9.79 years.

Table 1: Demographic profile of subject under study.

Variable		With NAFLD	Without NAFLD	P value
Age (mean years)		53.10±12.48	47.45±9.79	0.002
Sex	M	34	56	0.00000
	F	52	20	
Duration of T2DM		5.10±1.12	4.90±.98	0.234
BMI Kg/m2		26.42±2.54	23.11±3.14	0.0001

This difference was statistically significant as p value was 0.002.0In group of patients of type 2 DM with NAFLD there was female predominance, type 2 DM without NAFLD group there was male predominance. There is no significant difference between with NAFLD and without NAFLD groups regarding duration of diabetes mellitus (5.10±1.12 years vs. 4.90±0.98 years) (p=0.234). There was significant difference between with NAFLD and without NAFLD groups regarding BMI (26.42±2.54 Kg/m2 vs 23.11±3.14 Kg/m2) (p=0.0001). There was significant difference between with NAFLD and without

NAFLD groups regarding FPG (mg/dl) (144.12±10.54 vs. 122.48±11.67) (p=0.0001) (Table 2).

Table 2: Metabolic parameters of subjects with and without NAFLAD.

Variable	With NAFLD	Without NAFLD	P value
FPG (mg/dl)	144.12±10.54	122.48±11.67	0.0001
PPPG (mg/dl)	196.47±14.51	178.32±18.22	0.0001
HDL (mg/dl)	40.45±6.24	43.22±7.35	0.018
LDL (mg/dl)	132.46±22.47	118.44±24.84	0.0001
TG (mg/dl)	228.45±44.87	147.84±52.12	0.0001
Total Chol (mg/dl)	212.26±38.35	199.55±48.21	0.06

Table 3: Hepatic parameter of subjects with and without NAFLAD.

Variable	With NAFLD	Without NAFLD	P value
AST (U/l)	38.56±10.26	27.71±8.54	0.0001
ALT(U/l)	46.22±36.25	24.12±9.86	0.0001
AST/ALT	0.81±0.19	1.16±.31	0.0001
Alkaline phosphotase (IU/l)	157.83±47.21	134.24±32.76	0.0004
Serum bilirubin (mg/dl)	1.04 ±0.25	0.98 ±.14	0.06
Total protein (g/dl)	6.89±1.21	7.12±1.44	0.27

PPPG (mg/dl) was significantly higher in patients with NAFLD then without NAFLD groups (196.47±14.51 vs. 178.32±18.22) (p=0.0001). HDL (mg/dl) was significantly lower in patients with NAFLD then without NAFLD groups (40.45±6.24 vs. 43.22±7.35) (p=0.018). LDL (mg/dl) was significantly higher in patients with NAFLD then without NAFLD groups (132.46±22.47vs 118.44±24.84) (p= 0.0001). TG (mg/dl) was significantly higher in patients with NAFLD then without NAFLD groups (132.46±22.47vs 118.44±24.84) (p=0.0001). Total Cholesterol (mg/dl) was concentration higher in patients with NAFLD then without NAFLD groups (212.26±38.35vs 199.55±48.21) but this difference was not significant statistically (p=0.06). Regarding hepatic parameter of subjects with and without NAFLAD, serum AST (U/L) was significantly higher in patients with NAFLD then without NAFLD groups (38.56±10.26 vs. 27.71±8.54) (p=0.0001). Serum ALT (U/l) was significantly higher in patients with NAFLD then without NAFLD groups (46.22±36.25 vs. 24.12±9.86) (p=0.0001). AST/ALT ratio was significantly lower in patients with NAFLD then without NAFLD groups (.81±.19 vs. 1.16±.31) (p=0.0001). Alkaline phosphotase (IU/L) was significantly higher in patients with NAFLD then without NAFLD groups (157.83±47.21vs. 134.24±32.76) (p=0.0004). Serum bilirubin was concentration higher in patients with NAFLD then without NAFLD groups (1.04 ±.25 vs. 0.98 ±.14) but this difference was not significant statistically (p=0.06). Serum protein was concentration higher in patients with NAFLD then without NAFLD groups (1.04±0.25 vs. 0.98±0.14) but this difference was not significant statistically (p=0.06).

DISCUSSION

Liver is important site for systemic metabolism and responsible for insulin resistance and type 2 DM. Insulin resistance and obesity are common in NAFLD patients. Large number of patients with type 2 DM develops NAFLD.[7] In present study we have enrolled 160 patients type 2 diabetes mellitus patients to study the prevalence of NAFLD and metabolic parameters. In this study the prevalence of NAFLD was 53.75% among type 2 diabetes mellitus patients. Amiri et al from India has reported that the overall prevalence of NAFLD in type 2 diabetes mellitus patients by random effects models was 54% which supports our study.[8] Younossi et al from Virginia USA that the overall prevalence of NAFLD among patients with type 2 diabetes mellitus is 55.5%. This finding support our study.[9]

There was female predominance in patients with NAFLD and T2DM but in non NAFLD with T2DM has male predominance. This finding supported by the work of Bhatt et al.[10] There is no significant difference between with NAFLD and without NAFLD groups regarding duration of diabetes mellitus this finding is supported by the work of Clark et al.[11,12] There was significant difference between with NAFLD and without NAFLD groups regarding BMI. This finding is supported by the work of Xia et al and Bonora et al.[13,14] FPG (mg/dl) and PPPG (mg/dl) was significantly higher in patients with NAFLD then without NAFLD groups. This finding is supported by Amiri et al, Arrese et al and Bae et al.[8] [15,16.] Hepatic parameters like AST, ALT and alkaline phosphotase was significantly higher and AST/ALT was significantly lower in patients with NAFLD then without NAFLD groups. This finding is supported by Keith et al.[17,18]

Limitations

Limitations of current study were we could have done CT scan and histopathology to establish the diagnosis. Some more investigation like C-peptide assay and serum ferritin could have been done to establish insulin resistance and hepatic involvement.

CONCLUSION

In current study the prevalence of NAFLD was 53.75% among type 2 diabetes mellitus patients. There was female predominance in patients with NAFLD and T2DM but in non NAFLD with T2DM has male predominance. There was significant difference between with NAFLD and without NAFLD groups regarding BMI. Hepatic parameters like AST, ALT and Alkaline phosphotase was significantly higher and AST/ALT was significantly lower in patients with NAFLD then without NAFLD groups.

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