

Correlation of Non Alcoholic Fatty Liver Disease and its Grades with Diabetes Mellitus Type 2

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Abstract: A prospective longitudinal study was conducted to correlate the grades of NAFLD with patients with type 2DM. Ultrasonography was the mode of investigation and classification of NAFLD based on architecture of liver parenchyma. Results were analysed with chi square statistical instrument. Results were found to be significantly correlated. Out of these 100 subjects with presence of NAFLD (55 were males & 45 were females) ranging from 25 years onwards age group prevalence of diabetes were 41.8% in males and 77.7% in females. Whereas in control group (52 were males and 48 were females) prevalence of DM were 7.6% in males and 22% in females which is statistically significant. (P VALUE < 0.0001) and the same was compared with previous such studies through references.

1. Introduction

Non-alcoholic fatty liver disease (NAFLD) is a highly prevalent condition which is characterized by fatty infiltration of liver cells resembling that of alcohol-induced liver injury but occurring in patients who do not abuse alcohol [1]. The incidence of fatty liver is estimated at 14-23%. This figure is 70-90% in obese and type II diabetic people [2]. The prevalence of NAFLD is 20%–30% in the general adult population in Western countries (3) and is now 12%–24% in Asian-Pacific countries. (124) Its prevalence in obese or diabetic patients increases up to 70%–90%. (4) The spectrum of NAFLD ranges from fatty liver alone to steatohepatitis, which histologically is similar to alcoholic hepatitis, and may progress to end-stage liver disease and cirrhosis.

Definition of non-alcoholic fatty liver disease

Non-alcoholic fatty liver disease is the most common cause of chronic liver disease in the general population and is present when fatty infiltration affects .5% of hepatocytes, in the presence of <20 g (2.5 U) of alcohol consumption per day, without evidence of other causes of liver disease

Aims and Objective

To study the correlation between NAFLD and DM type 2

2. Review of Literature

Recently, a lot of data from the Western literature has suggested the increased atherosclerosis and cardiovascular risk in patients with NAFLD. But it is still a matter of debate whether NAFLD per se predisposes to these abnormalities or this is all happening because of the presence of metabolic

A clinical study of one hundred and forty eight individuals with type 2 diabetes mellitus by Deepak K. Amrapurkar, Parijat Gupte, in 2004 at Gastroenterology centre, Jagjivan Ram hospital, Mumbai, showed a high incidence of steatosis, steatohepatitis and fibrosis in individual. (5)

A study conducted in Shanghai to explore the relationship between fatty liver and the metabolic syndrome in the adults. The study population consisted of 3175 subjects (1218 men) with a mean (\pm SD) age of 52.4 ± 15.1 years. Metabolic syndrome and fatty liver were found in 726 (22.87%) and 661 (20.82%) of sampled cases, respectively. There is a high prevalence of metabolic syndrome and fatty liver among adults. Metabolic disorders are closely related to fatty liver; moreover, fatty liver appears to be a good predictor for the clustering of risk factors for metabolic syndrome (6).

Targher *et al* (7) studied a population of 200 diet-controlled type 2 diabetic subjects, reported that NAFLD patients had a markedly greater carotid IMT and that the increase of carotid IMT was largely explained by HOMA-estimated insulin resistance. In contrast IMT values were found to be significantly higher in diabetic patients regardless of the degree of steatosis by Cakir *et al* (8) Similarly other two studies performed in diabetic population reported that hepatic steatosis was not associated with carotid atherosclerosis and suggested that the association of hepatic steatosis and cardiovascular disease might be just an epiphenomenon (9,10).

İşilak *et al* (11) and Fotbolcu *et al* (12) reported that elastic properties of aorta were abnormally changed in patients with NAFLD, probably related to or associated with insulin resistance. In contrast, Catena *et al* (13) revealed that in essential hypertensive patients without additional cardiovascular risk factors, NAFLD was associated with insulin resistance but not with increased arterial stiffness.

Thakur *et al* (14) in a case-control study reported that in a cohort of Asian Indians subjects NAFLD is significantly associated with subclinical atherosclerosis and endothelial dysfunction. Interestingly, these results were independent from the classical cardiovascular risk factors, *i.e.*, obesity and metabolic syndrome. Similar results were reported by Kucukazman *et al* (16) In addition plasma levels of fetuin-A, which is known to inhibit insulin signalling and recently emerged as a biomarker for diabetes risk, was found independently associated with endothelial dysfunction and subclinical atherosclerosis in NAFLD patients (17). (15)

A study published in zahedan university of medical sciences saeni sasteni et al (15) suggests that Nonalcoholic fatty acid liver patients are at significantly higher risk for atherosclerosis and cardiovascular. The results of that study includes-

In this study, 39 patients with moderate to severe fatty liver disease and 39 age and sex matched healthy controls were investigated. Forty six percent of the subjects were men and 54% were women, and mean age of fatty liver group (57±10) was almost equal with that of control group (57±8) group. In terms of laboratory analysis, despite higher levels of fasting blood glucose and AST in fatty liver group than control group (105±38 versus 97±44 mg/dL, and 28±18 versus 24±10 IU/L, respectively), the differences were not statistically significant. However, the levels of total cholesterol, triglycerides, ALT, and ALP were significantly higher in fatty liver group (207±47 versus 174±38 mg/DL, p=0.001; 190±105 versus 111±52 mg/dL, p=0.001; 36±26 ver diseases.(78) A. N. Mavrogiannaki and I.N.Migdalidis: NAFLD is strongly associated with T2DM and CVD. Within this spectrum, steatosis alone is apparently benign, while nonalcoholic steatohepatitis may progress to cirrhosis and hepatocellular (18).

In a study by mohammad afsini et al(17) they examined 250 patients with NAFLD (139 male and 111 female) and 85 controls (46 male and 39 female). Because of the study design, cases and control subjects were almost identical in terms of gender and age. The mean age of patients with NAFLD was 46.5 ± 10.5 years and for controls was 44.8 ± 14.1 (P = 0.078 Mean fasting blood glucose was significantly (P = 0.001) higher in patients with NAFLD (117.16) than in normal subjects (90.77). P = 0.0001),

The prevalence of NAFLD is 20%–30% in the general adult population in Western countries¹² and is now 12%–24% in Asian-Pacific countries.¹³ Its prevalence in obese or diabetic patients increases up to 70%–90%.¹²

3. Interpretation of USG Abdomen

Abdominal ultrasonic criterion for fatty liver was set based on literature and examination with 3.5 MHz probe as follow [11]: -Grade I (mild) is slight increase in liver echogenicity, but normally visualized diaphragm and intrahepatic vessels.-Grade II moderate increase in liver echogenicity with slight impairment of visualization of the intrahepatic vessels. -Grade III marked increase in liver echogenicity with poor or no visualization of the diaphragm, intrahepatic vessels, and posterior part of the right lobe of the liver.

Sample Size

- 1) Sample of 100 patients having NAFLD
- 2) Sample of 100 patients without having NAFLD

Inclusion Criteria

Those fulfilling criteria for diagnosis of non-alcoholic liver disease

Exclusion Criteria

- 1) Those with a history of known liver disease, Hep B ,Hep C positivity.
- 2) Those who consume more than 20 g alcohol daily or abuse alcohol, and
- 3) Those with ultrasonic-proven liver disease other than fatty liver.
- 4) Those with other known co-morbid conditions like hypothyroidism.

Type of Study

Prospective case control study

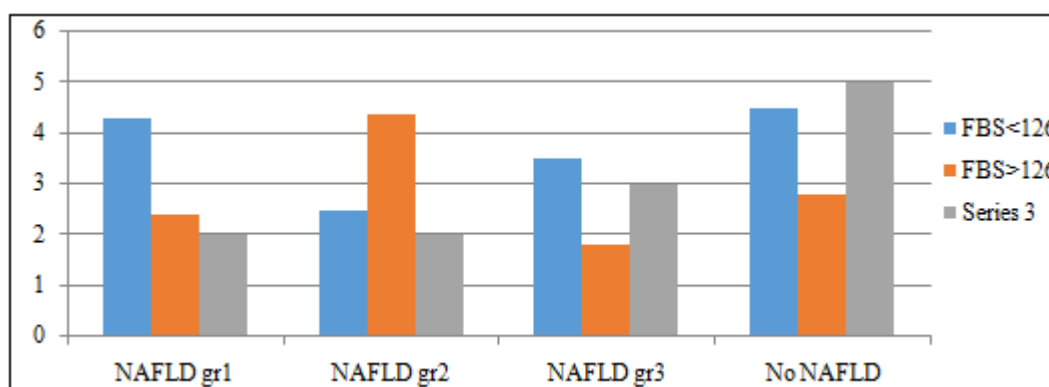
Source

Patient attending medicine opd and admitted in ward in hamidia hospital and gmc Bhopal .

Work plan/ Duration: Period of collection of data: MAY2013 –DEC 2014

4. Results

Correlation of FBS and grades of NAFLD



NAFLD/ FBS	NAFLD grade1	NAFLD grade2	NAFLD grade3	No NAFLD	Total
FBS<126	38	3	0	100	141
FBS>126	25	30	4	0	59
TOTAL	63	33	4	100	200

P value-<0.0001

Mean values of different variables

Variab	Cases Overall	Cases Males	Cases Females	Control Overall	Control Males	Control Females
FBS	143.61	132	157.2	123	117	129

Baseline Investigations will include

A Complete blood count Blood sugar T3, T4, TSH Renal function test Liver function test, Serum electrolyte, Data will be recorded on the day of diagnosis of Non-alcoholic fatty liver disease Chest radiographs USG liver USG, CIMT

5. Discussion

The present study included 200 subjects out of which 100 subjects were found to have USG proven NAFLD liver and 100 subjects are without NAFLD on USG examination which are mutually matched for age sex from May 2013 to Dec 2014 from OPD (medicine and cardiology) and admitted in Hamidia Hospital GMC and Hamidia Hospital Bhopal.

Out of 100 cases 55 were males and 45 were females and in control group 52 were males and 48 were females and so sex matched cases and control group were selected. There was no statistically significant relationship exists between the two groups (P VALUE-0.526)

A K Agrawal (23) et al found that mean WHR was 0.97 & 0.93 in NAFLD and non NAFLD population in DM2. Lopez Surez et al (19) found prevalence of NAFLD as 57.2% in DM 2 patients. Out of these 100 subjects with presence of NAFLD (55 were males & 45 were females) ranging from 25 years onwards age group prevalence of diabetes were 41.8% in males and 77.7% in females. Whereas in control group (52 were males and 48 were females) prevalence of DM were 7.6% in males and 22% in females which is statistically significant (P VALUE <0.0001).

Out of cases mean FBS was 143 mg/dl and in males it was 132 mg/dl & in females mean was 157 mg/dl out of the control group mean was 123 mg/dl and in males it was 117 mg/dl and in females it was 129 mg/dl which statistically significant (P VALUE <0.0001). Lopez Surez et al (19) found prevalence of NAFLD as 57.2% in DM 2 patients. Bajaj et al (56) found that the mean FBS as 161.3 mg/dl and 168.88 mg/dl in NAFLD and non NAFLD of DM2 population. Mohan et al (23) found prevalence of NAFLD (54.5%) was significantly higher in patients with DM2 compared to those with pre diabetes (IGT or IGF) (33%), isolated IGT (32.4%), isolated IGF (27.3%) and normal glucose tolerance (NGT).

Mantovani A et al (20) found the prevalence of LVH (evidence of hypertension) and DM 2 in subjects in NAFLD population was markedly higher than subjects without NAFLD. Mishra et al (21) found the prevalence of metabolic syndrome and NAFLD to be 24% and 14.8% resp. in non alcoholic north Indian men. Mishra et al (22) found the prevalence of NAFLD (54.5%) was significantly higher in DM2 patients as compared to those without it.

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