

ORIGINAL RESEARCH

Prevalence of non- alcoholic fatty liver disease and its correlation with coronary risk factors in patients with type 2 DM

¹Anand Gaurav, ²Md Shahid Iqbal¹⁻²Senior Resident, Department of Medicine, Anugrah Narayan Magadh Medical College, Gaya, Bihar, India**Corresponding Author**

Md Shahid Iqbal

Senior Resident, Department of Medicine, Anugrah Narayan Magadh Medical College, Gaya, Bihar, India

Email- shahidnmch@gmail.com

Received date: 18 April, 2024

Acceptance date: 21 May, 2024

ABSTRACT

Background: Nonalcoholic fatty liver disease (NAFLD) is a group of disorders characterized histologically by macrovesicular hepatic steatosis that affects people who do not consume alcohol in proportions that are typically thought to be damaging to the liver. The present study was conducted to assess prevalence of non- alcoholic fatty liver disease and its correlation with coronary risk factors in patients with type 2 DM. **Materials & Methods:** 120 patients of type 2 diabetes of both genders were divided into 2 groups of 60 each. Group I was NAFLD- patients with USG evidence of fatty changes in the liver and group II was non-NAFLD- patients without any USG evidence of fatty changes in the liver. The history of duration of diabetes was recorded. **Results:** In group I, males were 32 and females were 28 and in group II males were 34 and females were 26. In group I and group II, hypertension was seen in 42 and 21, smoking in 45 and 18, BMI >25 kg/m² in 36 and 7, HbA1c (>7%) in 52 and 16, metabolic syndrome in 42 and 20, LDL cholesterol >160 mg/dl in 17 and 34, HDL (<50 mg/dl in females and <40 mg/dl in males) in 55 and 37, total cholesterol >200 mg/dl in 53 and 32, triglyceride >150 mg/dl in 58 and 27, ALT (> 50 IU/l in males and >35 IU/l in females) in 42 and 12 and AST (>40 IU/l) in 48 and 17 patients in group I and II respectively. The difference was significant (P< 0.05). **Conclusion:** When type 2 diabetes is present, the prevalence of non-alcoholic fatty liver disease (NAFLD) rises significantly. In comparison to patients without NAFLD, obesity, hypertension, and dyslipidemia were much more common in those with NAFLD.

Key words: Diabetes, Non-alcoholic fatty liver disease, Hypertension

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution- Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

Nonalcoholic fatty liver disease (NAFLD) is a group of disorders characterized histologically by macrovesicular hepatic steatosis that affects people who do not consume alcohol in proportions that are typically thought to be damaging to the liver. The prevalence of NAFLD in the general population has been reported to be in the 15%- 30% range in many countries, and it is virtually certainly growing.^{1,2}

The prevalence of cirrhosis in NAFLD patients more than doubles from 10–25% when diabetes is also present.³ At least two-thirds of patients with hypertriglyceridemia and one-third with hypercholesterolemia who have hyperlipidemia have fatty livers according to ultrasonography. There may be a more accurate way to diagnose NAFLD with liver imaging.⁴

Compared to individuals without diabetes, people with type 2 diabetes seem to have a larger chance of developing NAFLD and, most definitely, a higher risk

of fibrosis and cirrhosis.⁵ Furthermore, recent research indicates that, independent of the components of the metabolic syndrome, the existence of NAFLD in type 2 diabetes may be linked to an increased risk of cardiovascular disease (CVD). If these results are accurate, they could help forecast the risk of CVD and have significant therapeutic implications by identifying NAFLD in those with type 2 diabetes.⁶ The present study was conducted to assess prevalence of non- alcoholic fatty liver disease and its correlation with coronary risk factors in patients with type 2 DM.

MATERIALS & METHODS

The present study comprised 120 patients of type 2 diabetes of both genders. All patients gave their written consent for participation in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 60 each. Group I was NAFLD- patients with USG evidence of fatty changes in the liver and group II was non-NAFLD-

patients without any USG evidence of fatty changes in the liver. The history of duration of diabetes was recorded. All underwent ECG and ischemic changes was recorded. Ultrasonographic evaluation was

performed by a single radiologist. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Status	NAFLD	Non- NAFLD
M:F	32:28	34:26

Table I shows that in group I, males were 32 and females were 28 and in group II males were 34 and females were 26.

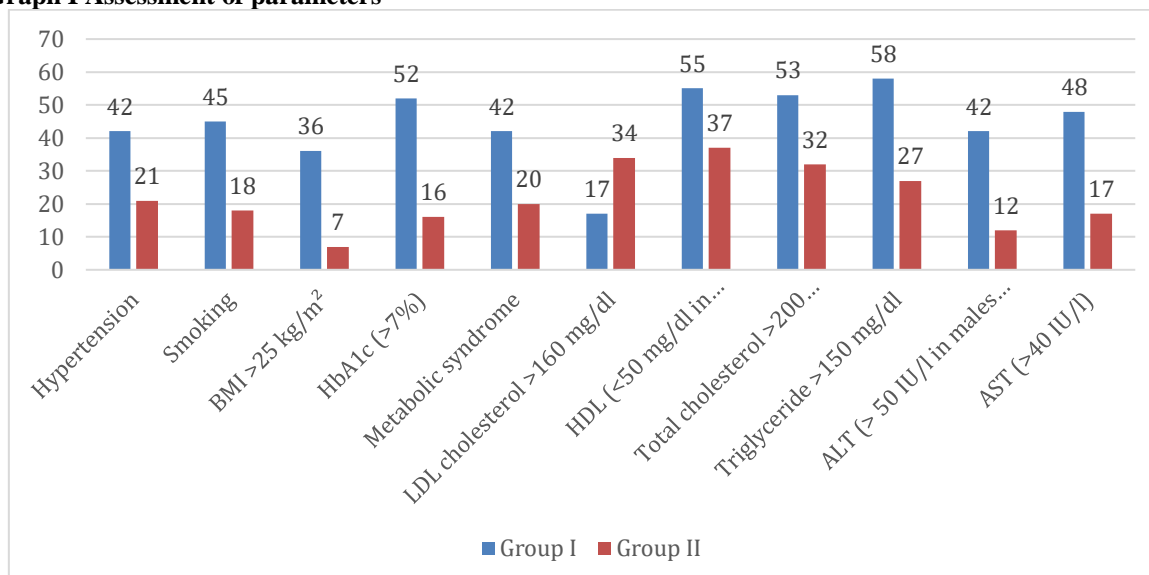
Table II Assessment of parameters

Parameters	Group I	Group II	P value
Hypertension	42	21	0.04
Smoking	45	18	0.01
BMI >25 kg/m ²	36	7	0.01
HbA1c (>7%)	52	16	0.03
Metabolic syndrome	42	20	0.05
LDL cholesterol >160 mg/dl	17	34	0.02
HDL (<50 mg/dl in females and <40 mg/dl in males)	55	37	0.04
Total cholesterol >200 mg/dl	53	32	0.05
Triglyceride >150 mg/dl	58	27	0.01
ALT (> 50 IU/l in males and >35 IU/l in females)	42	12	0.03
AST (>40 IU/l)	48	17	0.03

Table II shows that in group I and group II, hypertension was seen in 42 and 21, smoking in 45 and 18, BMI >25 kg/m² in 36 and 7, HbA1c (>7%) in 52 and 16, metabolic syndrome in 42 and 20, LDL cholesterol >160 mg/dl in 17 and 34, HDL (<50 mg/dl in females and <40 mg/dl in males) in 55 and 37, total

cholesterol >200 mg/dl in 53 and 32, triglyceride >150 mg/dl in 58 and 27, ALT (> 50 IU/l in males and >35 IU/l in females) in 42 and 12 and AST (>40 IU/l) in 48 and 17 patients in group I and II respectively. The difference was significant (P< 0.05).

Graph I Assessment of parameters



DISCUSSION

Non-alcoholic fatty liver disease (NAFLD) is the most frequent type of chronic liver damage and is on the rise worldwide, especially in communities with high rates of obesity and diabetes. Reports state that NAFLD is linked to a worse prognosis for liver

cirrhosis and cardiometabolic disorders, particularly type 2 diabetes. If a patient's liver fat content exceeds 5–10% of the organ's weight and secondary causes of hepatic steatosis are ruled out, NAFLD may be diagnosed if the patient takes less than 10 g of ethanol daily.⁷ Patients with type 2 diabetes mellitus (T2DM)

are undoubtedly more likely to experience worsening fibrosis and cirrhosis, and they also appear to have a larger chance of acquiring NAFLD than people without the disease. Increased risk of cardiovascular disease may also be a result of NAFLD in people with type 2 diabetes.⁸ For patients with NAFLD, T2DM increases the risk of liver-associated death by up to 22 times. There is a spectrum of liver diseases that includes non-alcoholic steatohepatitis (NASH), a progressive type of liver disease, and simple steatosis. Both in industrialized and developing nations, the prevalence of non-alcoholic fatty liver disease (NAFLD) is strikingly high, though it varies based on the population being studied and the criteria applied.⁹ Non-alcoholic fatty liver disease (NAFLD) is defined as a build-up of fat in the liver that progresses from simple steatosis to cirrhosis, hepatocellular carcinoma (HCC), and steatohepatitis when excessive alcohol consumption is avoided. More than 5% of hepatocytes exhibit macrovascular steatosis in NAFLD, which is characterized by the lack of inflammation.^{10,11} The present study was conducted to assess fatty liver disease and cardiovascular diseases in type 2 diabetic patients using USG.

We found that in group I, males were 32 and females were 28 and in group II males were 34 and females were 26. Suryawanshi et al¹² studied the prevalence of NAFLD by USG in patients with type 2 diabetes mellitus and correlated NAFLD with coronary artery disease and coronary risk factors in patients with type 2 diabetes mellitus. Among the 120 patients that took part in the study, there were 69 NAFLD patients and 51 non-NAFLD patients. Individuals with NAFLD had a significantly longer mean diabetes duration. In the NAFLD group, the prevalence of hypertension, obesity, visceral obesity, and metabolic syndrome was greater. The NAFLD group had much worse glycemic control. Sr. HDL and Sr. Triglyceride levels were found to be greater in the NAFLD group, whereas Sr. LDL levels were found to be higher in the non-NAFLD group, and Total cholesterol levels were practically comparable in both groups. ALT and AST values were higher in NAFLD patients than in non-NAFLD patients.

We observed that in group I and group II, hypertension was seen in 42 and 21, smoking in 45 and 18, BMI >25 kg/m² in 36 and 7, HbA1c (>7%) in 52 and 16, metabolic syndrome in 42 and 20, LDL cholesterol >160 mg/dl in 17 and 34, HDL (<50 mg/dl in females and <40 mg/dl in males) in 55 and 37, total cholesterol >200 mg/dl in 53 and 32, triglyceride >150 mg/dl in 58 and 27, ALT (> 50 IU/l in males and >35 IU/l in females) in 42 and 12 and AST (>40 IU/l) in 48 and 17 patients in group I and II respectively. Agrawal et al¹³ estimated the prevalence of non-alcoholic fatty liver disease (NAFLD) by ultrasonography, and to correlate NAFLD with coronary artery disease (CAD) and coronary risk factors in a group of Indian type 2 diabetics. Consecutive patients of type 2 diabetes were

recruited. History and physical examination were recorded. Laboratory investigations included fasting and 2-hour post-prandial blood glucose, blood urea, serum creatinine, liver function tests, lipid profile, glycated haemoglobin, microalbuminuria, and ultrasonographic measurement of carotid intimal-medial thickness (CIMT). NAFLD was diagnosed on the basis of ultrasound assessment of the liver. The study group (n=124) was divided into a NAFLD group (n=71) and a non-NAFLD group (n=53). The prevalence of NAFLD was 57.2%. CAD was more prevalent in the NAFLD subgroup (60.5%) compared to the non-NAFLD subgroup (45.2%). The NAFLD subgroup had higher prevalence of hypertension, smoking, obesity (measured by BMI), central obesity (measured by waist circumference and waist hip ratio), higher HbA1c, higher triglyceride levels and lower HDL levels, and higher mean CIMT. Using binary logistic regression analysis, it was found that hypertension (p=0.013), LDL cholesterol (p=0.049), microalbuminuria (p=0.034) and NAFLD (p=0.016) were significantly correlated with CAD.

Comparing the prevalence of cardiovascular disease (CVD) and its risk variables across individuals with and without non-alcoholic fatty liver disease (NAFLD), Targher et al¹⁴ assessed the prevalence of NAFLD in the population with type 2 diabetes. Among patients, the uncorrected prevalence of non-alcoholic fatty liver disease (NAFLD) was 69.5%, and the most common cause of hepatic steatosis on ultrasound examination (81.5%) was NAFLD. Age-adjusted NAFLD prevalence was 71.1% in males and 68% in women. The prevalence of NAFLD rose with age (65.4% among participants aged 40-59 years and 74.6% among those aged > or = 60 years; P < 0.001). Compared to those without NAFLD, patients with NAFLD had significantly (P < 0.001) higher age and sex-adjusted prevalences of peripheral (15.4 vs. 10.0%), cerebrovascular (20.0 vs. 13.3%), and coronary (26.6 vs. 18.3%) vascular disease.

The limitation of the study is the small sample size.

CONCLUSION

Authors found that when type 2 diabetes is present, the prevalence of non-alcoholic fatty liver disease (NAFLD) rises significantly. In comparison to patients without NAFLD, obesity, hypertension, and dyslipidemia were much more common in those with NAFLD.

REFERENCES

1. Angulo P. Non-alcoholic fatty liver disease. *N Engl J Med.* 2002;346:1221-31.
2. Daniel S, Ben-Menachem T, Vasudevan G, Ma CK, Blumenkehl M. Prospective evaluation of unexplained chronic liver transaminase abnormalities in asymptomatic and symptomatic patients. *Am J Gastroenterol.* 1999;94:3010-4.
3. Machado M, Marques-Vidal P, Cortez-Pinto H. Hepatic histology in obese patients undergoing bariatric surgery. *J Hepatol.* 2006;45:600-6.

4. Younossi ZM, Gramlich T, Matteoni CA, Boparai N, McCullough AJ. Non-alcoholic fatty liver disease in patients with type 2 diabetes. *Clin Gastroenterol Hepatol.* 2004;2:262-5.
5. Targher G, Day CP, Bonora E. Risk of cardiovascular disease in patients with non-alcoholic fatty liver disease. *New Eng J Med.* 2010;363(14):1341-50.
6. Younossi ZM, Gramlich T, Matteoni CA, Boparai N, McCullough AJ. Non-alcoholic fatty liver disease in patients with type 2 diabetes. *Clin Gastroenterol Hepatol.* 2004;2(3):262- 5.
7. Assy N, Kaita K, Mymin D, Levy C, Rosser B, Minuk G. Fatty infiltration of liver hyperlipidemic patients. *Dig Dis Sci.* 2000; 45: 1929-34.
8. Hamaguchi M, Kojima T, Takeda N, Nagata C, Takeda J, Sarui H, et al. Non-alcoholic fatty liver disease is a novel predictor of cardiovascular disease. *World J Gastroenterol.* 2007;13:1579-84.
9. S Banerjee, US Ghosh, S Dutta. Clinicopathological profile of hepatic involvement in type-2 diabetes mellitus and its significance. *JAPI.* 2008;56.
10. Bluemke DA, Kronmal RA, Lima JA, Liu K, Olson J, Burke GL, et al. The relationship of left ventricular mass and geometry to incident cardiovascular events: the MESA (Multi-Ethnic Study of Atherosclerosis) study. *J Am Coll Cardiol.* 2008;52:2148-55.
11. Lu H, Zeng L, Liang B, Shu X, Xie D. High prevalence of coronary heart disease in type 2 diabetic patients with non-alcoholic fatty liver disease. *Archives of Medical Research.* 2009 Oct 1;40(7):571-5.
12. Nitin Vishwanath Suryawanshi, Kalpita Pai, Rahul Radhakrishnan, Vinayak Sawardekar, and Sunil Dhanraj Bhaisare. Prevalence of non-alcoholic fatty liver disease and its correlation with coronary risk factors in patients with type 2 diabetes. *International Journal of Medical Research & Health Sciences (ijmrhs),* 2023, 12(2): 78-84.
13. Agarwal AK, Jain V, Singla S, Baruah BP, Arya V, Yadav R, Singh VP. Prevalence of non-alcoholic fatty liver disease and its correlation with coronary risk factors in patients with type 2 diabetes. *The Journal of the Association of Physicians of India.* 2011 Jun 1;59:351-4.
14. Targher G, Bertolini L, Padovani R, Rodella S, Tessari R, Zenari L, Day C, Arcaro G. Prevalence of nonalcoholic fatty liver disease and its association with cardiovascular disease among type 2 diabetic patients. *Diabetes care.* 2007 May 1;30(5):1212-8.