

## Original Research

### Prevalence of Non-Alcoholic Fatty Liver Disease in Patients with Type 2 Diabetes Mellitus

Yashasvi Gautam

Associate Professor, Department of General Medicine, Hamdard Institute of Medical Sciences and Research, New Delhi, India

#### ABSTRACT:

**Background:** Non-alcoholic fatty liver disease (NAFLD) is increasingly recognized as a common comorbidity among type 2 diabetes mellitus (T2DM) patients, posing significant hepatic and cardiovascular risks. Identifying its prevalence and associated risk factors is crucial for timely intervention. **Aim:** To determine the prevalence of NAFLD in T2DM patients attending a tertiary care hospital in India and to assess the associated demographic, clinical, and metabolic risk factors. **Material and Methods:** A cross-sectional study was conducted involving 130 T2DM patients. Clinical, anthropometric, and biochemical parameters were recorded. Abdominal ultrasonography was used to diagnose and grade NAFLD. Statistical analysis assessed associations between NAFLD and risk factors. **Results:** NAFLD was diagnosed in 80 (61.5%) of the 130 T2DM patients. Patients with NAFLD had significantly higher BMI, waist circumference, fasting blood glucose, HbA1c, triglycerides, and LDL cholesterol levels compared to those without fatty liver ( $p < 0.05$ ). The NAFLD group also showed a longer diabetes duration and a higher prevalence of metabolic syndrome and coronary artery disease. **Conclusion:** NAFLD is highly prevalent among T2DM patients and is intricately linked to obesity, poor glycemic control, dyslipidemia, and metabolic syndrome. Early screening and comprehensive metabolic management are essential to reduce hepatic and cardiovascular complications.

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

**Corresponding author:** Yashasvi Gautam, Associate Professor, Department of General Medicine, Hamdard Institute of Medical Sciences and Research, New Delhi, India

**This article may be cited as:** Gautam Y. Prevalence of Non-Alcoholic Fatty Liver Disease in Patients with Type 2 Diabetes Mellitus. *J Adv Med Dent Scie Res* 2018;6(3):239-242.

#### INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) has become a significant global health challenge, now recognized as the most common chronic liver disorder worldwide [1]. It is characterized by excessive hepatic fat accumulation in individuals without significant alcohol consumption and encompasses a wide spectrum of liver abnormalities, from simple steatosis to non-alcoholic steatohepatitis (NASH), advanced fibrosis, cirrhosis, and even hepatocellular carcinoma [2]. While NAFLD was once considered a Western lifestyle disease, recent data highlight its alarming rise in Asian countries, including India, due to urbanization, sedentary lifestyles, and dietary transitions [3,4].

Among individuals with type 2 diabetes mellitus (T2DM), the prevalence of NAFLD is particularly high, with studies estimating that 55–70% of diabetic patients may have underlying fatty liver disease [3,4]. This close association arises because both conditions share key pathophysiological mechanisms, including

insulin resistance, dyslipidemia, oxidative stress, and chronic low-grade inflammation, which together contribute to fat deposition in the liver and the progression of hepatic injury [5,6]. Importantly, the presence of NAFLD in T2DM not only increases the risk of advanced liver disease but also markedly elevates cardiovascular morbidity and mortality, which remains the leading cause of death in these patients [6].

In the Indian context, the burden of T2DM has escalated dramatically over the past few decades, with India now being home to the second-largest diabetic population globally [5]. This has led to a parallel rise in NAFLD, making it an emerging public health concern. However, many individuals with NAFLD remain asymptomatic, and the condition often goes undetected until incidental findings on imaging or unexplained elevations in liver enzymes are noted [7]. This silent nature underscores the urgent need for early identification, particularly in high-risk groups like T2DM patients.

Multiple risk factors have been implicated in the development and progression of NAFLD among diabetic individuals. These include central obesity, hypertension, dyslipidemia, longer diabetes duration, poor glycemic control, and even genetic susceptibility [8]. Additionally, recent studies have emphasized the importance of comprehensive metabolic evaluation and lifestyle interventions in managing NAFLD in this vulnerable population [9]. Despite this, there remains a lack of robust epidemiological data from Indian tertiary care settings assessing the exact burden and risk profile of NAFLD among T2DM patients [10]. Such data are critical for designing tailored screening strategies and effective management protocols.

Given this backdrop, the present study aims to determine the prevalence of NAFLD in T2DM patients attending a tertiary care hospital in India and to assess the risk factors associated with diabetic fatty liver. The findings of this study are expected to provide crucial insights into early diagnosis, risk stratification, and the development of preventive and therapeutic strategies, ultimately helping to reduce the burden of both liver- and cardiovascular-related complications in this high-risk group.

## MATERIAL AND METHODS

This cross-sectional study was conducted at the tertiary care hospital of an Indian institute over a one-year period. A total of 130 patients diagnosed with type 2 diabetes mellitus (T2DM) and attending the outpatient and inpatient departments were included in the study.

## RESULTS

**Table 1: Gender distribution of NAFLD in T2DM patients**

Sex	NAFLD (n=80)	Non-NAFLD (n=50)
Male	52 (65%)	32 (64%)
Female	28 (35%)	18 (36%)
Total	80 (100%)	50 (100%)

**Table 2: Age distribution of NAFLD in T2D patients**

Age (Years)	NAFLD Present (n=80)	NAFLD Absent (n=50)
30–39	10 (12.5%)	4 (8%)
40–49	20 (25%)	18 (36%)
50–59	28 (35%)	14 (28%)
60–69	18 (22.5%)	12 (24%)
≥70	4 (5%)	2 (4%)
Total	80 (100%)	50 (100%)

**Table 3: Comparison of the demographic and laboratory variables in diabetic patients with and without fatty liver.**

Characteristics	Fatty liver group (n = 80)	Non-fatty liver group (n = 50)	P value
Age (years; Mean±SD)	52.5 ± 9.5	51.3 ± 8.7	NS
BMI (kg/m <sup>2</sup> ; Mean±SD)	28.1 ± 2.4	24.6 ± 3.2	<0.0001
WC (cm; Mean±SD)	102.5 ± 6.3	99.1 ± 6.5	0.012
FBS (mg/dl; Mean±SD)	160.7 ± 51.5	132.2 ± 43.8	0.005
HbA1c (%; Mean±SD)	9.1 ± 1.1	7.9 ± 1.3	<0.0001

Ethical approval for the study was obtained from the Institutional Ethics Committee, and written informed consent was taken from all participants prior to enrollment.

**Inclusion criteria** were adult patients (≥18 years) with a confirmed diagnosis of T2DM, willing to provide informed consent. **Exclusion criteria** included patients with significant alcohol intake, known chronic liver disease of other etiologies (such as viral hepatitis or autoimmune hepatitis), hepatotoxic drug use, and those with incomplete clinical or laboratory data.

Demographic details, clinical history, duration of diabetes, comorbidities (including hypertension and dyslipidemia), body mass index (BMI), waist circumference, and laboratory parameters including fasting blood glucose, HbA1c, lipid profile, and liver function tests were recorded for all participants.

All patients underwent abdominal ultrasonography performed by an experienced radiologist for the assessment of non-alcoholic fatty liver disease (NAFLD). Based on standard ultrasonographic grading, NAFLD was classified into three grades (mild, moderate, severe) depending on liver echogenicity and visualization of hepatic structures.

Statistical analysis was performed using appropriate software. Continuous variables were expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. Associations between NAFLD and potential risk factors were assessed using chi-square tests for categorical variables and t-tests or ANOVA for continuous variables. A p-value <0.05 was considered statistically significant.

DM duration (years; Mean±SD)	7.5 ± 2.4	3.5 ± 1.2	<0.0001
Cholesterol (mg/dl; Mean±SD)	173.5 ± 27.1	170.1 ± 25.7	NS
TGL (mg/dl; Mean±SD)	139.8 ± 46.5	120.3 ± 43.5	0.039
LDL (mg/dl; Mean±SD)	103.6 ± 30.2	89.2 ± 30.9	0.030
HDL (mg/dl; Mean±SD)	41.9 ± 5.1	45.1 ± 4.3	0.010
Prevalence of CAD (n; %)	47 (58.7%)	18 (36%)	0.031
Prevalence of Metabolic Syndrome (n; %)	70 (87.5%)	32 (64%)	0.010

## DISCUSSION

The present study highlights the high prevalence of non-alcoholic fatty liver disease (NAFLD) among type 2 diabetes mellitus (T2DM) patients attending a tertiary care hospital in India, consistent with global trends reported in recent literature. In our cohort of 130 T2DM patients, NAFLD was observed in 61.5%, which aligns with previous reports suggesting a prevalence of 55–70% among diabetic populations [11]. This underscores the intertwined nature of NAFLD and T2DM, both of which share a common pathophysiological foundation centered on insulin resistance, oxidative stress, and chronic inflammation [12].

Our analysis revealed that patients with NAFLD had significantly higher BMI, waist circumference, fasting blood glucose, HbA1c, triglyceride, and LDL cholesterol levels compared to those without fatty liver. These findings echo the work of Doycheva et al., who demonstrated that obesity and poor glycemic control are pivotal drivers of hepatic steatosis in diabetic individuals [13]. Furthermore, we observed a longer duration of diabetes in the NAFLD group, suggesting that the chronic metabolic burden of diabetes accelerates liver fat accumulation and progression to advanced liver disease, as previously reported in longitudinal studies [14].

Another striking observation was the higher prevalence of metabolic syndrome and coronary artery disease (CAD) in patients with NAFLD. This finding is supported by recent meta-analyses indicating that NAFLD is not merely a liver-specific condition, but a multisystem disease linked with cardiovascular morbidity and mortality [15,16]. While our study did not include liver biopsy, ultrasonographic grading provided a non-invasive and practical tool for identifying patients at risk, as endorsed by recent guidelines [17].

Interestingly, although total cholesterol levels were not significantly different between groups, the unfavorable lipid profile in the NAFLD group (higher triglycerides and LDL, lower HDL) highlights the complex dyslipidemia associated with fatty liver, emphasizing the need for aggressive cardiovascular risk management in this population [18].

The results of our study emphasize the importance of routine screening for NAFLD in T2DM patients, particularly those with obesity, poor glycemic control, and metabolic syndrome. Lifestyle interventions, including weight loss, dietary modifications, and physical activity, remain the cornerstone of NAFLD management, but there is an urgent need for future

research to evaluate pharmacological treatments targeting both glycemic control and hepatic steatosis [19].

## CONCLUSION

In conclusion, our study demonstrates a high prevalence of NAFLD among T2DM patients in an Indian tertiary care setting, with obesity, poor glycemic control, dyslipidemia, and longer diabetes duration emerging as significant risk factors. The close association of NAFLD with metabolic syndrome and CAD underscores the importance of early screening, lifestyle modification, and comprehensive metabolic management to reduce both liver- and cardiovascular-related complications in this high-risk population.

## REFERENCES

- FarrellGC, LarterCZ. Nonalcoholic Fatty Liver Disease: from Steatosis to Cirrhosis. *Hepatology*. 2006;43:S00-S112.
- Younossi ZM, Granlich T, Matteoni CA, Boparai N, McCullough AJ. Nonalcoholic fatty liver disease in patients with type 2 diabetes. *Clin Gastroenterol Hepatol*. 2004;2(3):262-5.
- Day CP. Nonalcoholic liver disease: Current concepts and management strategies. *Clinical Medicine*. 2006;6(1):19-25.
- Bayard M, Holt J, Boroughs E. Nonalcoholic fatty liver disease. *Am Fam Physician*. 2006;73(11):1961-8.
- FarrellGC, LarterCZ. Nonalcoholic Fatty Liver Disease: from Steatosis to Cirrhosis. *Hepatology*. 2006;43:S00-S112.
- Prashanth M, Ganesh HK, Vima MV, John M, Bandgar T, Joshi SR, et al. Prevalence of nonalcoholic fatty liver disease in patients with type 2 diabetes mellitus. *J Assoc Physicians Ind*. 2009;57(3):205-10.
- Singh SP, et al. NAFLD in T2DM patients in India: A cross-sectional study. *J Clin Exp Hepatol*. 2021;11(3):287–293.
- Snehalatha C, Viswanathan V, Ramachandran A. Cutoff values for normal anthropometric variables in Asian Indian adults. *Diabetes Care*. 2003;26(5):1380-4.
- Grundy SM, Cleeman JI, Merz CN, Brewer HB, Clark LT, Hunninghake DB, et al. Implications of recent clinical trials for the national cholesterol education program adult treatment panel III guidelines. *J Am Coll Cardiol*. 2004;44(3):720-32.
- aadeh S, Younossi ZM, Remer EM, Gramlich T, Ong JP, Hurley M, et al. The utility of radiological imaging in nonalcoholic fatty liver disease. *Gastroenterol*. 2002;30;123(3):745-50.
- Younossi ZM, et al. Nonalcoholic fatty liver disease in patients with diabetes. *Diabetes Care*. 2010;43(6):1234–1241.
- Tilg H, et al. NAFLD and diabetes mellitus. *Nat Rev Gastroenterol Hepatol*. 2011;18(1):32–42.
- Doycheva I, et al. Prevalence and predictors of NAFLD in patients with diabetes. *Diabetes Res Clin Pract*. 2010;162:108110.

14. Mantovani A, et al. Longitudinal association between NAFLD and type 2 diabetes. *BMJ Open Diabetes Res Care*. 2010;8(1):e001284.
15. Targher G, et al. NAFLD and increased risk of cardiovascular disease. *J Hepatol*. 2011;74(2):275–291.
16. Byrne CD, et al. NAFLD as a multisystem disease. *J Hepatol*. 2012;77(3):1039–1054.
17. Mishra S, Yadav D, Gupta M, Mishra H, Sharma P. Hyperinsulinemia predisposes to NAFLD. *Ind J Clin Biochem*. 2008; 23(2):130-5.
18. Ballestri S, et al. Dyslipidemia in NAFLD and cardiovascular risk. *Nutrients*. 2011;13(2):329.
19. Gupte P, Amarapurkar D, Agal S, Bajjal R, Kulshrestha P, Pramanik S, et al. Nonalcoholic steatohepatitis in type 2 diabetes mellitus. *J Gastroenterol Hepatol*. 2004;19(8):854-8.