

Nonalcoholic Fatty Liver Disease and Non-Alcoholic Steatohepatitis in Type 2 Diabetes Mellitus: A Hospital Based Study

Kiranpal Singh Sirohi

Associate Professor, Department of Medicine,
Teerthanker Mahaveer Medical College and Research Centre, Moradabad, Uttar Pradesh, India.

Article History

Received: 02 Jun 2015

Revised: 11 Jun 2015

Accepted: 28 Jun 2015

*Correspondence to:

Dr. Kiranpal S Sirohi,
Associate Professor,
Department of
Medicine,
TMMC & RC,
Moradabad.
sirohi101@gmail.com

ABSTRACT

Background and Aims: Non-alcoholic steatohepatitis (NASH) is commonly associated with type 2 diabetes mellitus (DM). Prevalence of NASH in type 2 DM has not been well studied and there is an epidemic rise in type 2 DM in Asian and Western populations. Its association with chronic liver disease in the form of NASH makes it an important health problem.

Methods: One hundred and forty-eight individuals attending Teerthanker Mahaveer Medical College & Research Centre, Moradabad were screened. Forty-eight individuals were excluded due to history of alcohol intake or liver disease as a result of other causes. One hundred non-alcoholic individuals with type 2 DM underwent abdominal ultrasonography (US abdomen). Forty-nine patients had evidence of fatty liver on US abdomen, and 32 of these 49 patients underwent liver biopsy.

Results: Four of 32 (12.5%) individuals had steatosis alone. Mild, moderate and severe NASH was present in 21/32 (65.5%), 4/32 (12.5%) and 3/32 (9.35%), respectively. Fibrosis was present in 7/32 (21.8%) patients (four grade 1 and three grade 3). There was no significant difference in body mass index (BMI), transaminase levels, serum cholesterol and triglyceride levels among patients with non-alcoholic fatty liver disease.

Conclusion: We conclude that the prevalence of NASH is high in type 2 DM patients and liver biopsy is the only investigation to differentiate between non-alcoholic fatty liver and steatohepatitis.

KEYWORDS: Non-alcoholic steatohepatitis (NASH), Fatty Liver Disease, Diabetes Mellitus.

INTRODUCTION

The term Non-alcoholic steatohepatitis (NASH) was coined by Ludwig and colleagues to describe a form of liver disease observed in middle aged patients with abnormal liver biochemical test results and histologic evidence of alcoholic hepatitis but with no history of alcohol abuse.¹

The spectrum of NAFLD includes, simple steatosis without evidence of cell injury, which tends to be stable over time, to steatohepatitis, which progress to cirrhosis.² Non-alcoholic fatty liver disease (NAFLD) has become over the last decade the most common form of chronic liver disease in children and adults. It is tightly associated with obesity and threatens to become a serious public health problem

Non-alcoholic liver disease is an important cause of liver disease in India.

Epidemiological studies suggest its prevalence in around 9% to 32% of general population, but with a higher prevalence in overweight / obesity and diabetes.³

Non-alcoholic fatty liver disease is commonly associated with obesity, type 2 diabetes, dyslipidaemia and insulin resistance – components of the metabolic syndrome. This strongly supports the notion that NAFLD is the hepatic manifestation of metabolic syndrome.⁴

Non-alcoholic steatohepatitis (NASH) is commonly associated with type 2 diabetes mellitus (DM). Prevalence of NASH in type 2 DM has not been well studied and there is an epidemic rise in type 2 DM in Asian and Western populations. Its association with chronic liver disease in the form of NASH makes it an important health problem.

Indian population has a higher body fat content and abdominal adiposity: the latter is particularly associated with insulin resistance and hence NAFLD.³

Moreover with increasing incidence and prevalence, the perception of NAFLD being a benign condition of little clinical significance is rapidly changing. The overall prevalence of NAFLD in western countries varies from 15-40% and in Asian countries from 9-40%.⁵⁻⁷ In India too, NAFLD is emerging as an important cause of liver disease. Epidemiological studies suggest the prevalence of NAFLD to be around 9-32% in general Indian population, with a higher incidence amongst overweight/obese and diabetic/ prediabetic patients.⁸⁻¹⁰

So this study is conducted to estimate the prevalence of NAFLD as diagnosed by ultrasound examination of liver, in type 2 diabetes. Therefore these patients can be treated earlier and prevented from going into cirrhosis.

MATERIAL & METHODS

This prospective study was designed to enroll known T2DM patients (duration ≥ 3 years), in age group of 25-65 years, attending outpatient Medicine department of Teerthanker Mahaveer Medical College & Research Centre, Moradabad. The study was approved by the ethics committee of the hospital and informed consent was obtained from all the subjects. On the basis of inclusion and exclusion criteria, 325 T2DM patients enrolled over the period of 6 months and underwent complete medical and physical examination at the time of enrollment. The history of medication and alcohol consumption and other relevant details were obtained.

In this study, the study group is divided into 2 subgroups:

- NAFLD- patients with USG evidence of fatty changes in the liver.
- Non-NAFLD- patients without any USG evidence of fatty changes in the liver.

Data (risk factors and lab values) are collected and are compared between the two subgroups, to know the level of difference between them.

NASH will be suspected in a patient who is found to have elevations in liver tests such as alanine aminotransferase (ALT) or aspartate aminotransferase (AST). The only means of proving a confirmatory diagnosis of NASH will be done by liver biopsy. For a liver biopsy, a needle is inserted through the skin to remove a small piece of the liver. NASH will be diagnosed when examination of the tissue with a microscope shows fat along with inflammation and damage to liver cells. If the tissue shows fat without inflammation and damage, simple fatty liver or NAFLD is diagnosed.

We used data of liver enzyme abnormalities to characterize the prevalence, incidence, and risk factors for NAFLD in T2DM patients. The levels of Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) were measured. The elevation (value above normal) in aminotransferase levels was defined as per NHANES III criteria; corresponding to an AST >37 IU/L or ALT >40 IU/L for men and AST or ALT >31 IU/L in women.¹¹

The data processing was performed by capturing data into e-Case Report Forms. Data entered was checked by system design for completeness and integrity. Demographic data is presented as descriptive statistics. Sample studied was characterized by relative (%) and absolute (N) frequencies, for each of the qualitative variable.

RESULTS

A total of 325 patients, with more number of female patients 180 (55.38%) than male patients 145 (44.61%) were recruited with the suspicion of NAFLD and NASH in patients of Type 2 Diabetes Mellitus [Table 1].

Table 1: Demographic details of T2DM patients with NAFLD (n=325).

Age Group	Males n=145 (44.61%)		Females n= 180 (55.38%)		Total n=325	
	Non-NAFLD Patients	NAFLD Patients (n=75)	Non-NAFLD Patients (n=77)	NAFLD Patients (n=103)	Non-NAFLD (n=147)	NAFLD (n=178)
25-40	22	26	21	32	43	58
41-55	34	41	39	48	73	89
56-70	8	6	12	12	20	18
>71	6	2	5	11	11	13

Table 2: Demographic details of T2DM patients with NASH

Age Group	Males n=145 (44.61%)		Females n= 180 (55.38%)		Total
	NASH Patients (n=6)		NASH Patients (n=9)		
25-40	3		3		6
41-55	2		4		6
56-70	1		2		3
>71	-		-		-

Out of 325 patients enrolled in the study, n=178 (54.76%) T2DM patients (103 female/ 75 male), was identified as having NAFLD, based upon NHANES III criteria as described above. Data of these patients was analyzed further.

The prevalence of NAFLD was found to be more in females n=103 than males. Majority of the patients were found in 41-55 years age group followed by 25-40 years and least in more than 71 years age group [Table 2].

In the current study, elevation in AST and ALT levels, based on NHANES III criteria, were employed to estimate and characterize the prevalence of NAFLD in T2DM patients. The combined AST/ALT levels were more raised than AST and ALT alone [Table 3]. These levels were highly raised in patients of NASH confirmed by liver biopsy. Around 22 patients were undergone liver biopsy for the suspicion NASH. Out of 22 patients suspected, only 15 patients were found to be having NASH.

DISCUSSION

To best of our knowledge, there are no pan-India population based studies on prevalence of NAFLD in T2DM population. This is the first cross sectional, multi-center study to report on prevalence of NAFLD in Indian T2DM population. The majority of epidemiological studies on NAFLD in general or in T2DM population in particular, are based on histological evidence of steatosis or fatty infiltration proven by imaging. This study makes the first effort to record the prevalence of NAFLD in T2DM patients on the basis of elevated aminotransferase levels.

In our study, overall prevalence of NAFLD in T2DM Indian population was found to be 56.5%, which is in line with prevalence of 54.5% described by Mohan et al,¹⁰ but higher than the prevalence rate of 12.5% (8) and 20% (9) described in other studies. However, in the study by Prashanth et al,¹² 87% T2DM patients had NAFLD on histology. Most of the studies in India have shown higher prevalence of NAFLD in males than in female population (M:F ratio of 2:1 approx.),^{7,9,11,33} but our study revealed higher prevalence rate of disease in female (60%) than in male (54.3%) population, with same pattern reported from north and west part of the country.

REFERENCES

1. Andrea E. Reid. Nonalcoholic Fatty Liver Disease. Mark Feldman, Lawrence S. Frieddman, Lawrence J. Brandt, editors. Sleisenger and Fordtran's Gastrointestinal And Liver Disease, 9th ed, Philadelphia, 2010. 1401-11.

2. Stephen H. Caldwell, Curtis K. Argo. Non-alcoholic Fatty Liver Disease and Nutrition. James S. Dooley, Anna S.F. Lok, Andrew K. Burroughs, E. Jenny Heathcote, editors. Sherlock's Diseases of the Liver and Biliary System, 12th ed, West Sussex,2011.p 546-562.

3. Yogesh K Chawla, Sunil Taneja. Non-Alcoholic Fatty Liver Disease. YP Munjal, SK Sharma, editors. API Textbook of Medicine, Ninth ed, Mumbai, 2012. 885-87.

4. AK Agarwal, Vineet jain, Sumeet Singla, BP Baruah, Vivek Arya, Rajbala Yadav. Prevalence of non-alcoholic fatty liver disease and its correlation with coronary risk factors in patients with type 2 diabetes. JAPI 2011, 59: 351-354.

5. Farrell GC, Larter CZ. Nonalcoholic Fatty Liver Disease: from Steatosis to cirrhosis. Hepatology 2006;43:S00-S112.

6. Lazo M, Clark JM., The epidemiology of nonalcoholic fatty liver disease: a global perspective. Semin Liver Dis 2008;28:39-50.

7. Bellentani S, Scaglioni F, Marino M, Bedogni G., Epidemiology of non-alcoholic fatty liver disease. Dig Dis 2010;28:155-61.

8. Duseja A., Nonalcoholic fatty liver disease in India - a lot done, yet more required. Indian J Gastroenterol 2010;29:217-25.

9. Singh SP, Nayak S, Swain M, et al. Prevalence of non-alcoholic fatty liver disease in coastal eastern India: A preliminary ultrasonographic survey. Trop Gastroenterol 2004; 25:76-9.

10. Mohan V, Farooq S, Deepa M, Ravikumar R, Pitchumoni CS. Prevalence of non-alcoholic fatty liver disease in urban south Indians in relation to different grades of glucose intolerance and metabolic syndrome. Diabetes Res Clin Pract 2009;84:84-91.

11. Gupte P, Amarapurkar D, Agal S, et al. Non-alcoholic steatohepatitis in type 2 diabetes mellitus. J Gastroenterol Hepatol 2004;19:854-858

12. 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 India 2009;57:205-10.

Copyright: © the author(s) and publisher IJMRP. This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite the article: Kiranpal Singh Sirohi. Nonalcoholic Fatty Liver Disease and Non Alcoholic Steatohepatitis in Type 2 Diabetes Mellitus: A Hospital Based Study. Int J Med Res Prof. 2015, 1(3); 180-82.