

Prevalence of Non-Alcoholic Fatty Liver Disease in Patients with Type 2 Diabetes and its Correlation with Coronary Risk Factors

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ABSTRACT

Introduction: Non-alcoholic fatty liver disease (NAFLD) is increasingly seen to be associated with metabolic syndrome and is considered a risk factor for coronary artery disease (CAD).

Aim: To assess the prevalence of NAFLD among type 2 diabetics and assess correlation between risk factors of CAD and NAFLD in these patients.

Materials and Methods: This cross-sectional study was conducted among 100 consecutive patients of type 2 diabetes coming to our institution. A detailed history, physical examination and laboratory investigations including fasting plasma glucose (FPG), renal and liver function tests, lipid profile, glycated haemoglobin and ultrasound abdomen were carried out. NAFLD was diagnosed on the basis of ultrasonic

assessment of the liver. The study group was then divided into NAFLD and non-NAFLD group and the two groups were compared for presence of risk factors for CAD.

Results: The prevalence of NAFLD in diabetics was 61% and CAD was found to be more prevalent in this group. Also, the NAFLD subgroup had higher prevalence of hypertension, microalbuminuria, Metabolic syndrome and raised total cholesterol, Low Density Lipoproteins (LDL) and triglycerides.

Conclusion: NAFLD as a disease is fairly prevalent among type-2 diabetics and both these diseases occur simultaneously in patients with other known coronary risk factors. Hence, the presence of NAFLD can be considered as an important marker of coronary artery disease amongst type 2 diabetics. It is non-invasive, economical, easily assessable and reproducible parameter for coronary risk stratification in type 2 diabetics.

Keywords: Cholesterol, Heart, Hypertension

INTRODUCTION

Diabetes and cardiovascular diseases are rapidly gaining pandemic proportions in India and are becoming major cause of mortality. So, it is very important to predict cardiovascular complications at the earliest, especially in diabetic patients as diabetes itself predisposes for atherosclerosis which in turn increases cardiovascular complications [1]. Risk factors for atherosclerosis, such as hypertension, obesity, diabetes, dyslipidemia, and insulin resistance are frequently associated with NAFLD [2]. Metabolic syndrome now includes NAFLD as a component and hence predisposes to coronary artery disease. Thus, there is growing concern whether NAFLD is independent risk factor for CAD or just an incidental finding. This study was designed to address this issue. Here, we conducted a study to find prevalence of NAFLD in type 2 diabetes patients, compared presence of CAD and its risk factors between diabetic patients with and without NAFLD.

MATERIALS AND METHODS

This cross-sectional study was conducted among 100 consecutive patients of type 2 diabetes mellitus coming to the out-patient unit of tertiary care institution in the Department of Internal Medicine over a period of one year from February 2012 to January 2013, after due approval from the Institutional Ethical Committee. After taking informed consent from the patients, detailed history, physical examination and investigations with special emphasis on modifiable risk factors of CAD like smoking, obesity, dyslipidemia, and hypertension were undertaken. Presence of non-alcoholic fatty liver disease was confirmed by ultrasonography of abdomen which was defined as any degree of fatty liver in the absence of alcohol intake. Subjects with history of alcohol intake, with history of systemic illnesses known to cause fatty liver disease, and those who were receiving or had recently received drugs (including herbal medicines) known to raise ALT and GGT or cause fatty liver disease were excluded from this study.

After diagnosing Non-Alcoholic Fatty Liver Disease (NAFLD) by ultrasound, patients were grouped into two groups, Group I with DM type 2 with NAFLD and Group II with DM type 2 without NAFLD [Table/Fig-1].

These two groups were then assessed for presence of risk factors for coronary vascular diseases and correlation was done using group I as cases and group II serving as controls. Data was analyzed using SPSS. Chi-Square test and 't'-test were used for significance.

Diabetes was defined according to American Diabetes Association (ADA) 2011 criteria. Metabolic syndrome was defined by National Cholesterol Education Programme: Adult Treatment Protocol III (NCEP: ATP III) 2001 criteria. Coronary artery disease was diagnosed on the basis of electrocardiographic changes.

Variable (mean \pm SD)	Group I	Group II	p value
Age (yrs)	55.64 \pm 11.653	62.18 \pm 6.181	0.002
Waist circumference (cms)	93.61 \pm 8.231	89.87 \pm 5.890	0.016
BMI (kg/m ²)	26.926 \pm 2.5946	25.385 \pm 1.6798	0.001
Prevalence of Metabolic syndrome	45.9%	17.9%	0.003
Prevalence of CAD	57.4%	38.5%	0.05
Smoking	27.9%	20.5%	0.279
Microalbuminuria (30-300 mg/24hr)	36.1%	17.9%	0.041
Systolic BP (mmHg)	141.34 \pm 27.427	129.95 \pm 19.043	0.026
Diastolic BP (mmHg)	87.25 \pm 15.415	82.97 \pm 11.087	0.137
FPG (mg/dL)	143.69 \pm 49.078	140.77 \pm 36.669	0.751
HbA1C	6.90 \pm 0.59%	6.69 \pm 0.43%	0.064
TCh (mg/dL)	185.18 \pm 25.16	175.46 \pm 14.35	0.031
HDL (mg/dL)	42.25 \pm 3.62	42.51 \pm 2.49	0.688
LDL (mg/dL)	124.31 \pm 18.11	106.90 \pm 14.79	\leq 0.001
TG (mg/dL)	151.97 \pm 36.78	131.62 \pm 18.11	0.002
Total cases	61	39	

[Table/Fig-1]: Comparison of various parameters between diabetic patients with and without NAFLD.

RESULTS

Ultrasound examination in study population revealed 61 (61%) diabetic patients were having non-alcoholic fatty liver disease. NAFLD group was younger compared to non NAFLD group (55.6 vs 62.1). Coronary artery disease was more prevalent in NAFLD group than non NAFLD group (57.4% vs 38.5%). Hypertension (60.7% vs 41%), microalbuminuria (36.1% Vs 17.9%), Metabolic syndrome (45.9% vs 17.9%) were also more prevalent in NAFLD group than non NAFLD group. Patients in NAFLD group were also having higher systolic blood pressure at presentation, waist circumference, body mass index and dyslipidemia than non NAFLD patients [Table/Fig-1].

DISCUSSION

A number of studies have shown increased association of NAFLD with Metabolic syndrome (MS) and increased association of metabolic syndrome with coronary artery disease. Thus, it is widely discussed nowadays, that NAFLD itself could point towards increased risk of coronary artery disease (CAD). The present study was intended to address this issue in the north Indian population where such studies are lacking.

In our study prevalence of NAFLD in diabetic patients was 61%. Targher et al., Agarwal et al., and Prashanth M et al., also found high prevalence of NAFLD among diabetics as 69.5%, 87% and 57.2% respectively [3–5].

After detection of fatty liver by ultrasonography patients were divided into two groups, first, Group 1: DM type 2 with NAFLD and second, Group 2: DM type 2 without NAFLD. These two groups were then compared for presence of CAD and its risk factors.

CAD was significantly more ($p=0.05$) prevalent among NAFLD group (57.4%) than non NAFLD group (38.5%). In 2010, Viswanathan et al., also found significant prevalence of CAD in NAFLD group (11.5% vs 1.4%, $p=0.001$) [6].

Patients were evaluated for presence of other coronary risk factors like hypertension, smoking, obesity, microalbuminuria, Metabolic syndrome, glycaemic status and dyslipidemias among both the groups.

Significant number of patients in our study were hypertensive, 37 (60.7%) patients in NAFLD group compared to 16 (41%) in non NAFLD group ($p=0.043$). In similar studies by Brea et al., Viswanathan et al., and Targher et al., prevalence of hypertension was 50.0%, 64.7% and 73.0% respectively in NAFLD group ($p=0.001$) [3,6,7].

In present study, smoking habit was not significantly associated with NAFLD ($p=0.279$). Studies conducted by Brea et al., Ling S et al., and Targher et al., also showed nonsignificant association of smoking with NAFLD ($p=0.80$, NS and 0.60 respectively) [3,7,8].

Present study showed microalbuminuria was significantly associated with NAFLD ($p=0.041$). Casoinic F et al., and Hwang ST et al., also support this finding ($p < 0.05$ and < 0.001) [9,10].

NAFLD is nowadays considered as hepatic manifestation of Metabolic syndrome. Metabolic syndrome in itself is a risk factor for coronary artery disease. In our study group, 28 patients in NAFLD group had MS compared to seven patients in non NAFLD group ($p=0.003$). Multiple studies by Nimer A et al., Hamaguchi M et al., Ling S et al., and Agarwal et al., also showed significant association of NAFLD with MS ($p=0.008$, 0.001, 0.001 and 0.001 respectively) [4,8,11,12].

Obese patients had higher incidence of NAFLD as shown by higher waist circumference and BMI in NAFLD group ($p=0.016$ and 0.001). Studies done by Villanova et al., Ling S et al., and Agarwal et al., also showed higher values of waist circumference and BMI in NAFLD group than in non NAFLD group [4,8,13].

Dyslipidemias are associated with NAFLD. In present study higher values of total cholesterol, LDL and TG were associated with NAFLD ($p=0.031$, ≤ 0.001 and 0.002 respectively). In study done by Hamaguchi M et al., and Agarwal et al., similar results were found [4,12].

LIMITATIONS

Further follow-up prospective studies are required to substantiate the increased prevalence of coronary artery disease in these patients with diabetes and NAFLD.

CONCLUSION

The NAFLD is common finding in type 2 diabetic patients (61%) and its presence associated with higher risk of developing coronary artery disease. NAFLD also coincides with many of the other coronary risk factors like hypertension, obesity, metabolic syndrome, microalbuminuria and dyslipidemias (mainly raised TCh, LDL, and TG). So, detection of NAFLD on ultrasound which is a simple and noninvasive test should make us concerned about cardiovascular disease in our patient. Other risk factors for coronary artery disease should also be searched and treated if found.

Finding of NAFLD and its careful management will help us to provide better quality of life in type 2 diabetics by decreasing morbidity and mortality.

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