Original Article

Prevalence of Non Alcoholic Fatty Liver Disease and Its Association with Cardio Metabolic Diseases in Early Diabetics

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Abstract

Background: *To study the prevalence of non-alcoholic fatty liver disease and its association with cardiometabolic diseases in early diabetics.*

Materials and Methods: *The Study was conducted on 120 diabetic patients attending the outdoor patient department and in wards of Department of medicine and diabetic clinic S.N. Medical College, Agra during the period from March 2016 to Aug 2017. After taking informed consent from the patients a detailed history physical examination and laboratory investigations carried out. NAFLD was diagnosed on the basis of ultrasonic assessment of the liver.*

Results: *The prevalence of NAFLD in diabetics was 56.67%. NAFLD patients were associated with metabolic syndrome components like hypertension (52.94%) (p-value=0.8045), diabetic dyslipidemia (73.53%) (p-value=0.0022), central obesity(70.58%) (p-value=0.0165), hypothyroidism (23.53%) (p-value=0.0005), hyperuricemia (20.58%) (p-value=0.0001), and deranged transaminases (47.05%) (p-value=o.8045). NAFLD patients were also associated with cardiac components like left ventricular hypertrophy (23.53%) (p-value=0.0005), systolic dysfunction (20.58%) (p-value=0.0001), diastolic dysfunction (17.65%) (p-value=0.0001), and increased carotid intima-media thickness (29.41%) (p-value=0.0081).*

Conclusion: *The patients of diabetes mellitus should undergo liver function tests, ultrasonography of liver, Fibroscan and 2D echocardiography at the time of diagnosis. Early detection would help not only in modifying the disease course but would also delaying or preventing the fatal complications like steatosis, steatohepatitis, cirrhosis, and carcinoma of the liver. Accordingly the patient may be treated earliest by various measures like lifestyle modifications etc.*

Keywords: *Non- alcoholic fatty liver disease, metabolic syndrome, diabetics, cardiometabolic diseases.*

Introduction

Non-alcoholic fatty liver disease (NAFLD) is a clinicopathological syndrome encompasses several clinical entities ranging from simple steatosis to steatohepatitis, fibrosis and ESLD (End stage liver disease) in absence of significant alcohol intake. Non-alcoholic fatty liver disease (NAFLD) is a distinct hepatic condition characterized by abnormal fat accumulation in liver cells and histologically resembling alcohol induced liver damage.

Diabetes and cardiovascular diseases are rapidly gaining pandemic proportions in India and are becoming major cause of morbidity and mortality. Hence, 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. Risk factors for atherosclerosis, such as hypertension, obesity, diabetes, dyslipidemia, and insulin resistance are frequently associated with NAFLD.[1]

Most relevant studies have reported NAFLD to be more common in men than women and have described a later peak in prevalence in women, suggesting a relationship to sex hormones and menopause. Most cases of NAFLD are discovered in middle age during the fourth to sixth decades of life, although NAFLD has also been described with increasing frequency in children and adolescents, among whom the frequency of overweight and obesity has been reported to be 30 %.[2]

The association of NAFLD with obesity, diabetes, hypertriglyceridemia, hypertension, and cardiovascular disease is well known. Other associations include chronic fatigue syndrome, mood alterations, obstructive sleep apnea, thyroid dysfunction, and chronic pain syndrome. NAFLD is an independent risk factor for metabolic syndrome. Longitudinal studies suggest that patients with NASH (Non alcoholic steatohepatitis) are at two- to threefold increased risk for the development of metabolic syndrome.

The presence of NAFLD is also independently associated with endothelial dysfunction, increased carotid intimal thickness, and the number of plaques in carotid and coronary arteries. Such data indicate that NAFLD has many deleterious effects on health in general.

The prevalence of NAFLD in western countries is high and there is a trend towards a further increase, with millions of people at risk of advanced liver disease. The documented prevalence of NAFLD is lowest in African Americans (~25%), highest in Americans of Hispanic ancestry (~50%), and intermediate in American whites (~33%)[1].

Components of Metabolic syndrome-According to NCEP (National cholesterol education pragramme): ATP III (Adult Treatment Panel), definition of Metabolic syndrome is National Cholesterol Education Programme (2003)[3] A person with type 2 diabetes was classified as having the syndrome if he or she had at least two of the following four components:

I. Waist circumference > 102 cm in men or > 88 cm in women (Asian Indian criteria- for men equal to or greater than 90cm and for women equal to or greater than 80cm)

II. Triglycerides > 1.7 mmol/L(150 mg/dl) or specific medication

III. HDL < 1.0 mmol/L(40 mg/dl) in men and < 1.29 mmol/L(50mg/dl) in women or specific medication and

IV. B.P. > 130/85 mmHg or specific medication

Materials and Methods

This was a hospital based cross-sectional study conducted among 120 diabetic patients coming to our institution. After taking informed consent from the patients a detailed history, physical examination and laboratory investigations including fasting plasma glucose (FPG), 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. All patients diagnosed as NAFLD were investigated for metabolic

syndrome according to the NCEP ATP 3 Criteria and underwent 2D Echocardiography .Patients with Diabetes mellitus of duration < 1 year were included in the study. Patients having storage diseases such as Gaucher's Disease, paediatric age group (< 15 years) and patients not willing to take part were excluded from study.

Patients were first evaluated clinically mostly they are asymptomatic. If symptomatisc, symptoms are fatigue or right upper quadrant discomfort. Patients were subjected to the following investigations: CBC with GBP, Blood Sugar (Fasting and Post Prandial), HbA1C, USG abdomen, Aminotransferases level, S. Lipid Profile, Colour Doppler – for Carotid Intima Thickening, and 2 D ECHO

Results and Observations

Table 1 : USG Abdomen Findings in the Study Group

	Grade I	Grade II	Grade III	NAFLD	Normal	Total
Male	20	16	4	40	36	76
Female	12	12	4	28	16	44
Total	**32**	**28**	**8**	**68**	**52**	**120**

Figure 1: Showing Correlation of NAFLD with Metabolic Syndrome Components
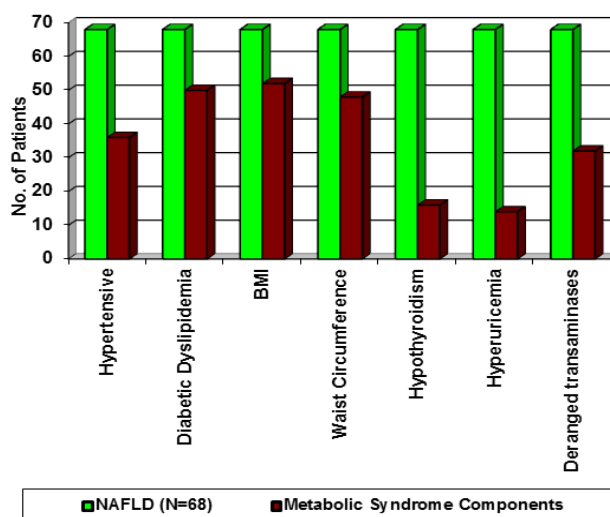

Figure 2: Showing Correlations of Metabolic Syndrome Components with the Grading of NAFLD
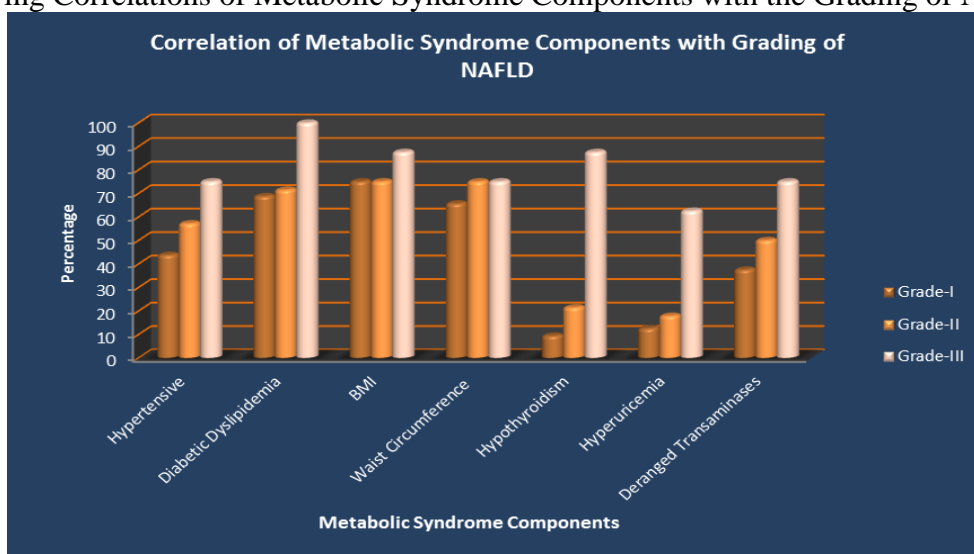
Figure 3: Showing Correlation of NAFLD with 2D Echocardiographic Findings and Carotid Intima-Media Thickness
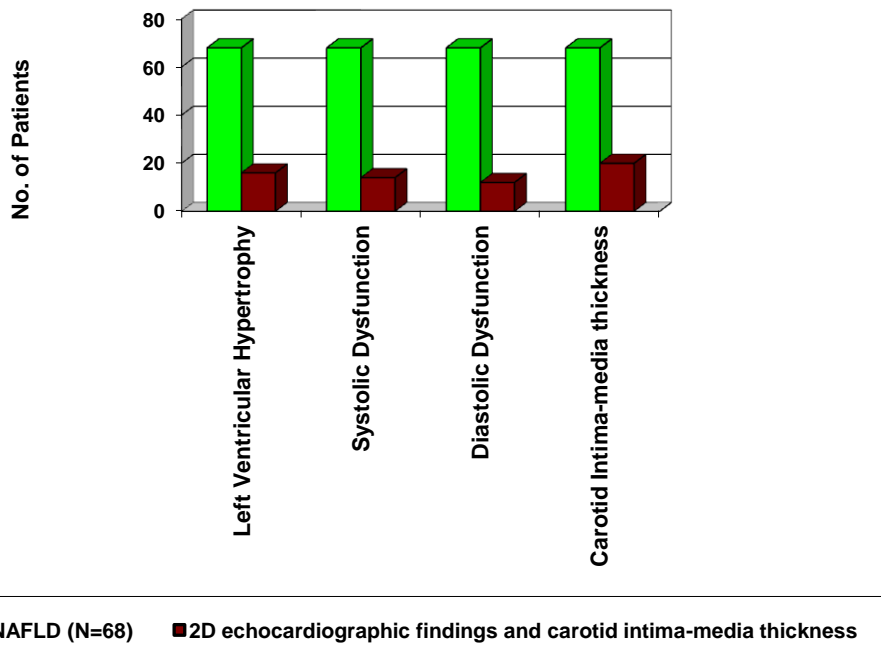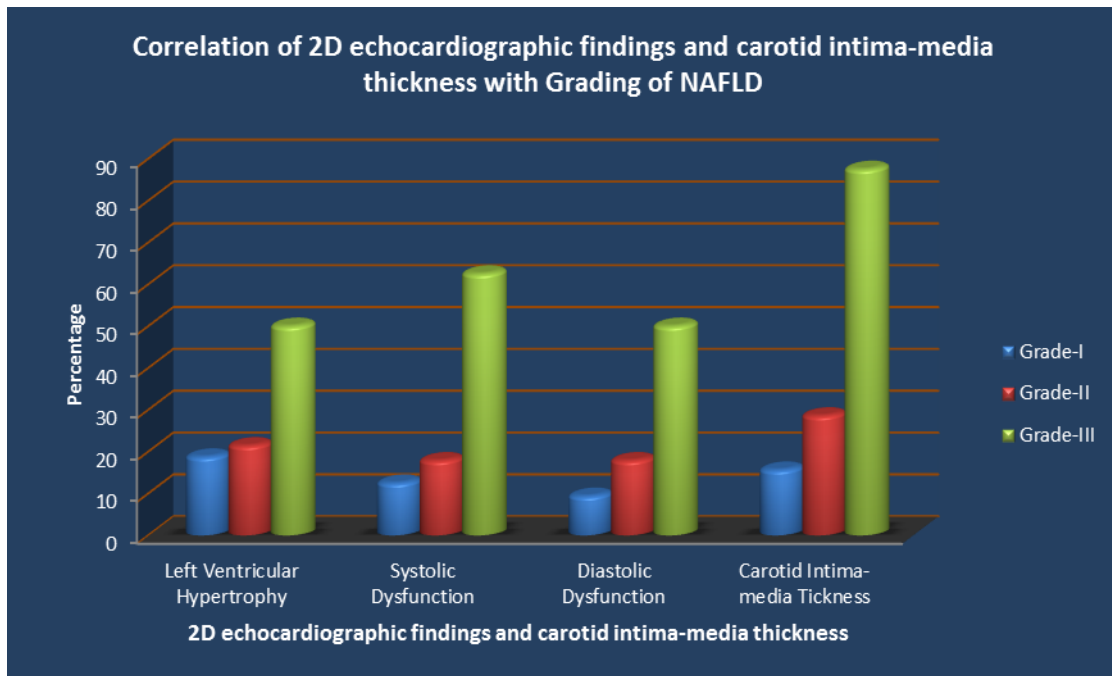

Figure 4: Showing Correlation of 2D Echocardiographic Findings and Carotid Intima-Media Thickness with Grading of NAFLD

Discussion

Demographically most of the patients were from rural areas sand having diabetes of less than 3 months duration.

Overall prevalence of NAFLD observed in diabetics were 56.67%, out of which 52.63% were males and 63.64% were females. 47.06% patients were having grade I NAFLD on ultrasonography.

Similar prevalence of 44.1% to 72.4% were observed by Kalra S, Vithalani M, Gulati G, et al (2014) [4] and prevalence up to 70% were observed by Jonathan M. Hazlehurst, Conor Woods, Thomas Marjot, et al (2016).[5]

In diagnosed cases of NAFLD, symptomatic patients were more than asymptomatic patients, having the main complaint of right upper abdominal pain/discomfort. Animesh Deb, Amitabha Chattopadhyay, Sk. Kamal Hassan, et al (2015) [6] also observed similar result in his study.

Maximum numbers of NAFLD patients were in 5th and 6th decade. Females had peak prevalence in later age group. Similar finding of later peak in prevalence in women suggesting a relationship to the menopause and sex hormones were also seen in study conducted by Ruhl CE, Everhart JE et al (2004). [2]

NAFLD patients were associated with various components of metabolic syndrome such as hypertension (52.94%), diabetic dyslipidemia (73.53%), central obesity (70.58%), hypothyroidism (23.53%), hyperuricemia (20.58%) and deranged transaminases (47.05%). As the grade of NAFLD increases, their association with these components increases. In grade I NAFLD they were maximally associated with diabetic dyslipidemia, overweight, central obesity and hypertension. In grade III NAFLD, patients were associated with maximal components of metabolic syndrome. Similar results were also observed in the study conducted by Animesh Deb, Amitabha Chattopadhyay, Sk. Kamal Hassan, et al(2015)[6], Rakesh Gaharwar, Sushma Trikha, Shubha Laxmi Margekar, et al (2015)[7] ,Ahad Eshraghian and Alireza Hamidian Jahromi et al. (2014).[8]

NAFLD patients were also associated with various components like left ventricular hypertrophy (23.53%), systolic dysfunction (20.58%), diastolic dysfunction (17.65%) and increased carotid intima-media thickness (29.41%). In grade I NAFLD, they were maximally associated with left ventricular hypertrophy followed by carotid intima-media

thickness, while in grade III NAFLD they are associated with approximately all components as carotid intima-media thickness, systolic dysfunction, diastolic dysfunction and left ventricular hypertrophy. Similar results were also observed in the study conducted by Kamran B. Lankarani, Mojtaba Mahmoodi et al (2013)[9], Hakan Fotbolcu, Tolga Yakar, Dursun Duman et al. [10]

Summary and Conclusion

Hence this study concludes that Diabetes mellitus is not only the disease of urban but it is equally prevalent in rural areas; hence focus of care must be emphasized to rural population due to the lack of diagnostic facilities. Statistically significant (p value <0.05) correlation were found between NAFLD and various components of metabolic syndrome. Therefore early lifestyle modifications in diabetics may prevent NAFLD as well as various other components of metabolic syndrome. In diabetic patients hepatic involvement in the form of NAFLD were observed (56.67%), which is statistically significant (p value <0.05). Hence we recommend that each and every diabetic patient must be subjected for liver function tests, ultrasonography of liver, Fibroscan and 2D echocardiography to find out the presence of various abnormalities earliest. Statistically significant (p value <0.05) association of left ventricular hypertrophy, systolic dysfunction, diastolic dysfunction, and increased carotid-intima media thickness were found in patients of NAFLD. Hence this reflects that in diabetics, cardiovascular system involvement may be occurring at early stage of diabetes, which may be prevented to its fatal outcomes in the form of coronary artery disease, hypertension and dilated cardiomyopathy etc. by early therapeutic interventions.

Hence from our above observations it is very clear that the patients of diabetes mellitus should undergo liver function tests, ultrasonography of liver, Fibroscan and 2D echocardiography at the time of diagnosis. Early detection would help not

only in modifying the disease course but would also delaying or preventing the fatal complications like steatosis, steatohepatitis, cirrhosis, and carcinoma of the liver. Accordingly the patient may be treated earliest by various measures like lifestyle modifications etc.

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