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Biochemical and sonological profile in patients with incidentally detected non alcoholic fatty liver disease

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Abstract

Background: Non-alcoholic fatty liver disease (NAFLD) is the upcoming leading cause of chronic liver disease and its prevalence is increasing worldwide. It is a spectrum of liver diseases that ranges from simple steatosis to a progressive form of liver disease called non-alcoholic steatohepatitis (NASH). NAFLD patients are at risk of progressing to NASH and ultimately cirrhosis; they are also at higher risk of cardiovascular diseases (CVD), including coronary heart disease and stroke. The aim of the present study is to co relate the association of lipid profile abnormalities in patients with different grades of fatty liver.

Aim: 1. To evaluate risk factor, association between sonographically diagnosed non-alcoholic fatty liver disease and biochemical derangement.

2. To estimate prevalence of non-alcoholic fatty liver in our population coming for general health checkup.

Materials and Methods: A total of 100 cases diagnosed with Non Alcoholic Fatty liver disease (NAFLD) on ultrasound were divided in to 3 groups based on sonological grading. They were further divided based on age into two groups, of which 55 are males, and 45 are females. All patients were subjected to complete history taking and clinical examination, fasting lipid profile and other routine blood investigations.

Results: In this study of 100 patients, 52 % are grade I, 30 % are grade II, and 18 % are grade III NAFLD. Serum TG, TC, LDL-C, and HDL-C levels were abnormally raised in 57%, 55%, 60%, and 59% patients, respectively. Forty two cases were diabetic, twelve individuals consume alcohol, and Thirty three are overweight in the present study population.

Conclusion: The sonological grade of the Fatty liver correlate with the biochemical lipid abnormalities, the higher the grade of fatty liver more is dyslipidemia.

Keywords: Nafld, lipid profile, dyslipidemia, fatty liver

Introduction

Non-alcoholic fatty liver disease (NAFLD) is a major cause of chronic liver disease worldwide [1], occurring when fat is deposited (steatosis) in the liver, not due to excessive alcohol use. It encompasses a wide spectrum of diseases that ranges from fat accumulation in hepatocytes (simple hepatic steatosis) to steatohepatitis (hepatic steatosis with inflammatory component) that may or may not have associated fibrosis.

The global prevalence of NAFLD is estimated to be 24% and the highest rates are reported from South America and the Middle East, followed by Asia, the USA, and Europe. [2] The prevalence of fatty liver in India has been shown to be as high as 15%-30%.

NAFLD is often associated with insulin resistance and is strongly associated with type 2 diabetes mellitus and obesity. NAFLD patients are at risk of progressing to NASH and ultimately cirrhosis; they are also at higher risk of cardiovascular diseases (CVD), including coronary heart disease and stroke [3]. NAFLD confers increased cardiovascular disease risk independent of traditional cardiovascular risk factors and metabolic syndrome (MetS) [4].

Liver imaging may be a more reliable method for diagnosing NAFLD. In three large population studies, ultrasound imaging suggestive of NAFLD was independently associated with cardiovascular events [5] Compared to histology, ultrasonography had a sensitivity of 85% and a specificity of 94% in detecting fatty liver disease [6]. Hepatic fat concentration as measured by MRI has been used for diagnosis of NAFLD. Quantity of liver fat has been reported to be predictive of metabolic syndrome and CVD risk. Several mechanisms have been postulated for development of accelerated atherosclerosis in patients with NAFLD, including genetic predisposition, insulin resistance and atherogenic dyslipidemia, oxidative stress, chronic inflammation, reduced levels of the adiponectin and altered production of pro and anticoagulant factors. NAFLD, regardless of its stage, is strongly associated with hepatic and adipose tissue insulin resistance (IR) [7].

NAFLD, especially in its necroinflammatory form known as Non-Alcoholic SteatoHepatitis (NASH), may cause atherogenic dyslipidemia. In addition there is an increase of pro-coagulant factors like fibrinogen, plasminogen activator inhibitor-1 and tumor growth factor, which all increase the risk of atherosclerosis [8].

NAFLD is considered to have chronic sub-clinical inflammation and associated with many inflammatory markers. Increased vascular risk has been linked to increased levels of inflammatory cytokines and markers such as IL-6, TNF, CRP, and fibrinogen. Oxidative stress may also play a role. This stress is thought to trigger

changes in endothelial function leading to formation and deposition of oxidized LDL in the sub-intimal space [9].
Visceral adipose tissue is also thought to play a role in NAFLD. Visceral fat is metabolically active and secretes several hormones that help regulate inflammation; tissue distribution is affected by an alteration in cellular free fatty acid transport. These alterations are possibly caused by hyperinsulinemia and ultimately divert accumulated triglycerides away from adipose tissue and towards other metabolic organs such as the liver. Non-alcoholic fatty liver disease, abdominal obesity, and insulin resistance all play a role in increased cardiovascular risk, though the exact causal relationship is still unclear. Hepatic necroinflammation, as seen in NASH, is an atherogenic mechanism that may explain why patients with NASH have greater CV risk than patients with simple steatosis. In the liver, a signal of hepatic necroinflammation is elevated liver enzymes which may serve as a marker for those at increased risk of CVD.
The objectives of the present study are to investigate the association of lipid profile abnormalities in patients with different grades of fatty liver. The majority of the patients were in Grade I, followed by Grade II and Grade III. The total cholesterol level was significantly higher among fatty liver Grade III than Grade I and Grade II.

Material and methods

Case studying

This is a hospital-based cross-sectional study conducted in the Department of Medicine, KVG Medical College and Hospital, Sullia, D.K. A total of 100 patients, which included 55 males and 45 females, were evaluated sonographically for fatty liver.

Inclusion criteria

All patients with NAFLD / NASH aged more than 16 years.

Exclusion criteria

1. History of consumption of alcohol
2. Patients on long term steroid therapy (more than 3 weeks)

Grading of non-alcoholic fatty liver

Ultrasonography of liver will be done to detect hepatic fat using high resolution B mode. Compared to histology, ultrasonography had a sensitivity of 85% and a specificity of 94% in detecting fatty liver disease [10]. According to conventional criteria, fatty liver disease will be diagnosed through characteristic echo patterns, such as diffusely increased liver near-field ultrasound echo (bright liver); liver echo greater than kidney and vascular blurring and the gradual attenuation of far-field ultrasound echo is considered diagnostic of NAFLD. When the echogenicity is just increased, it is grade I; when the echogenic liver obscures the echogenic walls of portal vein branches, it is grade II, and, when the echogenic liver obscures the diaphragmatic outline, it is grade III fatty infiltration.

Results

A total of 100 cases diagnosed with NAFLD on ultrasound are included in the study, of which 55 are males, and 45 are females. Of this, 52 % are grade I, 30 % are grade II, and 18 % are grade III NAFLD. Serum TG, TC, LDL-C, and HDL-C levels were abnormally raised in 57%, 55%, 60%, and 59% patients, respectively. Forty two cases are diabetic, twelve individuals consume alcohol, and Thirty three individuals are overweight in the present study population. In our study, there is a correlation between sonological grade of the fatty liver to that of biochemical lipid abnormalities i.e., with higher the grade of fatty liver more is dyslipidemia.

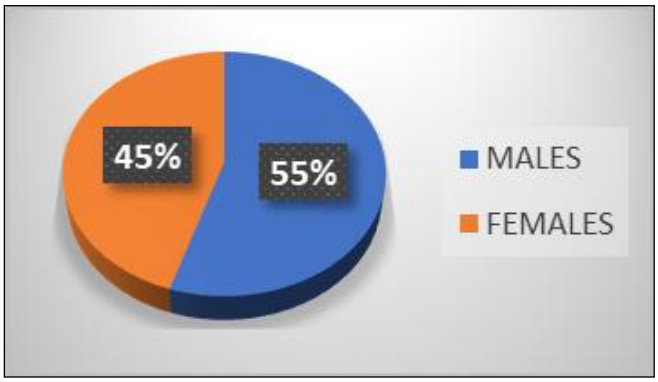

Fig 1: Sex distribution of cases

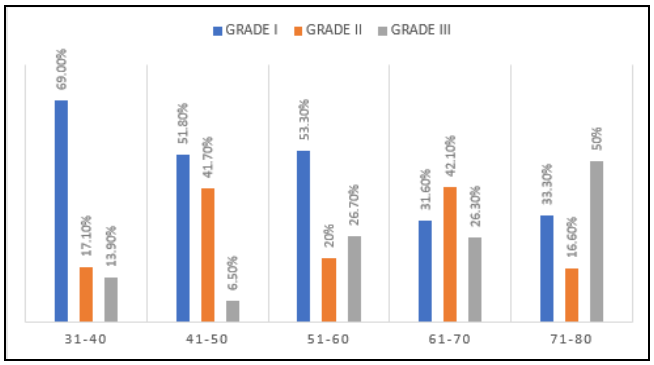

Fig 2: Age distribution and grades of fatty liver

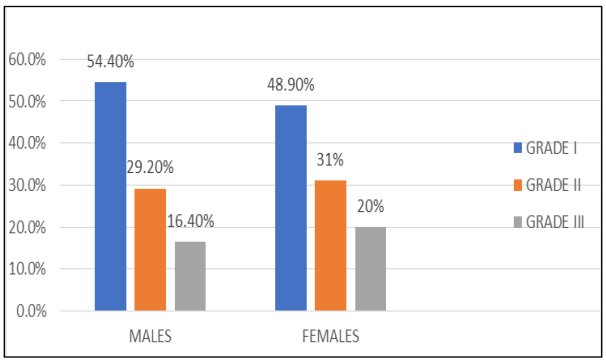

Fig 3: Sex distribution in different grades of fatty liver

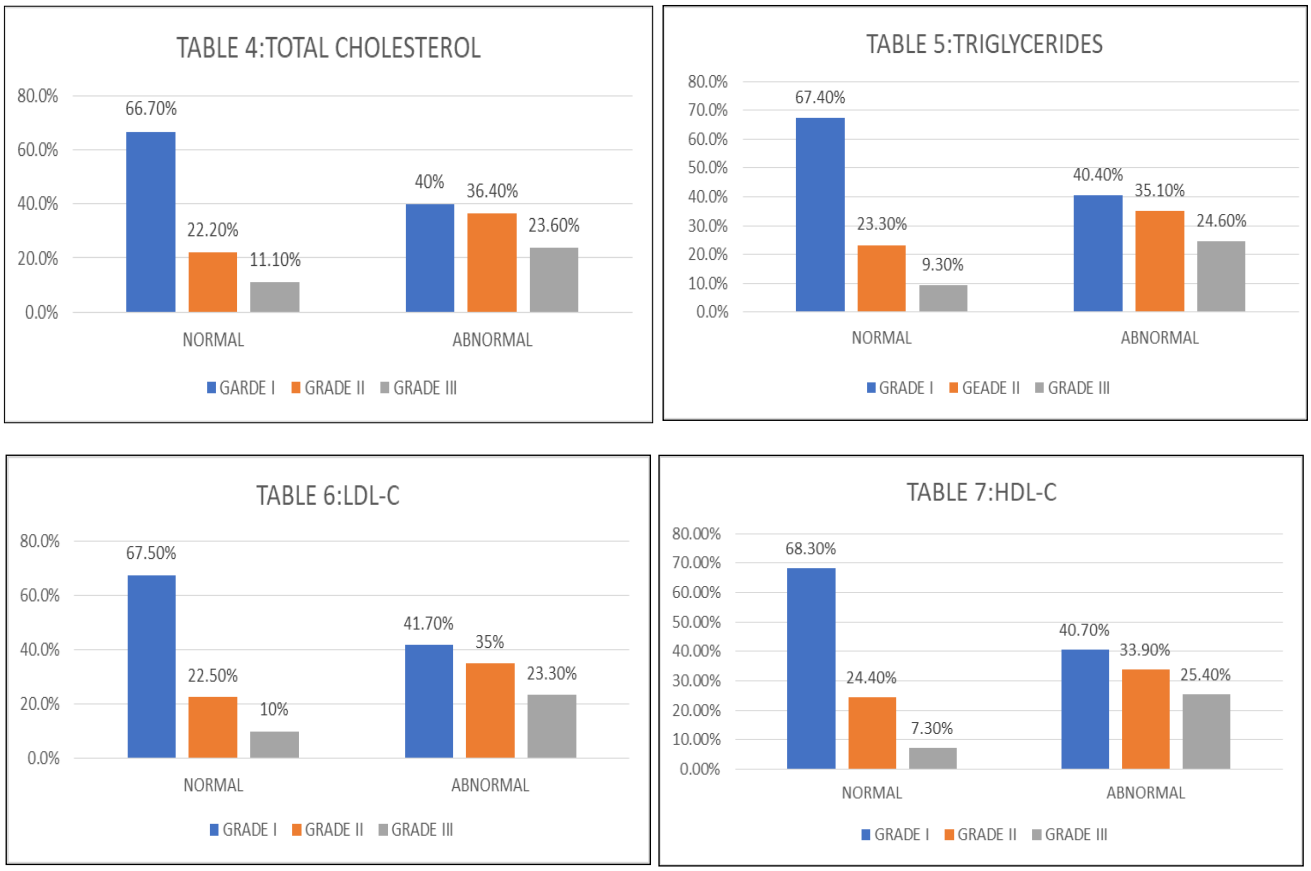

Fig 4-7: Depicts the graphical representation of the level of each lipid abnormalities in relation to the grade of the fatty liver based on ultrasound.

Discussion

NAFLD is a significant cause of chronic liver disease and is now regarded as the hepatic manifestation of the metabolic syndrome. The morbidity and mortality related to NAFLD is expected to rise with the upsurge of obesity and type 2 diabetes mellitus. NAFLD is increasingly recognized as a major cause of liver-related morbidity and mortality because of its potential to progress to fibrosis, cirrhosis, liver failure, and hepatocellular carcinoma. Most of the patients with NAFLD are asymptomatic. The disease is discovered either incidentally during routine laboratory examination or when the patient is investigated for other conditions. Patients with NAFLD are heavily enriched with metabolic risk factors, including atherogenic dyslipidemia.

Liver biopsy is the gold standard for the diagnosis of NAFLD. But because of its invasiveness, complication, painfulness, and sampling error, it is not feasible in every asymptomatic case. In this aspect, ultrasonography offers a promising role to diagnose NAFLD Increased lipid profile among NAFLD subjects had been reported in many studies.

In a cross-sectional study conducted in Brazil, Type-2 diabetic patients have a high prevalence of ultrasonographic NAFLD, and its presence is associated with hypertriglyceridemia, obesity and high-normal ALT levels [11]. Lizardi-Cervera et al., conducted a study that included 359 individuals with NAFLD, overweight was present in 46.79% and obesity in 36.49% of patients and high level of cholesterol was found in 63% of the NAFLD subjects [12] .

A study done by Clark in USA, demonstrated that high triglycerides levels were found in NAFLD patients [13].

In a study done by Mahaling et al., in 70 cases who were diagnosed as NAFLD on ultrasonography, grade I NAFLD cases were 47.15%, grade II were 42.85%, and grade III were 10%. The mean age of the patients was 49.14 years. The male to female ratio was 3:4. Serum triglycerides, total cholesterol, LDL, and VLDL levels were raised in 67.14%, 45.71% 34.28%, 25.71% of cases, respectively. Low serum HDL levels were seen in 62.85% of patients [14].

Manohar Lal et al. conducted a study among 128 individuals, with a mean age of the patients was 48.78±14.23 years, and 45.3% of the patients were males. The study found an abnormal profile of lipid levels among patients with fatty liver. The majority of the patients were in Grade 0 (43.8%), followed by Grade I (32%), Grade II (17.2%), and Grade III (7%) [15]. In our study, serum total cholesterol, triglycerides, serum LDL shows statistically significant abnormalities with increasing grades of NAFLD. With the increase in age, the grade of fatty liver tends to be higher among the affected individuals. A significant difference is seen among triglycerides and HDL-C in different grades of fatty liver.

Most of the patients of NAFLD in India is asymptomatic, non-diabetic and non-hypertensive. Though liver biopsy is the gold standard method for diagnosis of NAFLD, Ultrasonography which is non-invasive, simple tool, can be used for the early detection of NAFLD in asymptomatic patients.

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