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Lipid profile in different grades of Ultrasonic Non-Alcoholic Fatty Liver Disease

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ABSTRACT

Background & Objectives: This study was conducted with objective of studying the lipid abnormalities in patients with non-alcoholic fatty liver disease diagnosed on the basis of ultrasound. **Materials & Methods:** Total 100 patients consisting of 67 males and 37 females diagnosed as Non-alcoholic fatty liver disease on the basis of ultrasound were included in the study. Laboratory values of different lipid parameters were compared in different grades of these patients. **Results:** Out of total 100 cases, mild nonalcoholic fatty liver disease was found in 83 %, moderate in 17 % and severe in none of the participants. Age of the participants ranged from 26 to 79 years with mean being 45 ± 11.99 years. Presence of dyslipidemia was found in 94 % of the cases. Triglycerides, total cholesterol and low density lipoprotein levels were raised in 59, 53, 72% of the cases respectively and High density lipoprotein level was decreased in 57% of participants. There was significant positive correlation of presence of non-alcoholic fatty liver disease with increasing levels of serum total cholesterol (P value <0.001), low density lipoprotein (P value <0.001) and triglyceride (P value <0.001) and significantly decreasing high density lipoprotein (P value <0.001). Whereas increasing grades of non-alcoholic fatty liver disease weren't significantly associated with increasing level of lipid abnormalities. **Conclusion:** This study showed the high prevalence of dyslipidemia in non-alcoholic fatty liver patients. Early detection with simple non-invasive ultrasonography is very useful to detect dyslipidemic patients.

Key words: Dyslipidemia; Fatty liver disease; Lipid profile.

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INTRODUCTION

Non-alcoholic Fatty Liver Disease (NAFLD) is a clinico-histopathological entity with histological features that resemble alcohol-induced liver injury, but by definition, it occurs in patients with little or no history of alcohol consumption. It encompasses a histological spectrum that ranges from fat accumulation in hepatocytes without concomitant inflammation or fibrosis (simple hepatic steatosis) to hepatic steatosis with a necro-inflammatory component (steatohepatitis) that may or may not have associated fibrosis. The latter condition, referred to as non-alcoholic steatohepatitis (NASH), may progress to cirrhosis in up to 20% of patients.[1] Convincing evidence of negligible alcohol consumption should be present (less than 20 g of ethanol per week). Random blood assays for ethanol estimation should be negative. If performed, assays for the presence of desialylated transferrin in serum, a marker of alcohol consumption, should also be negative.[2] The major risk factors for NAFLD, central obesity, type 2 diabetes mellitus, dyslipidemia, and metabolic syndrome are common in western societies. NAFLD is the most common liver disorder in Western industrialized countries, affecting 20 to 40% of the general population.[3]

In a prospective study of 400 US military personnel and their families (mean age 55), the prevalence of NAFLD by ultrasound was 46%.[4] The prevalence was increased in men, older individuals, and those

with hypertension, obesity or diabetes. NASH was confirmed by biopsy in 30% of ultrasound-positive patients. Estimates of prevalence in Asia-Pacific regions range from five to 30%, depending on the population studied.[5] The constellation of abdominal obesity, hypertension, diabetes, and dyslipidemia has been called the metabolic syndrome, syndrome X, the deadly quartet, the insulin resistance syndrome, and the obesity dyslipidemia syndrome.

In one study done in 304 consecutive patients with NAFLD, 120 (74%) were diagnosed with NASH. Metabolic syndrome was significantly more common in patients with NASH compared with those with fatty liver alone (88 versus 53%).[6]

Earlier reports indicated that majority of cases of NAFLD are relatively mild and have a benign course. However, now it has been documented that number of these cases can progress to fibrosis, cirrhosis, liver failure and hepatocellular carcinoma and thus contributes to liver related mortality and morbidity.[7,8]

Most patients with NAFLD have no symptoms or signs of liver disease at the time of diagnosis, although many patients report fatigue or malaise and a sensation of fullness or discomfort on the right side of the upper abdomen. Hepatomegaly is the only physical finding in most patients.[9]

Liver biopsy is a sensitive method for diagnosis of NAFLD. However, liver biopsy is a painful and invasive procedure with rare, but potentially life threatening complications like bleeding[10] and is prone to sampling errors.[11] In addition, given the numbers of patients with NAFLD, the use of liver biopsy is clinically and financially impractical.

This study was designed to see the pattern of lipid profile among the NAFLD patients. This will help to know the association of lipid profile abnormalities in those patients; which will help for the earlier identification of dyslipidemia and better management in future.

MATERIALS AND METHODS

This was a cross sectional prospective study conducted from September 2016 to January 2017 in Green City Hospital, Basundhara, Kathmandu. A total of 100 patients were enrolled randomly after applying inclusion/ exclusion criteria. Patients of the age more than 20 years diagnosed as fatty liver by ultrasound were included in the study only after taking informed consent from the patient. Patient with history of alcohol intake more than 20 g/week are excluded from the study. All the ultrasound examinations were performed on Medison Acuvix US Scanners using 3-5 MHz.

Subjects were considered as cases if they have fatty liver according to the standard criteria accepted by the American Gastroenterology Association (AGA) i.e., an increase in hepatic echogenicity as a reference, the presence of enhancement and lack of differentiation in the periportal intensity and the vascular wall due to great hyperechogenicity in the parenchyma. The degree of involvement was standardised with a semi quantitative scale of the degree of hepatic involvement. Mild fatty liver is labelled when liver echogenicity is increased compared to cortex of kidney with normal visualisation of intrahepatic vessel borders and diaphragm. Moderate fatty liver is labelled when increased echogenicity is combined with impaired visualisation of intrahepatic vessels. Severe fatty liver is labelled when diaphragmatic outline is also obscured.

All patients diagnosed as FLD on USG were investigated for serum lipid profile. Triglyceride was calculated by enzymatic colorimetry using GPO-PAP method and cholesterol by CHOD-PAP method. Then, a relationship between NAFLD and serum lipid profile was compared.

Data were entered in the SPSS version 16 for windows and analysed. Frequency, Mean values, standard deviations were calculated for individual variables. Analysis of different grade of NAFLD with variable component of lipid profile was done using Analysis of Variation (ANOVA) test. p-value was calculated and value <0.05 was considered significant.

RESULTS

One hundred cases of NAFLD diagnosed on ultrasonography were included in the study. Study participants consisted of 67 males and 33 females. The age of the participants ranged from 26 years to 79 years with mean age being 45.39 ± 11.99 years. Most of the participants (57%) were of 40-59 years, 33% were less than 40 years and 10 % were more than 60 years. (Table 1). Majority of them were Hindu (86%) followed by Buddhist (10%) and Christian (4%). Body mass index (BMI) of participants varied from 18.14 to 44.75 kg/m2 with mean value of 27.97 ± 4.28 kg/m2. Most (42%) were of normal BMI, 34% were overweight (BMI 25-29 kg/m2), 23% were obese (BMI >30kg/m2), and 1% underweight (BMI< 18kg/m2). Out of all, 24% were smokers. Twenty seven percentages were diabetic and 30% were hypertensive. Out of 100 participants, abnormal baseline investigation (complete blood count and/or renal function test)

Table 1: Age and sex distribution of patients

Demographic features		Mild NAFLD	Moderate NAFLD
Age group	<40 years	31	2
	40-49	27	7
	50-59	16	7
	>60	9	1
Sex	Male	57	10
	Female	26	7

Table 2: Distribution of patients with abnormal serum lipid profile

Dyslipidemia	Mild NAFLD	Moderate NAFLD	Total
Presence	77	17	94
Absence	6	0	6
Total	83	17	100

was found in 6%. Elevated transaminase (abnormal liver function test) was observed in 23 % cases.

Among the enrolled 100 patients, 83% had mild fatty liver and 17 % had moderate fatty liver. We had no enrolled subject of severe fatty liver.

Dyslipidemia was observed in 94% of participants. But signs of dyslipidemia (xanthelasma) were present in only 6% of cases. Mean value of serum triglycerides, total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL) were 194.9, 208.1, 125.2, 41.2 mg/dl respectively. The HDL level was decreased in 57% of participants. Serum triglycerides, total cholesterol, LDL, were raised in 59%, 53% and 72% respectively. In total cholesterol category, 26 % had borderline high (200-239 mg/dl) and 27 % had high total cholesterol (>240 mg/dl). In LDL category, 28% had near optimal, 23% had borderline high, 9% had high and 12% had very high LDL cholesterol. In triglyceride category, 22% had borderline high (150-199 mg/dl), 34% had high (200-499 mg/dl) and 3% had very high (>500 mg/ dl) triglyceride.

On comparison of lipid changes in patients with NAFLD, it was observed that there was significant positive correlation of presence of NAFLD with increasing levels of serum total cholesterol (P value <0.001), LDL (P value <0.001) and Triglyceride (P value <0.001) and significantly decreasing HDL (P value <0.001). No significant positive correlation between the grading of fatty liver and level of different components of lipid profile was found.

DISCUSSION

This was a hospital based cross-sectioonal observational study including different grades of NAFLD patients. Majority of our participants were of 5th and 6th decade age group and mean BMI came in overweight category (26.97± 4.28 kg/m^2). In study done in India, the mean age of the patients was 46.65 ± 15.06 years and BMI was 29.50 ± 3.341. Another similar study shows the mean age as 49.14 years and the age wise population parameter were grossly comparable to our study.[12]

We had most patients of mild (83%) and few patients of moderate NAFLD (17%). We couldn't include severe NAFLD patients. In another study enrolling 385 patients of NAFLD; only 1.8% cases had severe NAFLD.[1] Due to the rarity of the severe fatty liver disease in non-alcoholic patients and limited sample size, our study couldn't include severe NAFLD.

Lipid profile abnormality was observed in majority of participants.

The mean total cholesterol levels in Mild NAFLD (206.3±44.48) and in Moderate NAFLD (216.7± 36.44), were comparable with the finding of study by Sen et l.[1]

Our study revealed significant positive correlation of presence of NAFLD with increasing levels of serum total cholesterol (P value <0.001), LDL (P value <0.001) and Triglyceride (P value <0.001) and significantly decreasing HDL (P value <0.001). This is in accordance with study done by Mahamoud et al.[13] No significant positive correlation between the grading of fatty liver and level of different components of lipid profile was found. This may be because of small sample size and inability to enroll participants from severe NAFLD category.

To summarize, NAFLD is not an uncommon disease entity. Several studies have been published with variable results. We could show positive correlation of lipid profile abnormalities with the presence of fatty liver but no significant correlation of increasing level of lipid abnormalities with increasing grades of fatty liver. Larger study including several more variables and more number of participants that could incorporate bouts of severe NAFLD cases and including participants from the community is encouraged and expected in future for more clarification on the subject.

CONCLUSION

The study showed majority of patient with NAFLD

had dyslipidemia. There was significant positive correlation of presence of NAFLD with increasing levels of serum total cholesterol LDL and Triglyceride and significantly decreasing HDL. No significant positive correlation between the grading of fatty liver and level of different components of lipid profile was found.

Dyslipidemia, a common condition, was associated with NAFLD. It is important for medical practitioners to identify and treat dyslipidemia in NAFLD patients, a known risk factor for cardiovascular and cerebrovascular disease.

Limitation

The main limitation of our study was that, in the majority of patients, diagnosis of fatty liver was done on only the basis of USG findings whose sensitivity and specificity is observer-dependent. As the present study was hospital-based and not a cross -sectional population study, the findings of this study may not be truly representative and applicable to the general population at large.

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