Original Research Article

Evaluating the Role Of Lipid Profile in Patients with Non-Alcoholic Fatty Liver Disease: A Prospective Study from Central India

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Abstract

Background: Non-alcoholic fatty liver disease (NAFLD) is a leading cause of chronic liver disease throughout the world. A liver biopsy is a sensitive method for detecting NAFLD. However, a liver biopsy is a painful and invasive procedure that can result in rare but potentially fatal complications such as bleeding and is prone to sampling errors. Furthermore, given a large number of NAFLD patients, the use of liver biopsy is both clinically and financially impractical. A pattern of lipid profile among the NAFLD patients can function as a non-invasive method of diagnosis. **Aims and objectives:** To evaluate the relationship between laboratory lipid data and NAFLD to evaluate and confirm noninvasively the usefulness of serum lipid biochemistry and increasing the accuracy of NAFLD diagnosis.**Materials and methods:** Two hundred patients (age 18-70 years) were studied in the outpatient and inpatient department of medicine of a tertiary care center of central India from July 2018 to June 2020. NAFLD was diagnosed on basis of clinical history, laboratory findings, and radiological investigation, and prevalence was identified. The lipid profile of patients was compared with the gender and association was obtained. **Results:** The majority of the patients were in the age group of 35 to 45 (34%) and 45 to 55 (32%) years. NAFLD was more prevalent in the age group 45 to 55 (60.38%) followed by 35 to 45 (30.19%) (p=0.023). The prevalence of NAFLD was higher in females (33%) than in men (19.15%) and the overall prevalence was 26.5%. The risk of NAFLD was more with abnormal LDL (p=0.032), TG (p=0.024), and TC levels (p=0.008).**Conclusion:** The risk of NAFLD is more than those having abnormal LDL, TG, and TC levels.

Keywords: prevalence, lipid abnormality, low-density lipoprotein, high-density lipoprotein

Introduction

Non-alcoholic fatty liver disease (NAFLD) is a leading cause of chronic liver disease worldwide, and it has recently emerged as a major cause of liver disease in India[1].

NFALD affects all racial and ethnic groups and has no preference for age or gender. Epidemiological studies indicate that NAFLD affects between 9% and 32% of the general population in India[2].

NAFLD etiology reflects complex interactions between genetic, neurohumoral, metabolic, and stress-related factors that are more common in Asian countries. The liver is involved in lipid metabolic pathways by absorbing serum-free fatty acids, producing, storing, and transporting lipid metabolites[3].

The presence of dyslipidemia (hypercholesterolemia, hypertri-glyceridemia, or both) has been reported in 20% to 80% of NAFLD cases[4]. Liver fat content reflects the balance of free fatty acid flux via lipolysis, fatty acid oxidation, and de-novo lip genesis. Dyslipidemia in NAFLD patients is atherogenic, and the pathogenesis of NAFLD is characterized by the accumulation of lipids, primarily triglycerides, in hepatocytes[5].As a result, the current study investigated the relationship between laboratory lipid data and NAFLD to evaluate and confirm noninvasively the usefulness of serum lipid biochemistry and increasing the accuracy of NAFLD diagnosis.

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Materials and methods

A present prospective cross-sectional study was performed on 200 patients at the outpatient and inpatient department of medicine of a tertiary care center of central India from July 2018 to June 2020 involving patients in the age group 18-70 years. NAFLD was diagnosed on basis of clinical history, laboratory findings, and radiological investigation at the study center.Non-alcoholic individuals, either total abstainers or who consumed <30 g of alcohol per day for men and <20 g of alcohol per day for women with elevated liver enzymes and ultrasound showing hyperechoic liver suggestive of fatty liver were included. Patients with alcohol consumption of ≥30 g/d for men and ≥20 g/d for women (as evident from patients' confession or interview of close relatives), positive hepatitis B surface antigen (HBsAg), positive antibodies to hepatitis C virus (anti-HCV), use of drugs such as amiodarone, corticosteroids, tamoxifen, methotrexate or high-dose estrogens, pregnancy, and imaging features of cirrhosis of the liver were excluded. Complete blood picture, fasting lipid profile, and age and gender were recorded.All the data analysis was performed using IBM SPSS ver. 20 software. Frequency distribution and cross-tabulation were used to prepare the tables. Microsoft office and PRISM software was used to prepare the graphs. Quantitative data were expressed as mean and standard deviation whereas categorical data were expressed as number and percentage. A Chi-square test was used to compare the percentage. A p-value of<0.05 is considered significant.

Results

Most of the patients were in the age group of 35 to 45 (34%) and 45 to 55(32%) years. NAFLD was more prevalent in the age group 45 to 55(60.38%) followed by 35 to 45 (30.19%) (p=0.023). The prevalence of NAFLD was considerably higher in females (33%) than in men (19.15%) and overall prevalence was 26.5%.

The mean age of NAFLD patients was 46.26. The mean age of NAFLD females and the male was 24 and 36 years, respectively.

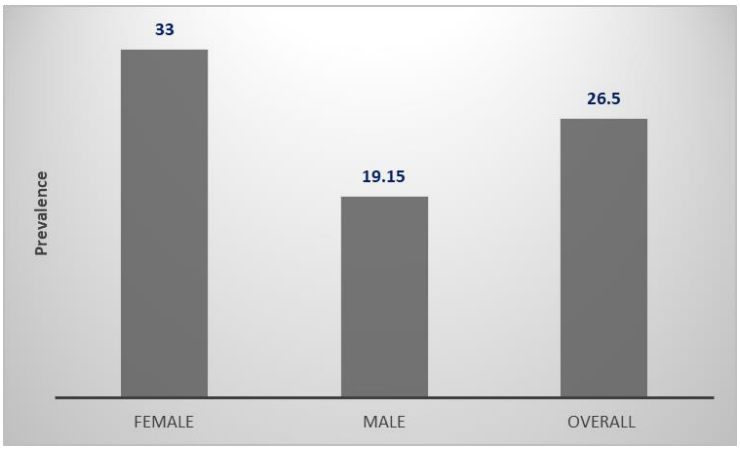

Fig 1:NAFLD prevalence

Table 1: Distribution of lipid profile between gender

Lipid profile		Female with NAFLD (n=35)	Male with NAFLD (n=18)	Total (n=53)	P-value
LDL	Normal	17 (48.6)	4 (22.2)	21	0.032
	Abnormal	18 (51.4)	14 (77.8)	32	
HDL	Normal	14 (40)	6 (33.3)	20	0.442
	Abnormal	21 (60)	12 (66.7)	33	
TG	Normal	1 (2.86)	2 (11.1)	3	0.024
	Abnormal	34 (97.1)	16 (88.9)	50	
TC	Normal	15 (42.9)	4 (22.2)	19	0.008
	Abnormal	20 (57.1)	14 (77.8)	34	

Chi Square test is used to calculate P value. LDL: Normal; up to 130 mg/dL, Abnormal; more than 130 mg/dL, HDL: Normal; more than 50 mg/dL,Abnormal; Less than 40 mg/dL, TC: Normal; up to 200 mg/dL, Abnormal; more than 200 mg/dL, TG: Normal; up to 150 mg/dL, Abnormal; more than 150 mg/dL. LDL; low density lipoprotein, HDL; high density lipoprotein, TG; triglyceride, TC; total cholesterol.Table 1 shows the distribution of 53 patients based on normal and abnormal lipid profile parameters. Out of 53 NAFLD patients, 35 were females and 18 were males. NAFLD patients were found to have a significant correlation with abnormal LDL, TG, and TC levels.

Discussion

NAFLD is a separate hepatic entity that is characterized by abnormal fat deposition in liver cells causing chronic liver disease. NAFLD prevalence is very high around the world in all age groups especially in middle age group individuals[6].In our study, most of the patients were in the age group of 35 to 45 (34%) and 45 to 55(32%) years. Our results revealed that the prevalence of NAFLD had a significant correlation with age. It was more prevalent in the age group 45 to 55(60.38%) followed by 35 to 45 (30.19%). This result is consistent with Khammaset al[7]and AlamS et al[8]. Khammas et al suggested that with an increase in age there is an increase in the prevalence of NAFLD, the highest peak observed between ages group of 52 years and 60 years; after 60 years the prevalence decreases[7].Alam S et al reported that younger age group people are less prone to have NAFLD, and as the age increases, the risk of developing NAFLD increases in each decade from 25 years to 54 years. In their study, they found that individuals of age between 45 to 55 years are at the highest risk of having NAFLD prevalence being 55.38%. Similarly, the risk of developing NAFLD decreases in patients with an age of more than 55 years[8].Duseja et al found that NAFLD had a high prevalence in the age group of 18–30 years that is 41.7%. [9] Our findings are also per a study by Hu et al, where NAFLD had a high prevalence of 26.4% and 26.3% in the 30–40 years and 50–60 years age group, respectively[10].

NAFLD occurs in all age groups. The liver regulates alcohol metabolism, and as the body ages, toxicity elevates resulting in increased organ damage. These events are related to a mitochondrial transport flaw rising with an increase in age and decrease in the smooth endoplasmic reticulum and metabolism of CYP2E1-dependent microsomal ethanol oxidation functions.

The mean age of NAFLD patients was 46.26. The mean age of NAFLD females and the male was 24 and 36 years, respectively. Duseja A et al reported that the mean age of individuals having NAFLD population was 30.7 years for males and 44.7 years for females[9]. In our study prevalence of NAFLD was considerably higher in females (33%) than in men (19.15%) and the overall prevalence was 26.5%. Similarly, in Almobarak et al study, female patients were having a higher prevalence of NAFLD in almost all age groups than male patients[11]. Ahmed MH et al that both males and females had an equal prevalence of NAFLD[12]. On the other hand, Khammas et al found out that NAFLD had more prevalence in men than women. In both sexes, the prevalence was increased with age even after reaching the highest peak between ages 52 and 60 years and then it declined over 60 years[7].Lipid profile includes TG, HDL-C, and LDL-C, which are measured from lipid profile tests. Cholesterol is one type of blood lipids that is essential to construct estrogen and other sex hormones. It also synthesizes vitamin D so that it is considered a necessary item in body organisms. Now several sources of Red meats such as lamb and beef as well as many dairy

products are considered main sources for cholesterol. HDL-C and LDL-C are termed as good and bad cholesterol, respectively because HDL-C is known to lower the risk of CVD and metabolic syndrome by routing cholesterol back to the liver and thereby preventing cholesterol synthesis in the arteries so to prevent atherosclerosis, that's why it is known as good cholesterol, whereas LDL-C is known to increased risk of CVD and metabolic syndrome by deposition of cholesterol in the arteries and causing atherosclerosis that's why it is called as bad cholesterol. TG is yet another type of lipid that is known to store energy from food[13].In the current study lipid profile test showed that in NAFLD patients, 39% had normal LDL and 61% had abnormal LDL, 38% had normal HDL and 62% had abnormal HDL, 6% had TG in the normal range and 94% had abnormal TG and 36% had normal TC and 64% had abnormal TC. Our findings correlate with Bandarua et al study, where hypercholesterolemia in 64.4%, high LDL in 35.5%, high triglycerides in 31 (40.7%), and low HDL in 36.8% in patients with NAFLD [14]. Khammas et al study found out that hypertriglyceridemia and low HDL-C were linked with NAFLD patients, whereas hypercholesterolemia and high LDL-C were not found to have any association with NAFLD. [7]Agrawal et al found out in their study that,21.8% of subjects were having hypercholes-terolemia, 45.16% subjects were having low HDL, 25% subjects were having high LDL, 56.5% subjects were having elevated VLDL, and 63.7% subjects were having hypertriglyceridemia, which is associated with NAFLD[15].Jali MV et al found out in their study that, 52% of subjects with NAFLD were having hypercholesterolemia, 27% subjects had low HDL levels, 59% subjects were having high levels of LDL, and 67% subjects were having high levels of triglycerides[16].Duseja A et al found out in their study that in 32% of patients having hypercholesterolemia and 79 (63.7%) patients had hypertriglyceridemia[17].

Conclusion

NAFLD is more prevalent in working-age females (45 to 55 years) than men. The risk of NAFLD was more with abnormal LDL, TG, and TC levels. Early detection of dyslipidemic patients with simple noninvasive biochemistry is extremely beneficial. As a result of this study, it is possible to conclude that serum biochemical analysis is one of the least expensive modalities for detecting changes associated with NAFLD, and it also reduces the exposure of these patients to unnecessary, expensive, complicated, and time-consuming investigations.

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