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A Comparative Study of Lipid Profile among Non-Alcoholic Fatty Liver Disease patients and Normal Patients

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Abstract

Background: Non-alcoholic fatty liver disease (NAFLD) is the term for a range of conditions caused by a build-up of fat in the liver. It's usually seen in people who are overweight or obese. Early-stage NAFLD does not usually cause any harm, but it can lead to serious liver damage, including cirrhosis, if it gets worse. Having high levels of fat in your liver is also associated with an increased risk of serious health problems, such as diabetes, high blood pressure and kidney disease.

Methods: This paper focuses on analyzing the importance of biochemical parameters in non-alcoholic fatty liver disease including Lipid Profile and their implications in the evolution of the disease by using standard procedure of selected biochemical parameters.

Results: The present study showed that the value of total cholesterol, Triglyceride, LDL were significantly high and HDL significantly low in non-alcoholic fatty liver disease patient compare to normal patients.

Conclusions: Our study also shows that non-alcoholic fatty liver disease patient have a high risk of critical condition and developing sever disease and also show poor prognosis compared normal patent.

Keywords: TC,TG,HDL,LDL,VLDL

Introduction

NAFLD refers to excessive and abnormal fat deposition in the liver cells in non-alcoholic populations. NAFLD has been recognized as a frequent and common causative cause of hepatic disease. [1]

Although Jurgen Ludwig, a pathologist, only acknowledged nonalcoholic fatty liver disease in 1980, it was previously described about 60 years prior. He presented the histo-pathological results in patients with steatohepatitis who had little to no alcohol consumption. His findings were accurate, and he stated that the majority of cases had a noticeable liver infection with necrotic regions. Steatosis—the accumulation of fats in hepatocytes—causes fatty liver, a non-alcoholic illness that can manifest as either simple steatosis or steatohepatitis. Steatohepatitis results from fatty alteration brought on by aberrant lipids being deposited in hepatic cells. [2]

The most common cause of chronic hepatitis (CLD) in the western population is non-alcoholic fatty liver disease [3]. However, it is currently expanding, particularly in the Asia-Pacific region, as a result of changes in lifestyle, such as increasing fat consumption, inactivity, and an increase in the burden of DM-2 [4].

NAFLD (non-alcoholic fatty liver disease) is divided into three grades based on histological characteristics.

Grade I (simple steatosis) is characterized by elevated hepatic echogenicity and ultrasonographic visualization of the periportal and diaphragmatic echogenicity. In grade II, there is a change in the liver's echo pattern that is characterized by steatosis and lobule inflammation as well as the ballooning of liver cells. Grade III ultrasound features include elevated hepatic echogenicity, undetectable periportal echogenicity with diaphragm blockage (inflammation of lobules with steatosis and ballooning of liver cells as well as fibrosis of Mallory hyaline), and Mallory hyaline fibrosis [5].

Steatohepatitis is simply the result of fat deposition (steatosis) leading to fibrotic and/or cirrhotic alteration. In non-alcoholic steatohepatitis, there is lipid deposition in the liver cells combined with signs of liver cell injury, fibrosis (different degrees), and inflammation, whereas in simple steatosis, there is buildup of fats as TG inside hepatic cells [6].

NAFLD affects 15% of people who are overweight and 40% of obese people. In relation to T2DM, there is an increase in the prevalence of non-alcoholic fatty liver disease (NAFLD). According to estimates, there will be 100 million people with DM-2 by the year 2020. 60% will unexpectedly be from Asia. When NAFLD is diagnosed, patients typically show no symptoms and no evidence of a liver condition. NAFLD is detected through routine ultrasonography or during diagnostic procedures for conditions like hypertension and diabetes mellitus with or without obesity [6] [7] [8].

Numerous patients report experiencing fatigue and malaise, as well as a feeling of fullness and unease in the right upper abdomen. Clinically, many patients exhibit liver enlargement [9].

Patients with diabetes mellitus, hypertension, obesity, and men's gender are more likely to develop it. [10]

In the general population of the world, fatty liver disease (non-alcoholic) occurs between 7% and 9% of the time; astonishingly, between 12% and 24% of the general Asian population is affected. NAFLD affects 30% of Americans overall, while 90% of obese people are morbidly affected by the condition [11].

A research conducted in Rawapindi, Pakistan, to track the prevalence of risk factors revealed that 66% of respondents were obese, 48% had elevated triglycerides, 34% had diabetes, and 28% had elevated cholesterol [12].

In a study conducted at the Institute of Pharmaceutical Sciences in Telangana, India, multiple grades of NAFLD were identified using ultrasonography, and patients' predicted fasting lipid profiles were calculated. The study recruited patients of varied ages to investigate the aberrant lipid profile in NAFLD. Lipid profile changes were seen in people between the ages of 30 and 39 (12.72%), 40 to 49 (33.93%), 50 to 59 (20.61%), and 60 to 69 (17.58%), respectively. In their study, Santoshini A et al. found that age has a substantial impact on subjects with various grades of NAFLD and that this impact is statistically significant. [13]

Due to pain, expense, and high rates of complications that cause misery and unease, liver biopsies (LB) are a genuine last-resort invasive diagnostic for diagnosis and staging that have several drawbacks. The safest, cheapest, simplest, and most accurate diagnostic method now available for fatty liver disease (non-alcoholic) is ultrasound findings in conjunction with noticeably elevated fasting lipid profiles. The most widely used imaging method for diagnosing and classifying fatty liver disease (a non-alcoholic condition) is ultrasound (USG), which is frequently used to examine asymptomatic individuals with elevated hepatic enzyme levels. This cross-sectional study was carried out to calculate the fasting lipid levels in NAFLD grades determined by ultrasound [14] [15] [16].

Studies on Pakistani patients with fatty liver (non-alcoholic illness) identified by ultrasonography are few and far between. This study evaluated the lipid profiles of participants with varying grades of NAFLD identified by ultrasonography. The goal of the current study was to evaluate fasting lipids and their relationship to various NAFLD grades using ultrasound. In order to reduce the burden of the disease and the outcome in terms of disability and death, early rearrangement of aberrant fasting lipids and NAFLD will aid in early protective management and avoidance of consequences due to NAFLD.

Materials and Methods

A study was conducted in Pacific Institute of Medical Sciences, Rajasthan, from March 2020 to December 2022 on non-alcoholic fatty liver disease patient. The

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source population was all cases of non-alcoholic fatty liver disease admitted at PIMS with a confirmed diagnosis of non-alcoholic fatty liver disease reported by central laboratory. In Inclusion Criteria Sample above 20-60 year of age.

Ex –smokers, ex-alcohol drinker Patient, Diabetes Mellitus type 2, acute or chronic kidney diasease was in exclusion criteria.

The blood samples for analysis were taken at least after minimum of 12 hours of complete fasting. The subject were asked to have a light, fat free diet on the day prior to sampling. The venepuncture was done in the cubital fossa, Tourniquet was used but was released just before sampling to avoid artifactual increase in the concentration of serum lipids. About 5 ml blood was drawn using perfectly dry and sterile disposable syringes. The serum was separated within 2 hours of collection to prevent artifactual changes in concentration of HDL. The sample were analyzed the same day or within 48 hours. The lipid and lipoprotein assay was done using the fully automated analyser EM 360.A total number of 100 patients admitted at Pacific Institute of Medical Sciences Udaipur, was form the subjects of the present study. Out of these 50 patients were suffering from non-alcoholic fatty liver disease, and 50 were normal patients. Efforts will be made to match all anthropometric factors comparable to both the groups of patients.

Clinical Methodology: Symptoms (Weakness, loss of appetite, Nausea,), serum Lipid Profile were recorded by using Autoanalyzer EM-640.

Statistical Analysis: For the quantitative analysis, we used the software SPSS software. In this meta-analysis, all p values reported were two-tailed with the statistical significance set at $\leqslant$ 0.05.

Result

Table 1: comparison of Lipid Profile between Normal Patient and non-alcoholic fatty liver disease patients

S. No	Test	Normal Patient		Nafld Cases		P Value
		Mean	SD	Mean	SD	
1	TC	149.41	27.62	205.83	38.61	<0.005
2	HDL	51.51	5.94	43.65	6.93	<0.005
3	LDL	70.71	15.55	129.09	31.53	<0.005
4	TG	133.51	16.44	238.56	55.06	<0.001
5	VLDL	21.41	7.15	51.05	18.20	<0.005
6	TC\HDL	2.93	0.62	4.85	1.27	<0.0001
7	LDL/HDL	1.39	0.33	3.03	0.86	<0.0001

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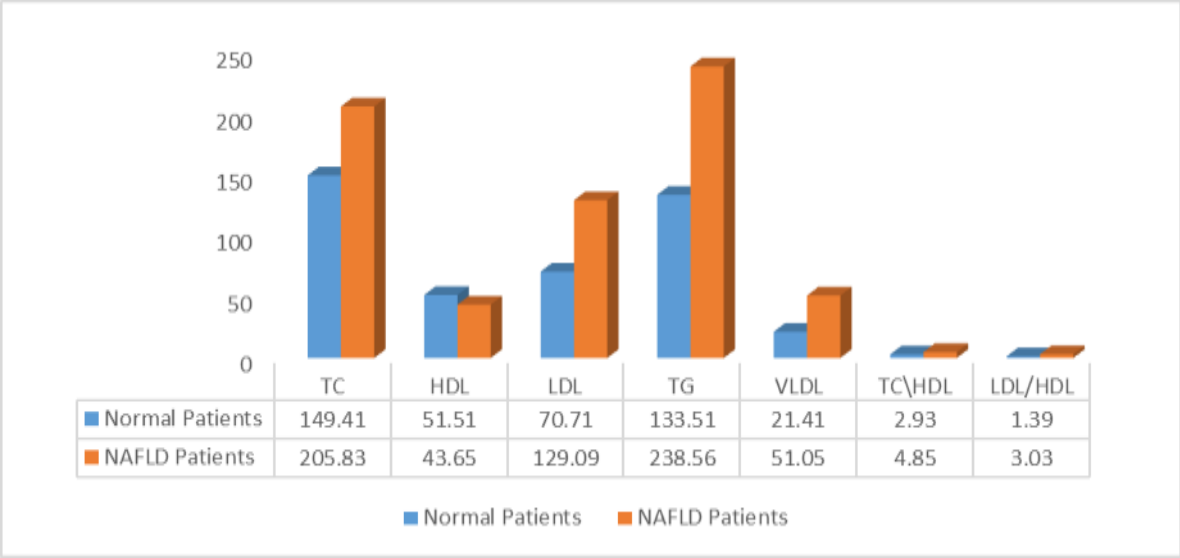
Fig 1: Comparison of Lipid Profile between Normal Patient and non-alcoholic fatty liver disease patients.



	TC	HDL	LDL	TG	VLDL	TC\HDL	LDL/HDL
Normal Patients	149.41	51.51	70.71	133.51	21.41	2.93	1.39
NAFLD Patients	205.83	43.65	129.09	238.56	51.05	4.85	3.03

The present study showed that the Mean and Standard deviation of Total Cholesterol (TC), Low density Lipoprotein (LDL), Triglyceride (TG), Very Low-Density Lipoprotein, TC\HDL ratio and LDL\HDL ratio were significantly high in non-alcoholic fatty liver disease compared to normal patients.

And the mean and standard deviation of HDL significantly low in non-alcoholic fatty liver disease patients compare to normal patients. (Table 1, fig 1)

Discussion

In our study we found significant increase in TC (P<0.005), LDL-C (P<0.005), VLDL-C (P<0.005), and TG with (P < 0.001) and decrease in HDL-C (P<0.005) in cases compared to controls. Somalwar et al: Found increase in HbA1c in cases of fatty liver group confirming obvious dysglycemia. They also found increase in AST, ALT and TG in cases compared to controls. [17] Ekta chitkara**:** found significant elevation in triglycerides in diabetics with fatty liver compared to Diabetics without Fatty liver (P<0.001). [18]

This may be due to fatty acids in the liver coming from different sources: Derived from dietary fat, released from adipocytes via lipolysis and from non-hepatic lipogenesis. An imbalance of any of the pathway involved in tri-acyl glycerol delivery, synthesis, export or oxidation could contribute to its accumulation in the liver. Estimation of HDL Cholesterol is useful to identify the effect of hyperglycaemia on liver because HDL acts as a scavenger to decrease the accumulation of bad cholesterol in the arteries (LDL). The levels of HDL cholesterol when compared between NAFLD subjects and Non NAFLD was found to have a very significant decrease (P<0.001). This may be due to the strong association between NAFLD and type 2 Diabetes and the prevalence of both disorders is increasingly related to an increase in the prevalence of obesity and insulin resistance.

Increase in LDL Cholesterol (Bad cholesterol) is also significant (P<0.001) as compared to non NAFLD patients may be due to visceral obesity and hepatic fat correlate with insulin resistance which is an important precision to development of type2 Diabetes and secondary to increased tumour necrosis factor (TNF), α and direct or Autoimmune damage to β-cells by the viruses.

Sharma et al (2014), Deng et al (2003): found raised TG, FBS with dysglycemia in cases compared to controls along with decrease in HDL-C. Also the levels of AST, ALT and GGT were found elevated in diabetics with fatty liver compared to controls. [19,20]

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Conclusion

The present study done on Normal patient and non-alcoholic fatty liver disease patient admitted in Pacific Institute of Medical Sciences, Umarda, Udaipur. Total 150 patients were included for this study .75 was normal patient and 75 was non-alcoholic fatty liver disease patient. 20-60 age group was taken for this study the study shows that the Mean and Standard deviation of Total Cholesterol (TC), Low density Lipoprotein (LDL), Triglyceride (TG), Very Low Density Lipoprotein, TC\HDL ratio and LDL\HDL ratio were significantly high in non-alcoholic fatty liver disease compare to normal patients. And the mean and standard deviation of HDL significantly low in non-alcoholic fatty liver disease patients compare to normal patients.

Our study also shows that non-alcoholic fatty liver disease patients have a high risk of critical condition and developing sever disease and also show poor prognosis compare to normal patent.

Ethical Clearance: Research project approved by the ethics committee of Pacific Institute of Medical Sciences, Umarda Udaipur- 313005, Rajasthan, INDIA**.**

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