ORIGINAL ARTICLE

Ultrasound Detected Non-Alcoholic Fatty Liver Disease – Contemplate and Investigate for Deranged Cholesterol Levels

WAJEEHA IMRAN ANDRABI, MUBASHIR DILAWAR*, MUHAMMAD ALI RAUF, *DURRE SHAHWAR TAHIR, ADNAN YOUSAF, SHAZIA ALEEM, KHALID FAROOQ*

ABSTRACT

Background: Fatty liver has life risk complications, evaluation of fatty changes according to cholesterol level could be helpful in prevention of permanent liver damage and help maintain its function. Classification of fatty liver into classes showing the extent of the fat status using ultrasound would facilitate objective handling of the disease.

Aims: To characterize Non-Alcoholic Fatty Liver Disease (NAFLD) using ultrasound relative to cholesterol levels, in order to predict the possible associated problems as early as possible.

Methods: A descriptive, cross-sectional study, designed to assess the relationship between fatty changes on ultrasonography of the liver and the amount of derangement of serum cholesterol was performed. This study included adult patient with age up to 80 years, with different degrees of fatty changes from both genders. The sample of this study consisted of 100 patients (45 males, 55 females) chosen randomly. This study has been carried out in Ghurki Trust Teaching Hospital, during the period from January 2016 to November 2016. The data was analyzed using SPSS, applying chi-square test to find the linear association between the cholesterol level and liver appearance.

Results: The results of this study show a significant linear relationship between serum cholesterol levels with degree of fatty change. However no significant relation is seen with age or liver size. The data collected was divided into three groups according to different degrees of fatty changes.

Conclusion: Linear relationship was seen between NAFLD and serum cholesterol levels with p value of < 0.001 ($p \leq 0.05$ is considered significant).

Keywords: Non-Alcoholic Fatty Liver Disease; Cholesterol

INTRODUCTION

Elevated serum cholesterol levels can also play a role in causing liver dysfunction. When cholesterol levels are high, it forces more cholesterol into the liver. This accumulation of liver depletes levels of chemicals that protect the liver from damage, making the liver more susceptible to a condition known as fatty liver disease, which can progress and cause permanent liver damage and dysfunction[1].

The median worldwide prevalence of NAFLD is estimated at 20%[2]. Fatty liver is an acquired, reversible disorder of metabolism resulting in an accumulation of triglycerides within the hepatocytes. Correction of the primary abnormality will usually reverse the process, although it is now recognized that fatty infiltration of the liver is the precursor for significant chronic disease and hepatocellular carcinoma in some patents[3]. Most people with a fatty liver feel generally unwell, and find they are becoming increasingly fatigued and overweight for no apparent reason. If the fatty changes in the liver increases, inflammation and fibrous tissue may build up and cause more serious problems. If nothing is done to improve liver function, the patent will become more over weight and the quality of life will gradually diminish. Fatty liver has life risk complications. Evaluation of fatty changes according to cholesterol level could be helpful in prevention of permanent liver damage and maintain its function; as well as classification of fatty liver into grades shows the extent of the fat status using ultrasound will facilitate objective handling of the disease. Sen et al evaluated lipid profile in patient having NAFLD and reported that the total cholesterol level was significantly higher among such patients[4].

The objective of this study is to characterize Non-Alcoholic Fatty Liver Disease relative to cholesterol level using ultrasound.

METHODS

This descriptive, cross-sectional study was conducted to assess the relationship between ultrasound detected fatty changes of the liver and amount of cholesterol in the blood. This study included patient with age up to 80 years, with different degree of fatty changes from both genders. Patients with viral hepatitis, autoimmune or inherent

*Dept. of Radiology, Ghurki Trust Teaching Hospital, Lahore, *Department of Medicine, Ghurki Trust Teaching Hospital, Lahore, Correspondence to Dr. Wajeeha Imran Andrabi Email: wajeehaandrabi@gmail.com Cell: +923346678999*

liver disease, taking hepatotoxic drugs and malnutrition were excluded from the study. The sample of this study consisted of 100 patients (45 males, 55 females) chosen conveniently. This study was carried out in the Department of Radiology and Medicine, Ghurki Trust Teaching Hospital during the period from Jan 2016 to November 2016. The data was collected by using Toshiba Xario Prime ultrasound machine using curvilinear transducer 3.75MHz. There are three grades of fatty liver which are characterized on the bases of echogenicity of liver. Grade I fatty liver means increased hepatic echogenicity with visible periportal and diaphragmatic echogenicity. Increased hepatic echogenicity with imperceptible periportal echogenicity, without obscuration of diaphragm is classified as Grade-II while increased hepatic echogenicity with imperceptible periportal echogenicity and obscuration of diaphragm is termed as Grade-III.Each patient was scanned by a qualified sonologist using Toshiba Xario-Prime Ultrasound machine to confirm the findings of liver. Cholesterol level was measured by taking fasting blood sample level and processing it in Microlab-300 (semi-automation) machine and applying 546 wave length filter.

Statistical analysis: The data was analyzed using SPSS 23, by finding the linear association between the cholesterol level and grade of fatty liver appearance on ultrasound. Cholesterol level above 200mg/dl was taken as hypercholesterolemia. Chi-square was applied on total cholesterol and degree of fatty changes which showed a P value <0.001 (highly significant).

RESULTS

Out of 100 patients included in the study, 51% of the patients had Grade 1 (mild fatty) disease, 33% had grade-II (moderate fatty) disease while 16% of the patients were found to be having grade-III (severe fatty) disease (Table-I). In 51% of the patients with grade I disease, mean cholesterol level was 191mg/dl (Fig. I). In 33% patients with grade II disease, mean cholesterol level was 226mg/dl (Fig. II). 16 patients with grade III disease showed mean cholesterol value of 253mg/dl (Fig. III). Mean cholesterol level for all the 100 patients included in the study was 213mg/dl, minimum levels were 156mg/dl while maximum were 298mg/dl (Table II). Age Distribution for patients included in the study is given in table-IV. Liver was measured with patient lying supine and placing the probe in right midaxillary line.

Table I: Degree of fatty change

Grade	Frequency	%age
Grade-I (Mild Fatty)	51	51.0
Grade-II (Moderate Fatty)	33	33.0
Grade-III (Severe Fatty)	16	16.0

Table II: Total Cholesterol

Mean	213.14
Std. Error of Mean	3.986
Minimum	156mg/dl
Maximum	298mg/dl

Table III: Mean serum cholesterol level & liver size according to grade of fatty liver

	Mean Serum Cholesterol Levels	Mean Size of Liver
Grade I (Mild Fatty)	191mg/dl	16.4cm
Grade II (Moderate Fatty)	226mg/dl	15.8cm
Grade III (Severe fatty)	253mg/dl	15.4cm

Table-IV

	Frequency	%age
30-39 Yrs	16	16.0
40-49 Yrs	50	50.0
50-59 Yrs	26	26.0
60-70 Yrs	8	8.0

Fig. I: Degree of fatty change

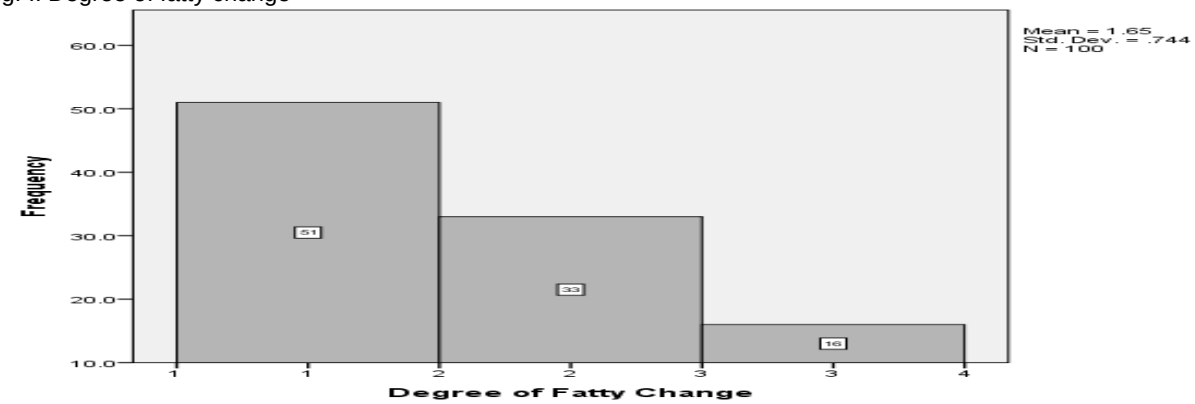


Fig. II: Mean, Minimum & Maximum serum Cholesterol levels in grade-II disease patients.

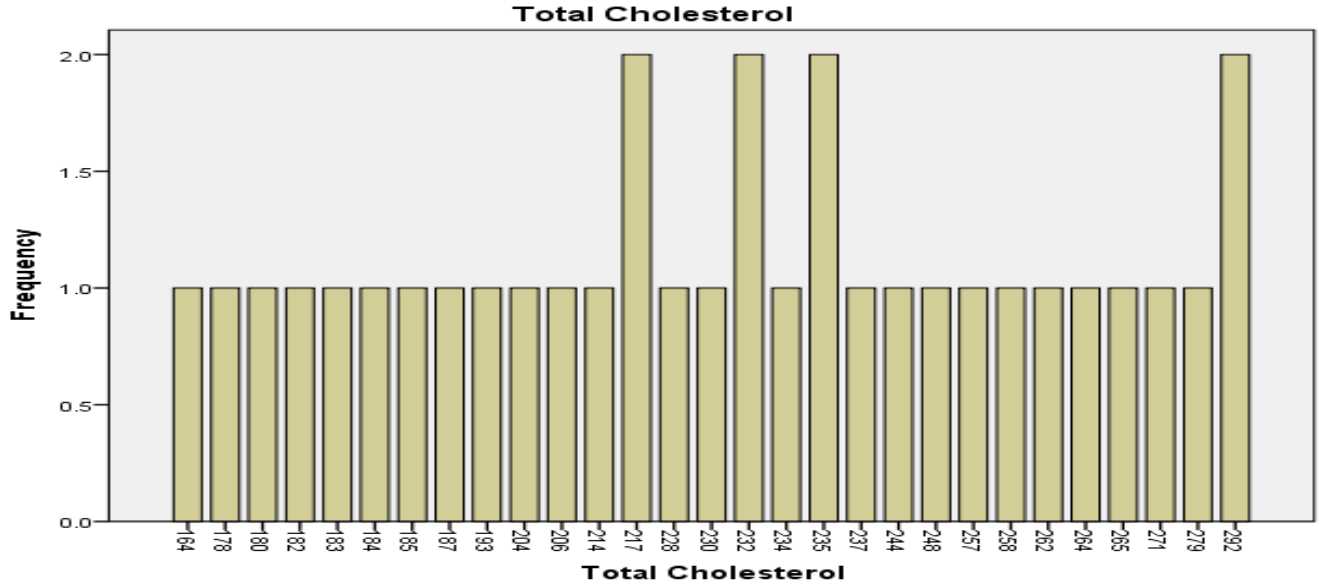


Fig. III: Mean, Minimum & Maximum serum Cholesterol levels in grade-III disease patients.

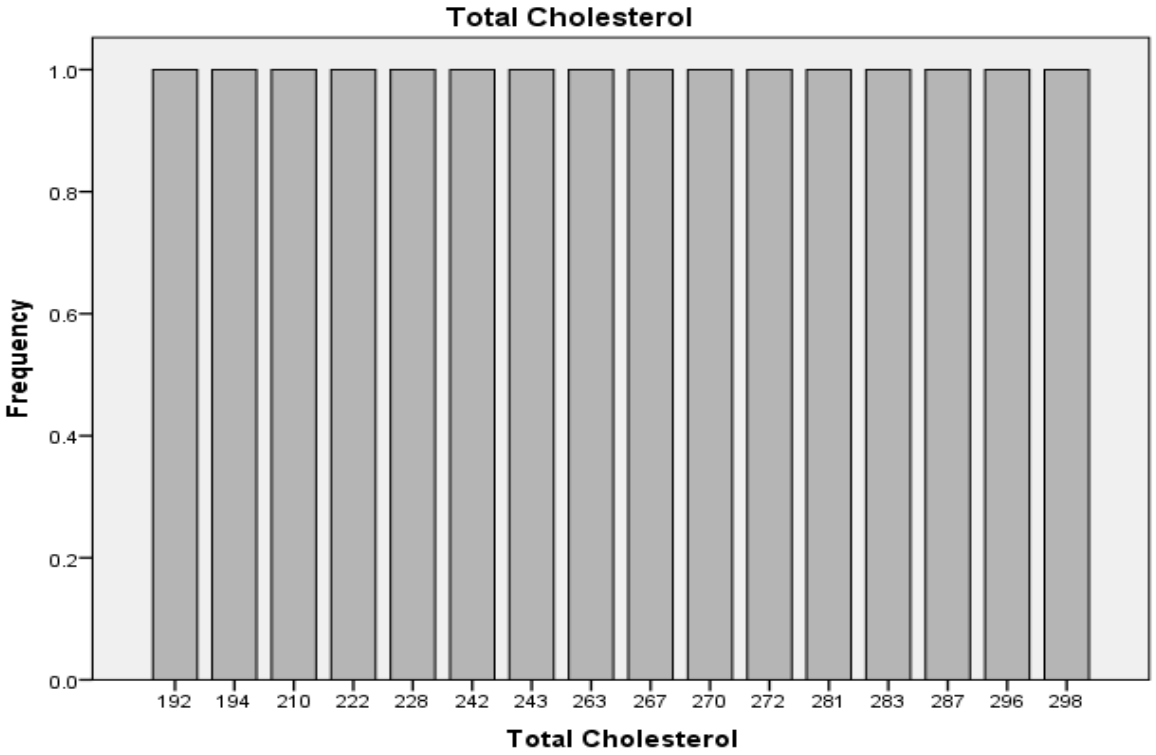
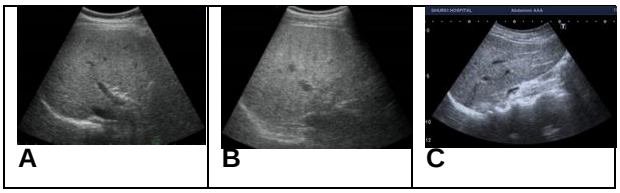


Fig. IV: A. Ultrasound abdomen shows Grade-1(mild fatty) disease in 26yrs old patient. B. Grade-II (moderate fatty liver) disease seen in a 30yrs old patient. C. Grade-III (severe fatty liver) seen in a 40yrs old patient.



DISCUSSION

The main objective of this study was to characterize Non-alcoholic fatty liver disease (NAFL) relative to cholesterol level using ultrasound; in order to predict the associated problems or the potential one as early as possible. The data was divided into three groups according to degree of fatty changes as mild fatty liver (Grade I), moderate fatty liver (Grade II), and Sever fatty liver (Grade III)[5]. The mean liver sizes of these groups were 16.4cm, 15.8cm and 15.4cm respectively, while their mean cholesterol levels were 191mg/dl, 226mg/dl and 253mg/dl respectively (Table 3). The result of this study showed that, there is a linear relation between cholesterol level and degree of fatty changes. Serum cholesterol level above 200mg/dl was taken as hypercholesterolemia. This result agrees with Wei, where he found that hypercholesterolemia related to NAFLD[6]. Sen also found that the total cholesterol level was significantly higher among liver grade 3 and then grade 2, and 1 respectively[4]. The two tailed (t-test) done to find if there is significant difference in cholesterol level and degree of fatty change shows p value of <0.001. Comparing the similar result with Luximi there was a strong association of NAFLD with total cholesterol[7]. Sonographic evaluation of fatty liver grades is shows in figure IV.

CONCLUSION

The result of this study showed there was convincing correlation between NAFLD and cholesterol levels. The main limitation of this study is the small sample size. The recommendations from this study are that the sample size should be greater and further studies can be done on effect of LDL and HDL levels on liver. Ultrasound should be performed as a routine examination for every patient with deranged serum cholesterol levels, to identify and control the complications which can happen due to NAFLD. NAFLD disease has potential serious complication, so it is important for people to follow healthy eating habits.

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