Original Article

Prevalence of Ultrasound Diagnosed Fatty Liver Disease in Adult Patient in a Hospital in North West of Pakistan: A Community-Based Study

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ABSTRACT

Objective: To find the prevalence of ultrasound-diagnosed fatty liver disease in adult patients in a hospital in the northwest of Pakistan.

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the Combined Military Hospital, Nowshera from October 2021 to April 2021.

Materials and Methods: Each subject underwent an ultrasound examination by radiologists with a 3.5 MHz probe. This is a study based on the relationships between hepatic structure and the lab investigations related to metabolic disorders like LDL, HDL, Cholesterol, and TG. Standard deviation (SD) and mean with SPSS 20 were used to express the data. The cutoff for significance was ≤0.05.

Results: 500 patients were included in this study and 148 adult patients were diagnosed with fatty liver disease (FLD) with a mean age of 43.23± 14.22 years, out of which 84 were males (56.8%) and 64 were females (43.2%). 62 (41.9%) out of 148 patients had grade 1 fatty changes on ultrasound, 65 (43.9) had grade 2, and 21(14.2) had grade 3 fatty liver disease.

Conclusion: Fatty liver disease is frequently diagnosed in patients referred for abdominal ultrasound examination, it was also observed that fatty liver disease is a hepatic manifestation which associated with metabolic syndrome as all indicators of metabolic syndrome found deranged.

Key Words: Fatty Liver Disease, Metabolic Syndrome, Cholestrol

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INTRODUCTION

Nonalcoholic fatty liver disease (NAFLD) has been identified as a major public health issue and is a well-known cause of chronic liver disease all over the world [1]. It is thought to affect 20% to 40% of the general population and is the most common liver condition in Western nations.

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It was once believed to be rare in Asia, but prevalence has increased quickly, reaching up to 30% of the general population [2]. Around ten years ago, the estimated prevalence of NAFLD in Western nations was, respectively, 25% and 34% in Italy and the USA. NAFLD would be a frequent disorder in Malaysia.Diabetes mellitus (DM), overweight, and obesity has all been reported to be on the rise in Malaysia.

Until it progresses to inflammation and fibrosis, simple hepatic steatosis is still regarded as a benign condition [3]. NAFLD disease is shown by fat buildup in hepatocytes that is greater than 5% of the weight of the wet liver without alcohol consumption. Without a history of alcohol consumption, NAFLD alterations resemble those seen in alcoholic fatty disease of the liver [4].

Nonalcoholic fatty liver disease (NAFLD) is the most common liver disease, with prevalence estimates of 20–30% in the general population of Western nations [5]. Simple steatosis and nonalcoholic steatohepatitis (NASH) are two subtypes of the histological spectrum of diseases known as NAFLD [6]. It was first believed to be a benign disorder, but it is now more and more

understood to be a significant contributor to liver-related morbidity and mortality. A person's chance of developing type 2 diabetes mellitus, atherosclerotic cardiovascular disease (ASCVD), and chronic renal disease is significantly increased by metabolic syndrome [7].

Central obesity, disorders of lipid metabolism, elevated systolic blood pressure, elevated plasma glucose, along with pro-inflammatory state appear to be the most significant underlying risk factors [8].

Because of the tight relationship between the two illnesses, metabolic syndrome (MS) and non-alcoholic fatty liver disease (NAFLD) are now regarded as having a hepatic component. Diabetes mellitus, obesity, and other metabolic risk factors are becoming more common, which is raising the prevalence of NAFLD in Asia [9]. On long-term follow-up, patients with NAFLD are at risk for cardiovascular disease and an increased prevalence of diabetes mellitus in addition to liver-related morbidity and mortality. Obesity, the metabolic syndrome (MetS), and cardiovascular risk factors all have a strong correlation with NAFLD, which is more prevalent in obese patients [10]. Nevertheless, despite having a body mass index (BMI) that is generally within the normal range, a lesser but still considerable percentage of people acquires NAFLD [11]. The main objective of the study is to find the incidence of fatty liver diagnosed by ultrasonography in adult patients in a hospital in the northwest of Pakistan.

MATERIALS AND METHODS

This cross-sectional study was conducted at Combined Military Hospital Nowshera from October 2021 to April 2021. In this study, we focus on finding the prevalence of fatty liver disease and its association with metabolic syndrome. We looked specifically at associations between hepatic histology and LDL, HDL, cholesterol, and TG, four indicators of the metabolic syndrome. All the patients presenting to the outdoor department during the study period having hypertension (blood pressure >150/90 mmHg), diabetes mellitus (Hba1c > 7 %) were subject to ultrasonography and the diagnosis of NAFLD was made.

The existence of macrovesicular steatosis, lobular inflammation (with or without), hepatocellular degeneration, and fibrosis were all determined by the ultrasound results. Additionally to having normal copper and iron levels, all individuals tested negative for viral hepatitis. All participants consumed 14 standard drinks of alcohol each week.

In this investigation, individuals were screened using an ultrasound machine with a 3.5 MHz probe. Each subject underwent an ultrasound examination by radiologists with at least ten years of experience. NAFLD was identified based on two of the following criteria: decreased visualization of intrahepatic vascular walls, decreased liver echogenicity (brighter liver) in comparison to the right renal cortex and spleen, and poor visualization of the diaphragm and posterior right liver lobe. In order to grade liver biopsies, a pathologist who was blind to the patient's details assigned a score ranging from zero to four for the previously mentioned fibrosis, steatosis, and inflammation. All biopsies were stained with Masson's Trichrome for additional fibrosis assessment, and the percentage of fibrosis was assessed in three replicates by microscopic examination and image analysis, and was represented as mean & percentages. Using SPSS 20, the data from the various baseline variables was examined. SD and mean were used to express the data. The cutoff for significance was 0.05.

RESULTS

A total 500 patients were included in this study A section of 148 (29%) adult patients were diagnosed with fatty liver disease (FLD). In these 148 patients, the mean age of 43.23± 14.22 years, out of which 84 were males (56.8%) and 64 were females (43.2%). 62 (41.9%) out of 148 patients had grade 1 fatty changes on ultrasound, 65 (43.9) had grade 2, and 21 (14.2) had grade 3 fatty liver disease. Statistical tests were applied to compute relationships between the Grades of fatty changes and diabetes mellitus, lipid profile, BMI and serum AST, ALT and ALP. After applying the one way anova test it was found that the serum values of ALT, AST and ALP were significantly higher in patients with grade 3 fatty liver disease changes on ultrasonography as compared to those with grade 1 fatty changes (p-value <0.001).

Mean serum ALT levels in patients with grade 1 FLD changes were 57.14U/L, in grade 2 were 75.6 U/L and grade 3 were 101.5 U/L. Mean serum AST levels in patients with grade 1 FLD changes were 53.12 U/L, in grade2 were 55.6U/L and in grade 3 were 74.3U/L. Mean serum ALP levels in patients with grade 1 FLD changes were 97.2U/L, in grade 2 were 207U/L and in grade 3 were 279 U/L. Similarly, a significant relationship was found between diabetes mellitus and the grade of fatty liver disease (p<0.001). 80% of the patients with diabetes for more than 10 years had grade 3 fatty changes. 50% of the patients with diabetes for 5 to 10 years had grade 3 fatty changes whilst only 5% of patients with no history of diabetes had grade 3 FLD changes. Similarly a significant relationship was found between BMI and the grade of fatty liver disease (p<0.001). 100% of obese patients had grade 3 fatty liver changes on USG, whereas 7.8% of overweight patients had grade 3 fatty liver disease changes and a mere 4.2% of normal BMI patients had grade 3 fatty liver changes on USG. Similarly, a significant relationship was found between lipid profile and the grade of fatty liver disease (p=0.02). 51% of the patients having grade 3 fatty liver disease had deranged lipid profiles whereas 32.4% of patients with grade 2

FLD had deranged lipid profiles and 16% of patients with grade 1 FLD had deranged lipid profiles.

Table No.1: Relation of FLD grades on USG with Serum liver enzyme levels

LFT's Levels	Grade I	Grade II	Grade III	P-value
ALT U/L	57.174± 8.9	75.6± 22.6	101.52± 11.6	<0.001
AST U/L	53.129± 4.4	55.6923± 10.5	74.30± 11.8	<0.001
ALP U/L	97.22± 28.2	207.7± 52.7	279.52± 46.14	<0.001

Table No.2: Relation of USG Grades of FLD with Diabetes Mellitus

Diabetes Mellitus	Fatty liver on USG			P- Value
	Grade 1	Grade 2	Grade 3	
No	59(50%)	53(45%)	6(5%)	<0.001
<5Years	3(33%)	3(33%)	3(33%)	
5-10Years	0	8(50%)	8(50%)	
>10years	0	1(20%)	4(80%)	

Table No.3: Relation of fatty liver disease with BMI (body mass index)

Body Mass Index (BMI)	Fatty liver on USG			P-Value
	Grade1	Grade2	Grade 3	
Normal	37(79%)	8(17%)	2(4.2%)	<0.001
Overweight	25(28%)	57(64%)	7(7.8%)	
Obese	0	0	12(100%)	

Table No.4: Relation of fatty liver disease with Lipid profile

Lipid Profile	Fatty liver on USG			P- Value
	Grade 1	Grade 2	Grade 3	
Normal	56(50%)	53(47%)	2(1.8%)	0.02
Deranged	6(16%)	12(32.4)	19(51%)	

DISCUSSION

The fifty patients included in this study were having the fatty liver disease (non-alchohol) and they were studied to see a co-relation of metabolic disorders with the prevalence of fatty liver disease. While measurements of adiposity were connected with hepatic steatosis, the prevalence and severity of the metabolic syndrome were correlated with hepatic inflammation and fibrosis [12]. This finding has practical ramifications because liver biopsies are now used to confirm the diagnosis and provide a prognosis [13], while hepatic ultrasonography and liver function tests have limited value in foretelling hepatic swelling and fibrosis. We propose that characteristics of the metabolic syndrome might serve as a better indicator of which individuals should be taken into account for a biopsy and subsequent targeted therapy [14].

NAFLD in its entirety, from pure fatty liver to nonalcoholic steatohepatitis (NASH), has come to light in recent investigations as a potential additional MS characteristic. Insulin resistance and hyperinsulinemia play a significant role in the development of both MS and nonalcoholic fatty liver, according to pathophysiologic considerations, clinical correlations, and laboratory research [15]. The findings of studies revealed that NAFLD is characterised by clinical and laboratory findings that are comparable to those of hyperglycemia and obesity, such as reduced insulin sensitivity and lipid metabolic anomalies [16] in the presence of normoglycemia and normal or mildly increased body weight.

90% of people with NAFLD have at least one risk factor for MS, and 33% have all of its symptoms. Independent of age, gender, and body mass index, the study found that people with MS had considerably higher liver fat content than those without the illness[17]. The prevalence of metabolic syndrome increased from 18% in people of normal weight to 67% in people who were obese in 304 NAFLD patients without diabetes mellitus[18]. A possibly progressive, severe liver disease is linked to the existence of various metabolic disorders such diabetes mellitus, obesity, dyslipidemia, and hypertension[19–21]. 30–100% of people with NAFLD19 have obesity. Steatosis is 4.6 times more common in obese people than in people of normal weight [22].

CONCLUSION

Fatty liver disease is frequently diagnosed in patients referred for abdominal ultrasound examination, it was also observed that fatty liver disease is a hepatic manifestation which associated with metabolic syndrome as all indicators of metabolic syndrome found deranged.

Recommendation: For correctly diagnosing NAFLD and all other medical liver illnesses, a thorough USG evaluation, careful consideration of clinical and laboratory parameters, and effective communication with the ultrasonologist are essential.

Author's Contribution:

Concept & Design of Study:	Sardar Muhammad Daud Khan
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Revisiting Critically:	Sardar Muhammad Daud Khan, Naila Mumtaz
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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