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Original Research

Evaluation of fatty liver disease with USG and CT scans

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ABSTRACT:
Background: Fatty liver disease, also known as hepatic steatosis, is characterized by fat accumulation in liver cells. The present study was conducted to evaluate fatty liver disease with USG and CT scans. **Materials & Methods:**84 cases of fatty liver disease of both genders were examined through ultrasonography (USG) and CT scan. **Results:** Out of 84 patients, males were 50 and females were 34. Fatty liver disease grading was grade I in 22, grade II in 28 and grade III in 34 patients. The difference was significant (P< 0.05). Liver CTHFN mean HU in grade I was 41.5 HU, in grade II was 25.8 HU and in grade III was 5.4 HU. The difference was significant (P< 0.05). **Conclusion:** Findings from the USG and CT scan were useful in the diagnosis of fatty liver disease.Because of its low cost, safety, and accessibility, ultrasound is likely the imaging technique of choice for screening for fatty liver disease.
Keywords: Fatty liver disease, hepatic steatosis, USG

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INTRODUCTION

Fatty liver disease, also known as hepatic steatosis, is characterized by fat accumulation in liver cells. There are two main types of fatty liver disease- non-alcoholic fatty liver disease (NAFLD) and alcoholic fatty liver disease (AFLD).[1]Simple fatty liver (Steatosis) is the early and reversible stage of NAFLD. Fat accumulates in the liver, but no inflammation or liver damage exists. Lifestyle changes like a healthy diet and regular exercise can often reverse this condition.[2]Non-alcoholic steatohepatitis (NASH) is a more severe form of NAFLD where inflammation and liver cell damage are present. NASH can progress to cirrhosis and liver failure if not managed properly.This condition is caused by excessive alcohol consumption. Like NAFLD, it can range from simple fatty liver to more severe forms of liver damage.[3]

Depending on the definition and methods used for detection, the prevalence of NAFLD in industrialized nations like the United States and Australia is believed to be over 30% of adults. Though previously believed to be at low risk, Asia is also seeing an increase in NAFLD cases; in China, a prevalence of up to 15% has been recorded.The most typical way that NAFLD manifests itself is when aberrant LFTs are accidentally discovered.[4] Raised gamma-glutamyltransferase (GGT), elevated ALT and AST, with a preserved ALT: AST ratio of 1.5, and occasionally elevated alkaline phosphatase (ALP) are typical findings in non-alcoholic fatty liver disease (NAFLD).[5] Liver attenuation/Computed Tomographic Hounsfield numbers (CTHFN), given in Hounsfield Units (HU), can be measured using Computed Tomography (CT) to quantitatively indicate liver fat content.[6]The present study was conducted to evaluate fatty liver diseasewithUSG and CT scans.

MATERIALS & METHODS

The present study consisted of 84 cases of fatty liver disease of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Xario ultrasonography (USG) with a 3.5 MHz probe was used to scan patients when they were supine or in the left lateral decubitus posture. Grade 0-normal echogenicity, Grade I-mild diffuse rise in echogenicity, Grade II-moderate diffuse increase in

echogenicity, and Grade III-noticeable increase in echogenicity were the diagnoses for the severity of FLD. Patients underwent additional testing, including a 64-slice dual-source CT scan. Supine positions were used for patient scanning. The procedure used was unenhanced CT (80–140 kV, 100–300 mAs, 5 mm section thickness). Regions of interest (ROIs) varying in size from 50 to 100 mm2 were randomly selected to determine the CTHFN of liver attenuation values. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 84		
Gender	**Males**	**Females**
Number	50	34

Table I shows that out of 84 patients, males were 50 and females were 34.

Table II Assessment of USG grading of fatty liver disease

Grading	Percentage	P value
Grade I	22	0.18
Grade II	28	
Grade III	34	

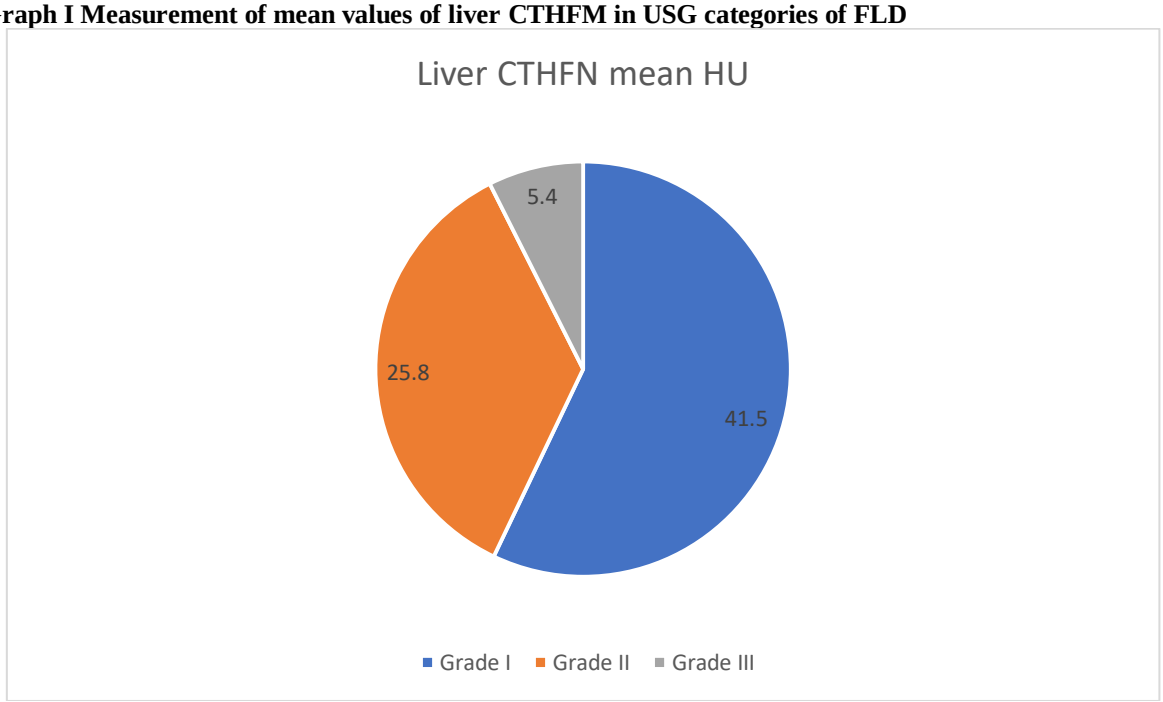
Table II shows that fatty liver disease grading was grade I in 22, grade II in 28 and grade III in 34 patients. The difference was significant (P< 0.05).

Table III Measurement of mean values of liver CTHFM in USG categories of FLD

Grading	Liver CTHFN mean HU	P value
Grade I	41.5	0.01
Grade II	25.8	
Grade III	5.4	

Table III, graph I shows that liver CTHFN mean HU in grade I was 41.5 HU, in grade II was 25.8 HU and in grade III was 5.4 HU. The difference was significant (P< 0.05).

Graph I Measurement of mean values of liver CTHFM in USG categories of FLD



DISCUSSION

Fatty liver is the accumulation of fat (i.e., macro-vesicular steatosis) within the hepatic parenchyma. Nonalcoholic fatty liver disease (NAFLD), the presence of fat infiltration in the liver in the absence of excessive alcohol consumption and other causes of liver disease, is the most common cause of fatty liver, with a prevalence as high as 30% in many populations.[7]NAFLD may lead to fibrosis, cirrhosis, liver cancer, liver failure requiring liver transplant, and mortality, and it is associated with type 2 diabetes, metabolic syndrome, and other

cardiovascular risk factors.[8] Although NAFLD represents a major public health challenge, its natural history and determinants are incompletely understood because of limitations in diagnostic technologies and because this condition is often asymptomatic until very late, severe complications occur.[9]The present study was conducted to evaluate fatty liver disease with USG and CT scans.

We found that out of 84 patients, males were 50 and females were 34. Fatty liver disease grading was grade I in 22, grade II in 28 and grade III in 34 patients. Riley et al[10]tested whether ultrasound can be used to diagnose nonalcoholic fatty liver disease (NAFLD) utilizing a prototype. Of 20 patients shown by liver biopsy to have NAFLD, 16 were successfully predicted by comparison to the prototype (sensitivity 80%). In 94 of 95 cases, ultrasound predicted those without NAFLD (specificity 99%). The positive predictive value was 94% and negative predictive value 96%. Training results showed substantial agreement with a kappa score of 0.76 with 95% of cases identified correctly.

We found that liver CTHFN mean HU in grade I was 41.5 HU, in grade II was 25.8 HU and in grade III was 5.4 HU.Boyce etal[11] found high prevalence of FLD in males as compared to females. They found prevalence of FLD in grade I, II and III in 51.5%, 40.4% and 8.6% patients respectively. CT can measure the degree of FLD quantitatively. It employs attenuation values to estimate liver fat content. There is a reduction in Liver attenuation with an increase in intrahepatic fat content. Many studies have shown a decrease in CTHFN with increase in severity of FLD. Unenhanced normal Liver parenchyma has CTHFN (attenuation) values in the range of 50 to 65HU, typically 8-10HU greater than liver. Unenhanced CT has sensitivity of 43-95% and a specificity of 90-100% for detection of Liver Steatosis.

Hamaguchi et al[12]evaluated the association among metabolic syndrome, visceral fat accumulation, and the severity of fatty liver with a new scoring system of ultrasonographic findings in apparently healthy adults.Subjects consisted of 94 patients who received liver biopsy and 4,826 participants who were selected from the general population. Two hepatologists scored the ultrasonographic findings from 0 to 6 points. Within-observer reliability was 0.95 and between-observer reliability was 0.95. The AUC to diagnose NAFLD was 0.980. The sensitivity was 91.7% and the specificity was 100%. The AUC to diagnose visceral obesity was 0.821. The sensitivity was 68.3% and the specificity was 95.1%. The adjusted odds ratio of the score for the metabolic syndrome was 1.37.

The limitation of the study is the small sample size.

CONCLUSION

Authors found that findings from the USG and CT scan were useful in the diagnosis of fatty liver disease.Because of its low cost, safety, and accessibility, ultrasound is likely the imaging technique of choice for screening for fatty liver disease.

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