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Assessment of cases of fatty liver disease using USG and CT scan

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Abstract
Background: Fatty Liver Disease (FLD) also known as Hepatic Steatosis (HS) is identified by the abnormal build-up of lipids particularly triglyceride in the cytoplasm of hepatocytes. The present study was conducted to assess fatty liver disease using USG and CT scan.
Materials & Methods: 130 cases of fatty liver disease in both genders were thoroughly examined and underwent Ultrasonography (USG) and CT Scan.
Results: Out of 130 patients, males were 78 and females were 52. FLD grading was grade I in 76, grade II in 34 and grade III in 20 patients. The difference was significant (P< 0.05). Liver CTHFN Mean HU in grade I was 42.6 HU, in grade II was 25.2 HU and in grade III was 3.8 HU. The difference was significant (*P*<0.05).
Conclusion: Both CT scan and USG findings were helpful in diagnosis of cases of fatty liver disease.

Keywords: fatty liver disease, CT scan, USG

Introduction
Fatty liver disease (FLD) also known as hepatic steatosis (HS) is identified by the abnormal build-up of lipids particularly triglyceride in the cytoplasm of hepatocytes. In Asia, the prevalence of FLD ranges from 12–24% with most estimates within the range of 6–14% in the general population [1]. NAFLD covers a spectrum of liver disease from steatosis to non alcoholic steatohepatitis (NASH) and cirrhosis.[2] According to the American Association for the Study of Liver Diseases, NAFLD is defined as fat accumulation in the liver exceeding 5% to 10% by weight, as determined from the percentage of fat-laden hepatocytes by light microscopy. Steatosis attributable to NAFLD is typically macrovesicular rather than microvesicular [3].
The prevalence of NAFLD is estimated to be approximately 30% of adults in developed countries such as Australia and the United States, depending on definition and detection methods. However, NAFLD is also becoming increasingly common in Asia (countries previously thought to be at low risk of NAFLD), where a prevalence of up to 15% has been reported in China [4].
The most common presentation of NAFLD will be incidental finding of abnormal LFTs. Typical findings in NAFLD are raised ALT and AST, with a preserved ALT: AST ratio of 1.5, raised gamma glutamyl transferase (GGT) and, occasionally, raised alkaline phosphatase (ALP). Computed Tomography (CT) can represent Liver fat content quantitatively by measuring Liver attenuation/Computed Tomographic Hounsfield numbers (CTHFN) expressed in Hounsfiled Units (HU). Liver attenuation of 30% liver fat content reliably [5]. The present study was conducted to assess fatty liver disease using USG and CT scan.

Materials & Methods
The present study comprised of 130 cases of fatty liver disease in both genders. All were made aware of the study and their written consent was obtained.
Information such as name, age, gender etc. was recorded. All were thoroughly examined. Ultrasonography (USG) with Toshiba Xario with 3.5MHZ probe at both centers was used to scan patients in supine and left lateral decubitus position. The severity of FLD was diagnosed as Grade 0- normal echogenicity, Grade I – Mild diffuse increase in echogenicity, Grade II - Moderate diffuse increase in echogenicity, Grade III - Noticeable increase in

echogenicity. Patients further were subjected to CT Scan taken with Siemens 64 slice dual source machine. Patients were scanned in supine position. Unenhanced CT (80-140 kV, 100-300 mAs, 5mm section thickness) was be performed. CTHFN of liver attenuation values were measured using random selection of regions of interest (ROIs) ranging from 50 to 100 mm^2. Results were of the study was assessed. P value less than 0.05 was considered significant.

Results

Table 1: Distribution of patients

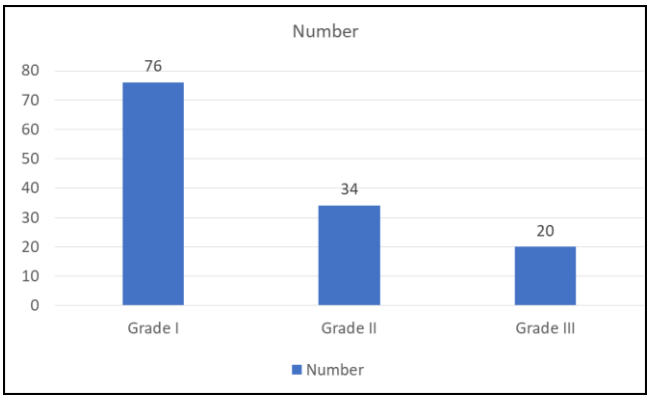
Total- 130		
Gender	**Males**	**Females**
Number	78	52

Table 1 shows that out of 130 patients, males were 78 and females were 52.

Table 2: USG grading of FLD

Grading	Number	P value
Grade I	76	0.02
Grade II	34	
Grade III	20	

Table 2, graph 1 shows that FLD grading was grade I in 76, grade II in 34 and grade III in 20 patients. The difference was significant (P< 0.05).



Graph 1: USG grading of FLD

Table 3: Mean values of Liver CTHFM in USG categories of FLD

Grading	Liver CTHFN Mean HU	P value
Grade I	42.6	0.02
Grade II	25.2	
Grade III	3.8	

Table 3 shows that liver CTHFN mean HU in grade I was 42.6 HU, in grade II was 25.2 HU and in grade III was 3.8 HU. The difference was significant (P< 0.05).

Discussion

A definitive diagnosis of NAFLD depends on three factors such as evidence of fatty infiltration from either imaging (ultrasound, magnetic resonance imaging [MRI]) or histology (liver biopsy), exclusion of significant alcohol consumption, exclusion of other causes of hepatic steatosis (eg. medications, surgery, metabolic disorders) [6]. Confirming hepatic fatty infiltration using ultrasound is important. Specificity is high (95%), but the sensitivity of ultrasound for detecting fatty infiltration is lower (85%) [7]. Ultrasound is also useful to look for signs of cirrhosis, such as irregular liver edge, but has a sensitivity of only 43–74% (specificity is slightly higher at 54–89%) [8]. Signs of cirrhotic complications are also important, eg. signs of portal hypertension (splenomegaly, increased portal vein size, varices) or other complications such as HCC, portal vein thrombosis, or ascites. These findings commonly occur in the setting of features of the metabolic syndrome. There are several features on examination and laboratory values that should raise suspicion of cirrhosis, such as spider naevi, low or falling platelets, low albumin or reversal in ALT:AST ratio (where AST exceeds ALT), before the features of portal hypertension and decompensation become obvious [9]. The present study was conducted to assess fatty liver disease using USG and CT scan.

In present study out of 130 patients, males were 78 and females were 52. Eifler *et al*. [10] included 227 patients of FLD who underwent both CT and USG scans of abdomen and with Ultrasonographic diagnosis of diffuse FLD was included. The USG categories of FLD were compared with mean Liver CTHFN. The mean age of population was 49.88 ± 14.52 years. The frequency of male population was 141(62.11%) and female was 86 (37.89%). The mild, moderate and severe FLD was found in 159 (70.04%), 50(22.03%) and 18(7.93%) patients respectively. The mean values of Liver CTHFN in mild, moderate and sever FLD categories by USG were 42.08 ± 5.07 HU, 24.41 ± 4.19 HU and 3.09 ± 6.64 HU respectively. These values along with P values and 95% Confidence Interval (CI). In multiple comparison the Least Significant Difference (LSD) of USG categories of FLD with mean Liver CTHFN, p value was significant when mild FLD was compared with moderate and severe FLD, moderate FLD was compared with mild and severe FLD and severe FLD was compared with mild and moderate FLD.

We found that FLD grading was grade I in 76, grade II in 34 and grade III in 20 patients. We observed that liver CTHFN Mean HU in grade I was 42.6 HU, in grade II was 25.2 HU and in grade III was 3.8 HU. Hernaez R *et al*. [11] conducted a met-analysis on 49 studies and reported sensitivity and specificity of USG for detection of moderate-severe FLD as compared to histology (gold standard) 84.8% and 93.6% respectively. Latest studies comparing USG with histopathology have confirmed that it is a pertinent non-invasive tool for evaluation of FLD and intends Grade 0 or 1 do not require biopsy.

Boyce *et al*. [12] 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 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. There are many studies which 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 specificity of 90-100% for detection of Liver Steatosis.

Conclusion

Authors found that both CT scan and USG findings were

helpful in diagnosis of cases of fatty liver disease.

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