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Original Research Article.

Evaluation of Liver Ultrasound for the Diagnosis of Nonalcoholic Fatty Liver Disease (NAFLD) in Obese Patients: A Clinical Study

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ABSTRACT

Background: In the present scenario, the best quality level for diagnosing NAFLD is liver biopsy. In any case, liver biopsy is obtrusive and may cause genuine complexities - a technique not reasonable for screening NAFLD. Liver ultrasonic scanning is one of the regular techniques for diagnosing NAFLD, yet this strategy can be effectively influenced by subjective components. Hence; under the light of above mentioned data, we planned the present study to clinically assess the liver ultrasound findings in the diagnosis of NAFLD in obese patients.

Materials & Methods: The present study clinical assessment of liver ultrasound for diagnosis of NAFLD in obese patients. A total of 100 patients were included in the present study. We obtained completed demographic and clinical details of all the patients. Liver biopsy was performed in all the patients. On the day of liver biopsy, after overnight fasting, liver ultrasound was done in all the patients. Detailed and descriptive data of all the liver ultrasound reports was obtained. Scoring of fatty liver parameter was done. All the results were evaluated by SPSS software.

Results: Mean NAFLD activity score of the patients was 3.8. Mean fibrosis stage was 0.8. It was observed that echographic total score showed a considerable correlation with the steatosis grade.

Conclusion: Ultrasound has certain limitations in relation to diagnosing and observing time dependent alterations of hepatic steatosis in NAFLD patients.

Key words: Nonalcoholic Fatty Liver Disease, Obesity, Ultrasound.

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INTRODUCTION

One of the important cardiovascular risk factor is NAFLD, which is defined as more than five percent intracytoplasmic deposition of liver without alcohol consumption history, along with absence of toxic exposure or viral disease.[1-3] Since, in this condition, there is presence of a possible progressive score, assumption of a benign prognosis should not be made. Due to increase in prevalence of NAFLD, all these factors are particularly disturbing. This has been attributed to the increased lifespan and the upsurge in obesity but these associations are not clinically well substantiated. For example, the presence of moderate NAFLD is common in young patients with morbid obesity.[4-6] In the present scenario, the best quality level for diagnosing NAFLD is liver biopsy. In any case, liver biopsy is obtrusive and may cause genuine complexities - a technique not reasonable for screening NAFLD. Liver ultrasonic scanning is one of the regular techniques for diagnosing NAFLD, yet this strategy can be effectively influenced by subjective components; thus, this strategy can't precisely identify liver fat substance. Thus, it is hard to analyse NAFLD at a beginning period. In any case, with the advancement of computer innovation, it is presently conceivable to quantitatively decide liver fat substance by the ultrasound hepatic/renal proportion.[5-7] Hence; under the light of above mentioned data, we planned the present study to clinically assess the liver ultrasound findings in the diagnosis of NAFLD in obese patients.

MATERIALS & METHODS

The present study was planned in the Department of Radiology, Rama Medical College and Hospital, Hapur, Uttar Pradesh (India)

and it included clinical assessment of liver ultrasound for diagnosis of NAFLD in obese patients. We obtained ethical approval from institutional ethical committee and also obtained written consent from all the patients after explaining in detail the entire research protocol. A total of 100 patients were included in the present study. Inclusion criteria for the present study included:

- Patients in between age group of 20 years to 60 years,
- Patients with absence of any form of liver disorder or pathology other than NAFLD/NASH
- Patients with negative history of any other systemic illness,
- Patients with negative history of alcohol consumption habit

We obtained completed demographic and clinical details of all the patients. We screened all the patients for the presence of NAFLD and T2DM by means of a 1 H-MRS and an oral glucose tolerance test (OGTT) respectively based on criteria given previously in the literature.[8] Liver biopsy was performed in all the patients. On the day of liver biopsy, after overnight fasting, liver ultrasound was done in all the patients. Detailed and descriptive data of all the liver ultrasound reports was obtained. Following parameters of the ultrasound were used for evaluation of fat scorers based on criteria given previously in the literature:[9]

- Parenchymal echogenicity,
- Far gain attenuation in right intercostal view at posterior axilla line,
- Gallbladder wall blurring in right sagittal subcostal view,
- Portal vein blurring in right intercostal view at anterior axilla line, and
- Hepatic vein blurring in right intercostal view at middle axilla line

Scoring of each parameter was done as 0, 1 or 2 and a fatty score was obtained. All the results were evaluated by SPSS software. Student t test and chi- square test were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

In the present study, we analyzed a total of 100 subjects with NAFLD. Mean age of the subjects was 52.5 years. Out of 100, 75 subjects were males and the remaining 25 were females. Mean BMI of the subjects was 35.2 Kg/m^2. Mean NAFLD activity score of the patients was 3.8. Mean fibrosis stage was 0.8. Sensitivity of ultrasound fatty score and parenchymal echogenicity for the diagnosis of NAFLD is shown in Graph 1. Table 2 shows the correlation analysis between ultrasound parameters and histopathologic features. It was observed that echographic total score (sum of the five parameters) showed a considerable correlation with the steatosis grade ($P < 0.001$).

Table 1: Demographic and clinical details of the patients

Parameter	Number
Mean age (years)	52.5
Males	75
Females	25
BMI (Kg/m^2)	35.2
Prevalence of obesity (percent)	79
NAFLD activity score (NAS)	3.8
Fibrosis stage	0.8

Graph 1: Sensitivity of ultrasound fatty score and parenchymal echogenicity for the diagnosis of NAFLD

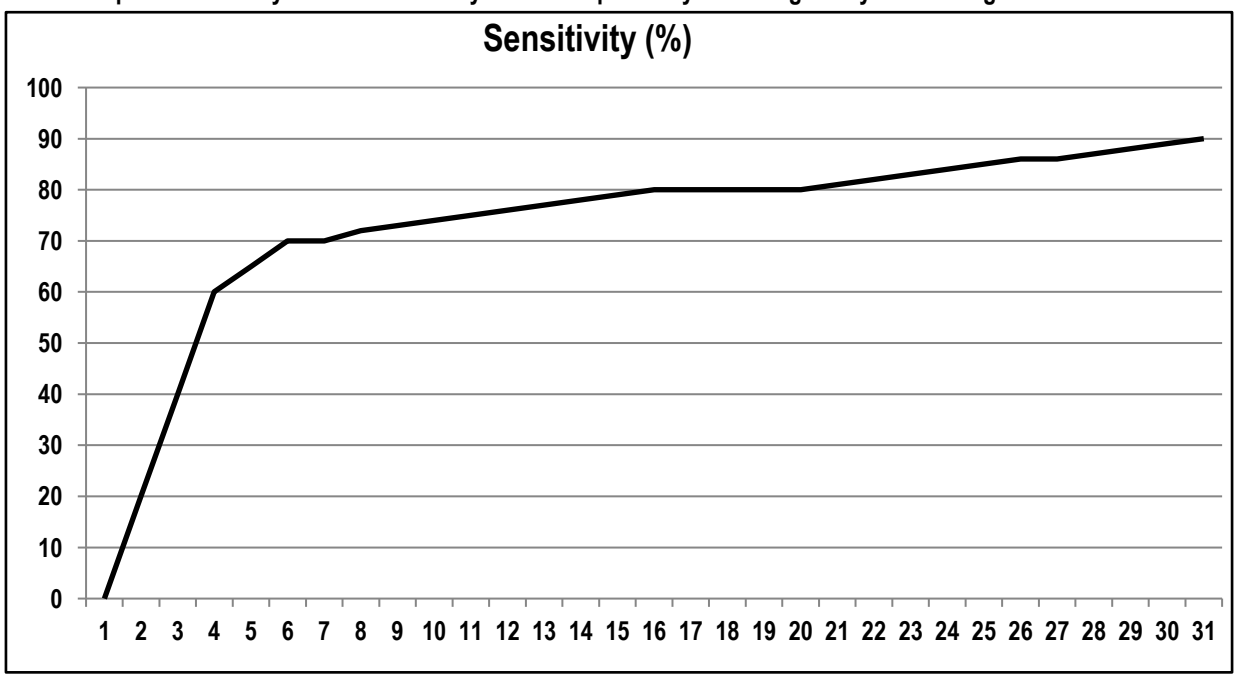

Table 2: Correlation analysis between ultrasound parameters and histopathologic features

Parameter	Parenchymal echogenicity	Far grain attenuation	GB wall blurring	Portal vein blurring	Hepatic vein blurring	Steatosis score
Steatosis grade	0.42	0.39	.43	0.50	0.55	0.46
Percentage of fat accumulation	0.54	0.42	0.32	00.51	0.47	0.59

DISCUSSION

In the present study we observed a significant positive correlation between the echographic total score with the steatosis grade. Zhang B et al approved a basic quantitative evaluation technique for NAFLD in view of combination of the ultrasound hepatic/renal proportion and hepatic lessening rate. An aggregate of 170 subjects were enlisted in this investigation. All subjects were inspected by ultrasound and (1)H-attractive resonance spectroscopy ((1)H-MRS) around the same time. The ultrasound hepatic/renal reverberate power proportion and ultrasound hepatic resound force lessening rate were gotten from common ultrasound pictures utilizing the MATLAB program. Connection examination uncovered that the ultrasound hepatic/renal proportion and hepatic reverberate power weakening rate were altogether associated with (1)H-MRS liver fat substance. Spearman relationship investigation uncovered that the liver fat substance proportion of the quantitative ultrasound model was decidedly connected with serum alanine aminotransferase, aspartate aminotransferase, and triglyceride, however adversely associated with high thickness lipoprotein cholesterol. Recipient working trademark bend examination uncovered that the ideal point for diagnosing fatty liver was 9.15% in the quantitative ultrasound model. Moreover, in the quantitative ultrasound demonstrate, greasy liver indicative affectability and specificity were 94.7% and 100.0%, separately, demonstrating that the quantitative ultrasound model was superior to traditional ultrasound strategies or the joined ultrasound hepatic/renal proportion and hepatic echo-intensity attenuation rate. In the event that the (1)H-MRS liver fat substance had an esteem < 15%, the affectability and specificity of the ultrasound quantitative model would be 81.4% and 100%, which still demonstrates that utilizing the model is superior to alternate techniques. The quantitative ultrasound model was a straightforward, ease, and delicate apparatus that can precisely survey hepatic fat substance in clinical practice. It gives a simple and successful parameter for the early conclusion of gentle hepatic steatosis and assessment of the viability of NAFLD treatment.[10]

Calvo N et al investigated the handiness of MRI and spectroscopy (MRS) for evaluation of NAFLD as contrasted and liver histological and metabolomics results. Patients experiencing bariatric surgery following strategies engaged with laparoscopic sleeve gastrectomy were enlisted as a model of obesity instigated NAFLD in an observational, cross-sectional investigation with a pre-set span of 1 year. Important information was acquired tentatively and surrogates for inflammation, oxidative pressure and lipid and glucose digestion were gotten through standard research facility estimations. To give dependable information from MRI and MRS, novel techniques were intended to restrain testing changeability and different wellsprings of mistake utilizing a 1.5T Signa HDx scanner and conventions procured from the 3D or 2D Fat SAT FIESTA remedy supervisor. No patient portrayed NASH. After surgery all patients fundamentally diminished their body weight and steatosis was for all intents even in patients with past extreme sickness. Change was likewise seen in the serum centralizations of chose factors. The most pertinent observations utilizing metabolomics demonstrated expanded levels of triglyceride and monounsaturated unsaturated fats in extreme steatosis however those outcomes were joined by a huge exhaustion of diglycerides, polyunsaturated unsaturated fats, glucose-6-phosphate and the ATP/AMP proportion. Consolidated information demonstrated the planned activity on mitochondrial fat oxidation and glucose transport action and may bolster the thought of NAFLD as a probable mitochondrial infection.[11] Gonçalves Dos Reis Monteiro ML et al assessed hepatic Doppler ultrasound (US) records for steatosis conclusion and evaluating, having biopsy as reference. Doppler and customary US were done in 49 sound subjects, without hazard factors for NAFLD, and in 49 patients with NAFLD and no less than one risk factor: weight, dyslipidemia or potentially diabetes mellitus. Noteworthy alcohol admission and hepatitis B or C were prohibition criteria. NAFLD patients were biopsied, and steatosis seriousness evaluated histologically. Examination of Portal Venous Pulsatility Index (PVI), Hepatic Artery Resistance Index (HARI) and Pulsatility Index (HAPI) were done in hilum. Hepatic vein waveform patttern (HVWP) was named triphasic, biphasic or monophasic. Two pathologists examined histological examples. ROC curve characterized affectability and specificity and multivariate examination characterized a condition for arranging patients. HARI and HAPI couldn't separate the solid from the steatosis gathering. None of the files corresponded with steatosis evaluating. Portal and hepatic vein lists permit non-intrusive steatosis finding yet are constrained to evaluate it. Histology stays critical for steatohepatitis analysis and for steatosis evaluating.[12]

CONCLUSION

Under the light of above results, the authors concluded that ultrasound has certain limitations in relation to diagnosing and observing time dependent alterations of hepatic steatosis in NAFLD patients. Therefore these limitations should be thoroughly considered while performing ultrasound in such patients.

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