

Evaluation of Diffuse Liver Diseases Using Conventional Ultrasound

Shima Ibrahim Ali^{A,B}, Mohamed Adam Mohamed^B, Mingxing Xie^A

^ADepartment Of Ultrasound, Union Hospital, Tongji Medical College , Huazhong University Of Science And Technology, Wuhan, China.

^BRadiological Science And Medical Imaging Department, Alzaiem Alazhari University, Khartoum, Sudan.

Abstract: The study was aimed to evaluate the diffuse liver diseases by using 2D-conventional ultrasound. A prospective, analytic, and descriptive study of abdominal ultrasound images of 100 subjects with diffuse liver diseases; fatty infiltration, acute hepatitis, chronic hepatitis and cirrhosis. An ultrasound assesses characteristics of the liver including (size, echogenicity, outline and intra hepatic duct), was collected and analyzed. Also cross tabulation was done to assess the relationship between all these variables and diffuse liver diseases. The study found that the liver cirrhosis is higher incidence in diffuse liver diseases representing 40% and more in age group between 31 and 45 years by percentage of 41% of diffuse liver disease, acute viral hepatitis were 31%, chronic hepatitis were 13% and fatty liver 16%.

Keywords: ultrasound, liver cirrhosis, fatty liver, hepatitis

I. Introduction

Ultrasound has emerged as a suitable technique for evaluation of patients with diffuse liver disease due to its evaluation for biliary dilatation, because bile duct obstruction can cause abnormal liver test results, raising the suspicion of liver disease. ⁽¹⁾2D-ultrasound (B-mode) can be used to distinguish diffuse liver disease due to cirrhosis (nodular liver surface and texture), non-cirrhotic portal fibrosis (diffuse texture), or fatty infiltration (increased parenchymal echogenicity) with moderate accuracy. These changes which involve the entire liver producing an overall change in echogenicity and liver size. The most common abnormality observed is a generalized increase in the echogenicity of the liver parenchyma. ⁽²⁾A less common diffuse involvement of the liver is an overall decrease in echogenicity may be seen with lymphoma of the liver. ⁽³⁾The role of the radiologist in evaluating patients with diffuse liver disease has increasingly expanded. Imaging may point directly to the diagnosis and helps narrow the differential diagnosis or in the follow-up of patients. ⁽⁴⁾ The aim of this study was to evaluate and determine diffuse liver disease by using ultrasound.

II. Methods

2-1 Study population and protocol

This is a prospective, analytic, and descriptive study recruited 100 consecutive diffuse liver disease patients with adequate 2D acoustic window who were scheduled for routine evaluation in ultrasound clinic. All the patients were evaluated with the use of 2D conventional ultrasound.

2-2 Data acquisition

2D conventional ultrasound was performed with the use of Toshiba and Aloka SSd-500. All the patients were scanned in the Supine or left lateral decubitus position, with the use of standard curvilinear low frequency transducer 3.5 MHz or 5MHz for very thin patient Transducer with Deep held inspiration, following the scanning protocol established by Burwin Institute of Ultrasound (Lunenburg, Canada) and the findings of scan was recorded. ⁽⁵⁾ Scanning was done in room with dim light, to minimize the reflected artifact of the screen, applying a sonic coupling agent to the abdomen and begin the evaluation with a simple sweep of the transducer up and down to the abdomen and side-to-side across the abdomen to get a rough sense of the abdominal organs before focusing on specific areas of interest. After getting the rough sense that the observations were made and assess liver; size, echogenicity, outline and intra hepatic duct. Exclusion criteria included; hydatid liver disease, benign hepatic cysts, hepatic adenomas, hepatocellular carcinoma.

2-3 Statistical analysis

After collecting data entered in computer using SPSS for Windows version 20.0 and double-checked before analysis. The means (\pm standard deviations) and numbers (percentage) were compared using the t test; multiple logistic regression analysis had been performed as independent variables. $P < 0.05$ was regarded as significant

III. Results And Discussion

One hundred diffuse liver diseases were recruited consecutively for this study. They were aged between 13 and 75 years old with mean age 41.93 ± 13.86 years and regarding age distribution, the diffuse liver diseases as general more in age group between 31 and 45 years by percentage of 41%. The study population consisted of 32 female and 68 male. The evaluation of diffuse liver diseases by ultrasound were divided into; fatty infiltration, acute hepatitis, chronic hepatitis and cirrhosis in order to observe any possible effect in liver.

3-1 liver size group distribution

ultrasound find in case of liver size versus pathology showed that; in case of fatty liver there is 93.8% of cases with a large liver, normal in both acute hepatitis (48.4% cases) and chronic hepatitis about 38.5% cases, and mostly shrunk in cirrhosis 70% cases .

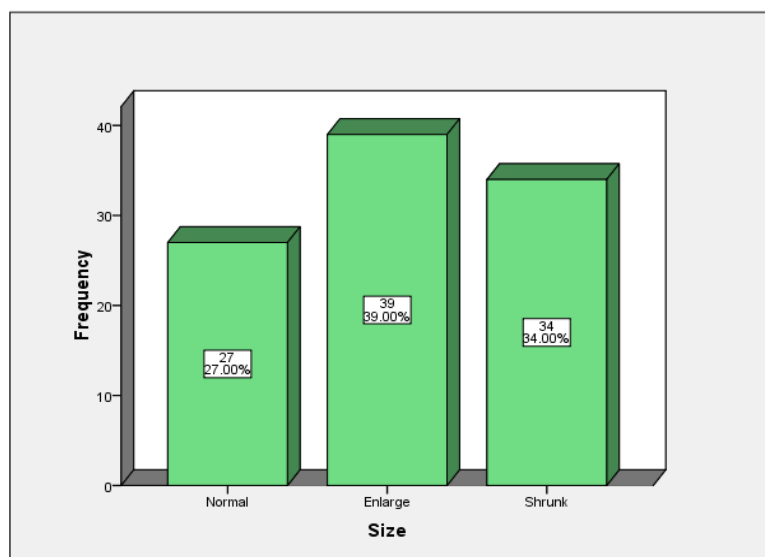


Fig.1. Frequency distribution of liver size

3-2 Parenchymal Echogenicity Group Distribution

Ultrasound demonstrated Parenchymal echogenicity increase about 100% in fatty, normal 61.3% in acute hepatitis, increase 92.31% in chronic hepatitis, increase 90% in cirrhotic cases.

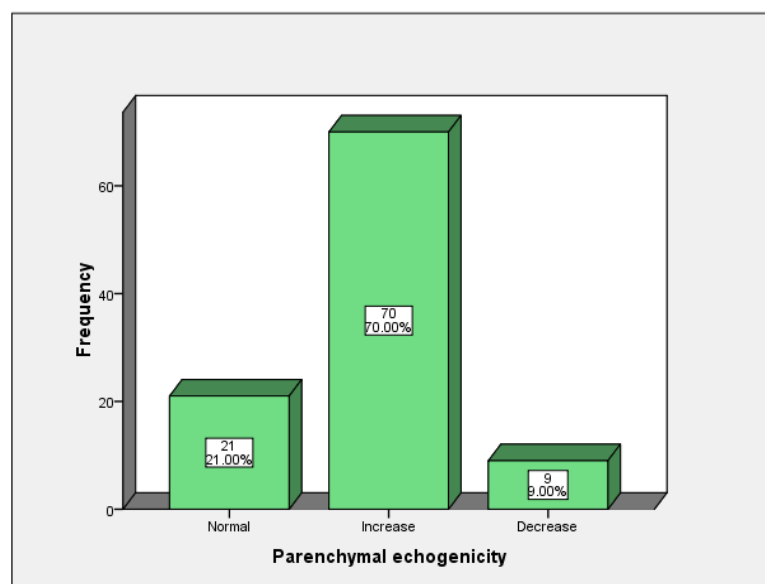


Fig.2. Frequency distribution of Parenchymal echogenicity

3-3 Outlines Group Distribution

Ultrasound show irregular liver outline 31.3% in fatty, 3.2% in acute hepatitis, 0% in chronic hepatitis, 57.5% in cirrhotic cases.

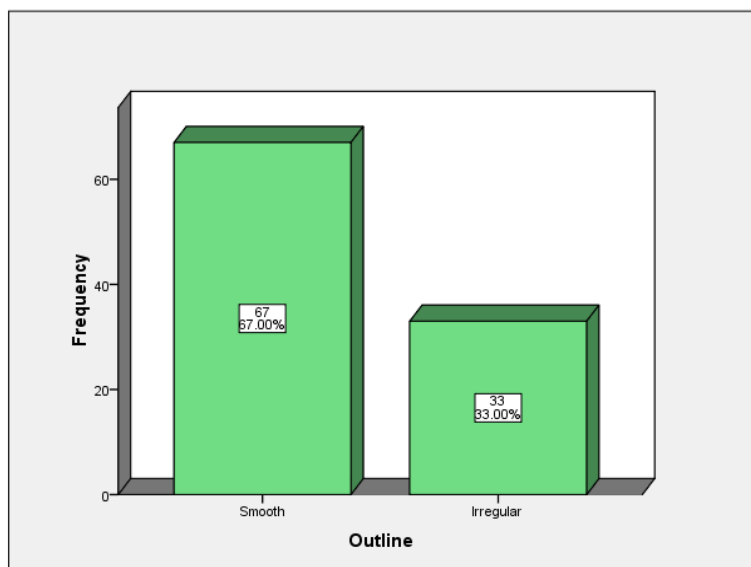


Fig.3. Frequency distribution of liver outline

3-4 Intra Hepatic Duct Group Distribution

Ultrasound find dilated intra-hepatic duct 6.3% in fatty, 13% in acute hepatitis, 30.8% in chronic hepatitis, 10% in cirrhotic cases.

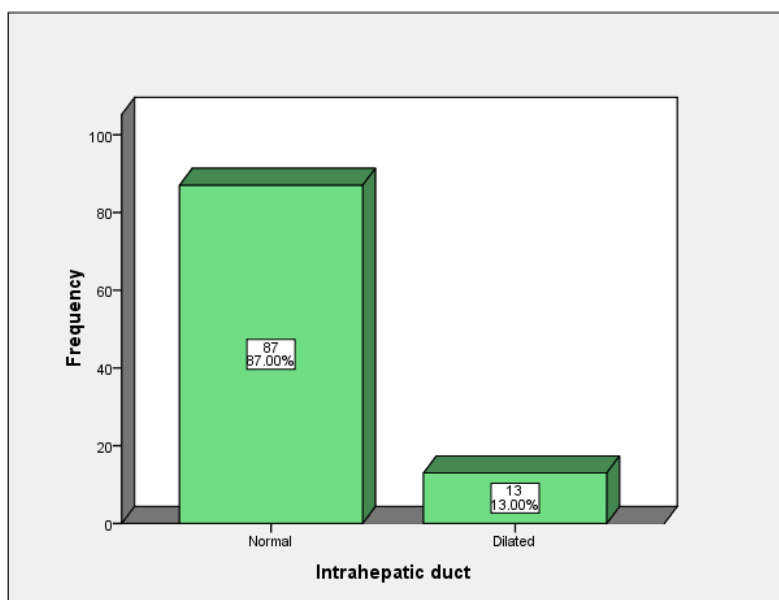


Fig.4. Frequency distribution of intrahepatic duct

Table (1) shows association of ultrasound diagnosis with liver size

Ultrasound diagnosis	Size			Total
	Normal	Enlarge	Shrunk	
Fatty	1%	15%	0%	16%
Acute hepatitis	15%	14%	2%	31%
Chronic hepatitis	5%	4%	4%	13%
Cirrhosis	6%	6%	28%	40%
Total	27%	39%	34%	100%

P value 0.000

Size is significant affected in the cirrhosis patients and most are found shrunk about 28% of patients because disease progresses and damage the liver parenchyma.

Table (2) shows the association of ultrasound diagnosis and parenchymal echogenicity.

Ultrasound diagnosis	Parenchymal echogenicity			Total
	Normal	Increase	Decrease	
Fatty	0%	16%	0%	16%
Acute hepatitis	19%	6%	6%	31%
Chronic hepatitis	0%	12%	1%	13%
Cirrhosis	2%	36%	2%	40%
Total	21%	70%	9%	100%

P value 0.000

The echogenicity is reliable finding in cirrhosis and increased about 36% of patients because fibrosis and nodular formation.

Table (3) shows association of Ultrasound diagnosis and Outline.

Ultrasound diagnosis	Outline		Total
	Smooth	Irregular	
Fatty	11%	5%	16%
Acute hepatitis	30%	1%	31%
Chronic hepatitis	13%	0%	13%
Cirrhosis	13%	27%	40%
Total	67%	33%	100%

P value 0.000

Table (4) shows the association of ultrasound diagnosis and intra hepatic duct

Ultrasound diagnosis	Intra hepatic duct		Total
	Normal	Dilated	
Fatty	15%	1%	16%
Acute hepatitis	27%	4%	31%
Chronic hepatitis	9%	4%	13%
Cirrhosis	36%	4%	40%
Total	87%	13%	100%

P value 0.204

Our study agrees with study done by Lessa Andreia et al. ⁽⁶⁾ that found liver heterogeneous echogenicity and irregular surface correlated to liver cirrhosis. And disagree with study done by Elfatih . M. Edosh. ⁽⁷⁾ That found the Acute hepatitis higher incidence in the study population about 40.8% and Patients with Cirrhosis 11% but our study demonstrate that liver cirrhosis is higher incidence in diffuse liver diseases representing 40%.

IV. Conclusions

The study well demonstrated that the diagnostic medical ultrasound is an easy, fast, safe method with high value and accuracy to answer most clinical problems of findings of diffuse liver diseases, and clearing how far its danger, hence prevents the delay of patient care and complications. Ultrasound is a useful but imperfect tool in evaluating diffuse liver disease because unable to assess the sensitivity and specificity.

V. Recommendation

Doppler ultrasounds are highly recommended for revealing portal hypertension and other complication of diffuse liver diseases. Further researches should be conducted on assessing the higher incidence of fatty liver among the Sudanese population with relation to their diet.

VI. Disclosure Of Interest

The authors declare that there was no conflict of interest.

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Legend of figures

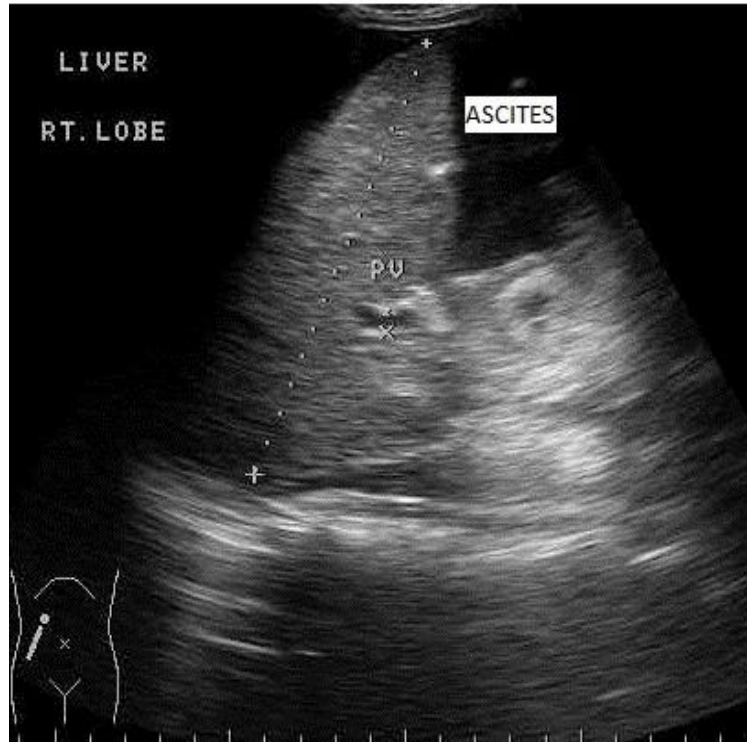


Figure1: ultrasound image show late stage liver cirrhosis.



Figure2: ultrasound image show fatty liver compared with kidney