Liver abnormalities detected by ultrasound scan among apparently healthy population in Jos, Nigeria

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Abstract

Background: Most individuals with liver abnormalities are asymptomatic. Patients present most of the time with complications of liver cirrhosis. Abdominal ultrasound scan (USS) is relatively cheap, inexpensive, non-invasive, and readily available. It is a useful tool in screening common liver abnormalities such as cirrhosis, liver tumors, liver cysts, fatty liver and hepatomegaly.

This study was aimed at identifying the common liver abnormalities in our environment, among apparently healthy individuals.

Methods: We reviewed retrospectively the results of a mass screening exercise that was conducted at Farin gada community in Jos, Plateau state, by the Hepatology unit of the Jos University Teaching Hospital (JUTH). Two hundred and eighty (280) apparently healthy individuals (without documented symptoms and signs of liver diseases), aged 18 years and above were studied. The data was analyzed using SPSS version 23.

Results: One hundred and fifty seven (56.1%) of the study subjects were females. The mean age of the study subjects was 37.8±13.6 years. The mean BMI in the study was 26.3±6.1 kg/m^2, and 59(21.1%) were obese (BMI $\geq$ 30kg/m^2). The commonest liver abnormalities diagnosed by ultrasound were hepatomegaly (6.4%) and fatty liver (6.4%). Four (1.4%) had features of liver cirrhosis on USS and one participant had a liver tumor.

Conclusion: The common USS-diagnosed liver abnormalities among apparently healthy individuals in our environment include fatty liver, hepatomegaly and liver cirrhosis.

Key words: abdominal, cirrhosis, hepatomegaly, liver, ultrasound

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Introduction

Liver disorders are a common cause of morbidity and mortality in our environment.[1] This is because the early stages of most liver disorders occur without symptoms or signs.[2] Therefore, presentations are mostly late, usually with complications of cirrhosis such as ascites, hepatic encephalopathy, variceal bleeding, and in some instances, primary liver cell carcinoma.[2]

Because of the high prevalence of risk factors of liver disorders such as HBV, HCV, aflatoxins, schistosomiasis and the prevalence of obesity with its attendant complications of Non-Alcoholic Fatty Liver Disease (NAFLD) in our environment, there is a growing incidence of end stage liver disease.[1,2] It is therefore imperative to promote practice that enhance early detection of liver abnormalities, especially in sub-Saharan Africa where prevalence of advanced liver disease is high despite to highly constrained resources.[1,2] Also, data on the epidemiology and pathogenesis of common liver abnormalities in our environment which is needed to guide the formulation of preventive policies and provide direction in the institution of strategies in prevention of end stage liver disease, is scarce.[1,2]

Abdominal ultrasonography is a safe, relatively cheap and readily available non-invasive technique for the examination of the liver.[3] Liver disorders such as tumors, cirrhosis, fatty liver, cysts, abscesses, among several others, are usually detected by abdominal ultrasound scan.[3]

Non-alcoholic fatty liver disease, for example, which is associated with obesity, diabetes mellitus or dyslipidemia has become an important risk factor for end-stage liver disease mainly because of the global increase in the prevalence of obesity.[4] Early detection among at-risk individuals is key in prevention of a future epidemic of end-stage liver disease.[4] Conventional B-mode ultrasonography is the most common technique used to assess the presence of fatty liver in clinical settings and population studies.[3,4] Fatty liver is diagnosed based on the following ultrasound parameters: parenchymal brightness (increased echogenicity), liver-to-kidney contrast, deep beam attenuation, bright vessel walls, and gallbladder wall definition.[3,4] The overall sensitivity and specificity of ultrasound in detection of moderate to severe fatty liver have been shown to be accurate and comparable to those of histology (gold standard).[5]

Liver cirrhosis is the end stage of chronic liver injury.[6] It is also a precursor of hepatocellular cancer. Liver cirrhosis is associated with several life threatening complications.[6] Early detection of this condition with abdominal USS among high-risk groups (such as people

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with HBV and HCV infection), will provide an opportunity for instituting measures that will prevent the development of life threatening complications such as variceal bleeding, hepatic encephalopathy and hepatocellular carcinoma.[2]

Liver tumors especially hepatocellular carcinoma (HCC) have a high prevalence in sub-Saharan Africa.[1,6] More than 80% of global HCC patients are estimated to occur in sub-Saharan Africa (SSA) and Eastern Asia.[1,7] The common risk factors for HCC are hepatitis B and C virus infections, alcohol overuse, and nonalcoholic fatty liver disease (NAFLD).[1,2] Early-stage HCC is curable with surgical resection and liver transplant.[8] However, treatment of intermediate- and advanced-stage HCC is largely palliative and carries a grave outcome.[9] Early detection of HCC and or detection of precancerous stages are therefore the best chance for any reasonable intervention.[8]

There is therefore, a need for policies and guidelines on regular screening using tools such as abdominal ultrasound, in high risk groups such as individuals with liver cirrhosis, obesity or HBV infection, in our environment. Since routine screening for rare disease conditions are not necessarily cost-effective, formulation of policies such as this, will require epidemiological data on liver abnormalities in our environment. This study was aimed at providing data on the common liver abnormalities detected by abdominal ultrasound (USS) among apparently healthy (asymptomatic) individuals.

Methods

We reviewed retrospectively the results of a mass screening exercise that was conducted at Farin gada community, Jos North Local Government Area of Plateau state, at Jos ECWA Theological School (JETS). This screening exercise was organized by the Hepatology unit of Jos University Teaching Hospital (JUTH) as part of the activities to mark the world liver day. The screening exercise was done in April 2021. The population comprised of the students and staff of the ECWA Theological School, students and staff of the ECWA College of Education, people from the Farin gada community and several others from near-by communities. Formal approval was obtained from the JETS management and informed-consent from all participants for the writing and publication of the data.

Two hundred and eighty (280) apparently healthy individuals (without documented symptoms and signs of diseases) aged 18 years and above, who had consented for publication of their data, were enrolled. The data was analyzed for bio-demographics (age, sex, level of education), biophysical data (weight, height and BMI), history of alcohol use, results of Hepatitis B surface antigen (HBsAg) and anti-HCV test, and abdominal ultrasound scan findings.

Abdominal ultrasound scan was done by radiologists from JUTH and ECHO-LAB, Abuja. HBsAg and Anti-HCV were done using LabACON rapid test kits.

Participants with shrunken liver, coarse heterogeneous echotexture, surface nodularity were considered as having liver cirrhosis.[10] Fatty liver was diagnosed when the liver was diffusely echogenic (Liver-to-kidney contrast) while acute hepatitis was diagnosed in participants with more extensive demonstration of the portal vein radicle walls and overall decreased echogenicity of the liver (giving a starry-sky appearance).[10] Liver size greater than 16cm (in the sagittal plane in the mid-clavicular line from the diaphragm to the inferior border) was considered as hepatomegaly.[11] Liver masses were characterized either as cystic or solid.

We carried out a descriptive analysis using SPSS version 23.

Results.

Over three hundred and fifty individuals participated in the mass screening exercise. Two hundred and eighty apparently healthy participants (without documented symptom/signs of diseases) who had granted written informed-consent were enrolled. One hundred and fifty seven (56.1%) of the study subjects were females. The mean age of the study subjects was 37.8±13.6 years. The mean BMI in the study was 26.3±6.1 kg/m$^{2.}$ One hundred and thirty (46.4%) had a normal BMI while 59(21.1%) were obese (BMI ≥30kg/m^2). (See Table 1.)

Fifty (17.9%) had a history of alcohol use. Forty one (14.6%) had positive HBsAg while 5 (1.8%) had positive Anti-HCV. (See Table 1). Fifty two (18.6) of the study participants had an abnormality on abdominal scan. The commonest liver abnormalities diagnosed by ultrasound were hepatomegaly (6.4%) and fatty liver (6.4%). Four (1.4%) participants had features of liver cirrhosis on USS. (See Table 2).

Twelve (67%) of the 18 participants with fatty liver were females. Also, all participants with fatty liver were above 30 years of age. Sixteen (89%) out of 18 of the subjects with fatty liver on ultrasound scan (diffusely hyper-echogenic liver) were either over-weight or obese (had BMI of ≥ 30kg/m^2). Fourteen (78%) of the 18 participants with fatty liver had Non-alcoholic fatty liver (Only 4 of the participants with fatty liver had a history of alcohol use). Thirteen (72%) of the 18 subjects with hepatomegaly were either obese or over-weight, while 7 (39%) had history of alcohol use. One of the four subjects with cirrhosis had HBV infection while the other subjects had no obvious risk factor. One participant had a solid liver mass with positive HBsAg.

Table 1: Demographic characteristics and some risk factors of liver disease among study participants

Demographic characteristics	Frequency (n=280)	Percentage
Gender		
Male	123	43.9
Female	157	56.1
Age group		
≥30	101	36.1
31-40	79	28.2
>40	100	35.7
Occupation		
Student	108	38.6
Civil servants	74	26.4
Clergy	24	8.6
Business men/women	25	8.9
Others(unemployed, retiree)	49	17.5
BMI status		
Underweight (<18.5)	9	3.2
Normal (18.5-24.9)	130	46.4
Overweight (25-29.9)	82	29.3
Obese (>29.9)	59	21.1
HBsAg Positive	41	14.6
Anti-HCV positive	5	1.8
History of Alcohol ingestion	50	17.9

Table 2: Ultrasound findings among study participants

USS finding	Frequency	Percentage
Normal	228	81.4
Hepatomegaly	18	6.4
Fatty liver	18	6.4
Cirrhosis	4	1.4
HCC (confirmed histologic.)[α]	1	0.4
Hepatic Cyst	2	0.8
Hepatitis	1	0.4
Others (renal stone, renal cyst, ascites, renal parenchymal disease)	8	2.8
TOTAL	280	100

[α]obtained from the follow-up documents of patient at JUTH hepatology unit, following an informed-consent.

Discussion

Although liver biopsy is the gold standard for the diagnosis of most liver parenchymal diseases, it is invasive and ethically inappropriate for screening or epidemiologic studies.[12] Abdominal ultrasound scan is non-invasive, relatively inexpensive and available, making it a preferred modality for the screening of most liver diseases.[3,5]

The most prevalent liver abnormalities in the study as detected by USS were hepatomegaly and fatty liver (6.4% each). Most of the participants who had these conditions were obese females. The significance of diagnosing fatty liver on USS lies not only with increased risk of end stage liver disease, but also with strong risk of cardiovascular disease.[5,12] Fatty liver that is not associated with alcohol intake (Non-alcoholic Fatty Liver Disease - NAFLD) is said to be on the increase, likely due to the increase in prevalence of obesity.[5] These group of patients, although mostly asymptomatic, usually require both liver and cardiovascular work-up.[12,13] The prevalence of NAFLD is generally lower in Africa (6-13.5%) [14,15] compared with the western countries(20- 50%).[12,15] Several studies have documented a rising prevalence in Africa and argued that reports of low prevalence is likely due to scanty data.[15] Since this condition is considered to be a global risk of future epidemic of end stage liver disease,[16] there is need to build on our study, by conducting well-designed studies on NAFLD in Africa.

Four (1.4%) participants had features of liver cirrhosis in our study. Because patients with compensated liver cirrhosis are usually asymptomatic, and presentation is usually with complications such as upper gastrointestinal bleeding, hepatic encephalopathy, ascites, it is important to screen at-risk individuals in order to institute measures such as endoscopic variceal surveillance, which could prevent upper gastrointestinal bleeding, a complication with a very high mortality rate.[17] The global prevalence of cirrhosis (from autopsy studies) is estimated to be about 4.5% to 9.5% of the general population.[18] A prevalence of 4-13% has been found among HBV infected patients in Africa,[19] and a prevalence of 1.06% was reported in a large study in the US.[20] The variation in prevalence rates can easily be explained from the methods of diagnosing liver cirrhosis and the differences in the populations that were studied. Although HBV infection is considered to be the leading cause of cirrhosis in our environment,[1,2] only one of the four subjects with cirrhosis had HBV infection while the other subjects had no obvious risk factors, this highlights the significance of commonly neglected risk factors, such as NAFLD.

Only one participant (0.4%) had a solid liver mass which was subsequently confirmed histologically to be hepatocellular carcinoma (during his clinic follow up visits). Abdominal USS has been recommended by different professional bodies (such as American Association for the Study of Liver Disease (AASLD), European Association for the Study of Liver (EASL)) for HCC surveillance in at-risk individuals such as patients with HBV infection or liver cirrhosis.[8] HCC surveillance provides the opportunity for early detection as only patients detected with early disease have a chance of

curative therapy.[8,9]

Conclusion

The common liver diseases in apparently healthy individuals in our environment, detected by abdominal USS are fatty liver, hepatomegaly and liver cirrhosis. There is a need for a large multi-centre well-designed study to build on our study and further elaborate on the epidemiology of liver diseases in our environment.

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