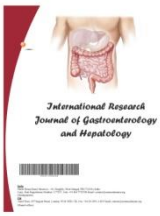

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Liver Fibrosis in a Healthy Population in Jos, North-central Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: The excessive accumulation of extracellular matrix protein, primarily collagen, leads to the fibrosis of the liver, and when fibrosis becomes advanced, it leads to liver cirrhosis. Liver cirrhosis is progressive hepatic fibrosis characterized by distortion of the liver parenchyma and the formation of regenerative nodules. Globally, 59% of mortality and 46% of the global burden of diseases result from chronic liver diseases. Nigeria is one of the countries described as hyper-endemic for hepatitis B with attendant high mortality from the impact of chronic liver disease. Thus, early detection and determination of the disease burden are essential tools that will help in public interventions and the prioritization of intervention programs.
Aim: The study aims to determine the burden of liver fibrosis using FibroScan, in a healthy population.
Method: This cross-sectional observational study was carried among two hundred and twenty three (223) healthy individuals. Demographic data, weight, and height were determined and each of the patients had a FibroScan carried out to determine the degree of liver fibrosis. Blood was taken for hepatitis B and C tests.
Results: There were 223 participants; males were 106(47.53%) while females were 117(52.4%). The mean BMI was 26.53±5.47 kg/m^2, it was 24.16±3.26 kg/m^2 vs 28.98±6.22kg/m^2 for males and females respectively, p=0007.
The median (IQR) fibrosis score for the general population was 5.4(4.4-6.7)kpa while it was 5.6(4.6-

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6.8) kpa vs. 5.2(4.2-6.7)kpa for males and females respectively p=0.10. Thirty seven (16.59%) participants had significant fibrosis (FibroScan score ≥7.2kpa), and 6 (2.7%) had liver cirrhosis (FibroScan > 12.5kpa). Fibrosis of the liver was associated with being obese, odds ratio1.20, [95% CI(0.43-3.3)], Alcohol ingestion, odds ratio 1.17,[95%CI(0.03-4.48)], and sex, odds ratio 2.03 [95% CI(0.82-5.01)].

Conclusion: Hepatic fibrosis is a significant cause of morbidity and mortality. Screening individuals at risk of liver fibrosis should be intensified in order to ensure early detection and deter further progression and complications.

Keywords: Cirrhosis; fibroscan; fibrosis; liver.

1. INTRODUCTION

The excessive accumulation of extracellular matrix protein, primarily collagen, leads to the fibrosis of the liver, which is a significant occurrence in most types of chronic liver diseases [1].

When fibrosis becomes advanced, it leads to liver cirrhosis with its attendant complications of portal hypertension [1]. Liver cirrhosis refers to the progressive hepatic fibrosis characterized by distortion of the hepatic parenchyma and the formation of regenerative nodules [2]. The gold standard for diagnosing cirrhosis has been liver biopsy until recently when noninvasive modalities of assessing hepatic fibrosis such as FibroScan are becoming available [2].

Globally, 59% of mortality and 46% of the global burden of diseases result from chronic liver diseases [3]. The global burden of cirrhosis from postmortem biopsies was 4.5% to 9.5% in the general population [3]. Death from cirrhosis has progressively been on the rise, and it is estimated to be the 12 leading causes of death globally by the year 2020 [3]. The leading causes around the globe are viral hepatitis, Alcohol, and Non-alcoholic steatohepatitis [4]. Sub-Saharan Africa (SSA) accounts for the highest death rates among all WHO regions, with viral hepatitis B accounting for most of the deaths from cirrhosis in SSA [5].

Nigeria is one of the countries described as hyper-endemic for hepatitis B with attendant high mortality from the impact of chronic liver disease [5]. Mortality from Hepatocellular Carcinoma (HCC), a complication of cirrhosis, is high, with an average survival of 3 months from diagnosis to death [6]. Thus, early detection is key. Determination of the disease burden along with other epidemiological data are essential tools that will guide public health measures and the prioritization of intervention programs.

The study aims to determine the burden of liver fibrosis in an apparently healthy population in Nigeria.

2. METHODS

This cross-sectional observational study was carried out among two hundred and twenty-three (223) healthy individuals (without apparent symptoms or signs of liver disease), 18 years and above, who consented to the study. They were recruited consecutively during a One-day screening program that we organized in March 2021 within a tertiary education setting. A structured questionnaire was administered to obtain information on demographics, medical history, drug, and social history.

We took the weight and height, and the body mass index was calculated for each participant. The researchers took a blood sample and HBsAg, HbeAg and anti-HCV tests were performed using LabACON test kits, according to manufacturer's manual. A FibroScan (transient elastography-TE) was carried out using FibroScan® Echosens, Paris, E100m002, 13-version, with the patient in the supine position with their hands behind the back of the head. We used the FibroScan medium probe to obtain fibrosis scores according to manufacturer's guide. Fibroscan (TE) scores were categorised into 3 groups as follows: Group 1- No significant fibrosis, TE <7.2kpa; Group 2- significant (mild/moderate) fibrosis, TE 7.2-12.5kpa and; Group 3- severe fibrosis/cirrhosis, TE > 12.5kpa [7]. Anyone with a fibrosis score of more than 12.5kpa was categorized as having cirrhosis of the liver [7]. Participants with FibroScan (TE) score 7.2kpa and above were considered as having significant fibrosis [7].

2.1 Statistical Analysis

Data was collected in google sheets and analyzed in EPI info version 7. Frequency tables

were generated for the dichotomized variables, and continuous variables were presented as means with standard deviation, while categorical variables were presented as percentages.

3. RESULTS

There were 223 participants; males were 106(47.53%) while females were 117(52.4%). The mean age for the study population was 38.471± 4 years, 38.081±3 years, and 38.821±4 years for males and females, respectively. The mean BMI was 26.53±5.47 kg/m^2, 24.16±3.26 kg/m^2vs 28.98±6.22kg/m^2 for males and females respectively, p=0007. Those who were obese, BMI>30kg/m^2, were 49(22.22%), and those with BMI below 25 were 97(43.75%), see Table 1.

The median (IQR) fibrosis score for the general population was 5.4(4.4-6.7)kpa while it was 5.6 (4.6-6.8)kpa vs. 5.2(4.2-6.7)kpa for males and females respectively p=0.10. The distribution of participants based on severity of fibrosis in to 3 categories as follows: No significant fibrosis (<7.2 kpa), 62.24%; significant (mild/moderate) fibrosis (7.2-12.5kpa), 34.97% and; severe fibrosis/cirrhosis: (>12.5kpa), 2.70%. When the data were dichotomized into those with significant Fibrosis (>7.2kpa), and those with no significant fibrosis (≤7.2kpa), 186(83.41%) had no significant fibrosis while 37(16.59%) had significant liver fibrosis. Fibrosis of the liver was associated with being obese, odds ratio1.20, [95% CI(0.43-3.3)], Alcohol ingestion, odds ratio 1.17,[95%CI(0.03-4.48)], and sex, odds ratio 2.03 [95% CI(0.82-5.01)].

Those with HbsAg positive status were 29(13%), HbeAg(2.24%), anti-HCV 4(1.79%).

4. DISCUSSION

This is the first study, to the best of our knowledge that has been carried out in a community in North-central Nigeria to evaluate the prevalence of liver fibrosis in the general population using transient elastography (FibroScan). The study highlights the high prevalence of liver fibrosis in an apparently healthy community. Factors such as overweight/obesity, hepatitis B and alcohol use, played a significant role as contributors to liver fibrosis. It also highlights the increasing role of obesity in the demographic transition of disease in our community.

Liver biopsy has been the gold standard for determining liver fibrosis for a very long time [2]. This method of determining fibrosis is fraud with a lot of limitations, top among them is that liver biopsy is an invasive procedure, which alone limits its acceptability and application [4]. The FibroScan has been demonstrated to have an excellent concordance to liver biopsy in assessing the degree of liver fibrosis [7]. It has the added advantage of being easy to use, reproducible, and lacks the major drawback of the liver biopsy in that it is not an invasive procedure [7]. Therefore, it is much more acceptable than a liver biopsy. This study demonstrates the ease of use of the FibroScan in a community to determine liver fibrosis. Here we found that liver fibrosis is not an uncommon finding in an apparently healthy population in our environment. The relatively high prevalence of significant fibrosis is in keeping with what has been demonstrated elsewhere in communities with high incidence of hepatocellular carcinoma.

Table 1. Characteristics of the studied population

Characteristics	Frequency(n)	Percentage %
Sex		
Male	106	47.53
Female	117	52.47
Educational level		
None	4	1.80
Primary	5	2.24
Secondary	31	13.90
Tertiary	183	82.06
Body mass index kg/m^2		
Underweight<18.9	8	3.47
Normal 19-24.9	90	40.28
Overweight 25-29.9	76	34.03
Obese>30	49	22.22
HBsAg	29	13
HBeAg	5	2.24
Anti-HCV	4	1.79

Characteristics	Frequency(n)	Percentage %
Fibrosis		
Not significant(TE < 7.2kpa)	186	83.41
Significant (TE ≥ 7.2kpa)	37	16.59
Severe fibrosis/cirrhosis (TE > 12.5kpa)	6	2.70

A study done that was done among Mexican Americans in south Texas, who are among communities known to have the highest rates of hepatocellular carcinoma (HCC) in the US, showed a prevalence of significant fibrosis of 16.5% [8] which is about the same with our study. Another study done in a Korean population using magnetic resonance elastography showed a relatively high prevalence of liver fibrosis (9%) in a community, albeit, lower than the value in our study [9] (likely due to the fact that different testing modalities were used). A lower prevalence of 9% was also documented in a European study, using FibroScan, with a lower cut-off of 6.8kpa, for significant fibrosis.[10] This finding from our study, indicate that this premalignant condition is prevalent, and should be sought out and measures to reduce its impact put in place.

Our study also highlights an emerging risk factor in hepatic fibrogenesis, ie obesity and the associated fatty infiltration of the liver. Obesity likely played a vital role in the fibrosis of the liver in our study population. Indeed the prevalence of overweight and obesity was over 50% in the sampled community. This finding is in keeping with what is seen globally and has been reported in several studies across different continents [11-13]. The role of obesity and its attendant fatty infiltration of the liver, will be an essential key player in cirrhosis of the liver in the coming years in our setting. In a similar study carried out in France using blood-based biomarkers of fibrosis, the authors also demonstrated the role of NAFLD and Alcohol as critical players in the occurrence of liver fibrosis in the community they surveyed [14]. More commonly, viral hepatitis B is the critical factor in driving fibrosis of the liver in this hyper-endemic region [5], its prevalence in this study was 13%.

A key strength of our study is that we have demonstrated from a community survey that there is a high prevalence of liver fibrosis and that FibroScan can be deployed in the community to detect liver fibrosis. The limitations of the study are that we did not sample a large pool of individuals and also did not use a probability sampling technique.

The direction for future research in this regard will be one where these patients are studied prospectively.

5. CONCLUSION

In conclusion, hepatic fibrosis is a significant cause of morbidity and mortality. Screening individuals at risk of liver fibrosis should be intensified in order to ensure early detection and deter further progression and complications.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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