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A comparative analysis of the APRI and FIB4 score in evaluating the severity of chronic liver disease in a low and middle income setting

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ABSTRACT

Background

Establishing the presence of fibrosis (cirrhosis) is appropriate in the evaluation of chronic liver disease (CLD) patients. In addition, early interventions can positively influence the outcome of the disease. Liver biopsy and imaging are very important investigations in establishing the presence of fibrosis. However, in low and middle income countries (LMICs) liver biopsy may be fraught with many difficulties. Furthermore, CLD patients in our clinical setting frequently present late with features of decompensation (such as coagulopathy which is a contraindication to liver biopsy). Based on these observations, the World Health Organisation (WHO) advocates the use of non-invasive tests (NITs) such as; aspartate aminotransferase to platelet ratio index (APRI) and fibrosis index based on 4 factors (FIB-4) to assess fibrosis in viral hepatitis in LMICs. The use of accurate and validated NITs in resource-poor settings such as ours may help with the optimal selection of patients with chronic viral hepatitis eligible for antiviral treatment.

Objectives

The aim of this study was to compare the APRI and FIB4 score in the evaluation of the severity of liver disease in a cohort of CLD patients.

Methods

This was a cross-sectional descriptive study involving consecutive CLD patients seen in the Gastroenterology Unit of the University of Calabar Teaching Hospital. One hundred and six (106) patients were recruited over a 9 month period of which only 15 of these patients met the criteria for a liver biopsy.

Results

Up to two third of CLD patients had either Child Tourette Pugh (CTP) class B (48%) or class C (27%) disease. The APRI score was low in slightly more than half (i.e. 58%) of CLD patients, while the FIB-4 score suggested that close to two third of patients had moderate (43%) or severe fibrosis (29%) scores. In addition, The FIB-4 score better correlated (r= 0.420, p < 0.001) with the age of patients than the APRI score (r= -0.009, p= 0.927).

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Conclusions
The FIB-4 score correlated better than the APRI score in evaluating patients with CLD.

Keywords: Cirrhosis, Chronic Liver Disease, Fibrosis, Non Invasive Tests

INTRODUCTION

Chronic liver disease (CLD) accounts for high rates of hospital admissions and deaths seen in medical practice in low and middle income countries (LMICs) such as Nigeria.[1-6] Chronic viral hepatitis B and C, alcohol as well as non-alcoholic fatty liver disease (NAFLD) are major causes of CLD in Nigeria.[7-9] Chronic (persistent) inflammation of the liver irrespective of the aetiology can progress to potentially reversible fibrosis and eventually to cirrhosis and hepatocellular carcinoma (HCC).[10] Cirrhosis, represents a more advanced stage of fibrosis. It signifies the presence of more scar tissue than fibrosis alone.[11] In addition there is distortion of the liver parenchyma associated with septae and nodule formation, altered blood flow, and risk of liver failure.[11] Despite this, cirrhosis is remarkably a dynamic and evolving state. Hence prompt management could possibly regress scar tissue and improve clinical outcomes despite being an advanced stage of the disease.[11]

Asymptomatic patients with compensated cirrhosis without any intervention, may in time decompensate.[12] They may develop potentially life-threatening complications of ascites (spontaneous bacterial peritonitis), bleeding oesophageal varices, hepatic encephalopathy, sepsis and renal failure.[3,13] Scoring tools such as the Child- Tourette Pugh classification can be used to prognosticate chronic liver disease patients, establish the presence of complications and select patients eligible for liver transplantation.[1,4] The CTP score further assesses hepatocellular dysfunction in cirrhotics, by incorporating five distinct parameters (i.e. two clinical and three biochemical features).[1, 14]

Establishing the extent of liver damage from fibrosis (cirrhosis) is relevant in the management of CLD patients, as treatment options vary with the class (extent) of the disease.[1,2,15] Liver biopsy and imaging are relevant investigations in evaluating the extent of liver injury such as fibrosis.[2] However, in LMICs liver biopsy may be relatively expensive, associated with increased risk of complications such as bleeding and in addition, there may be lack of expert histological interpretation as well as sampling error during sample collection.[10, 16] Ultrasound scan of the liver on the other hand, may be useful in the evaluation of liver disease, it is non-invasive and relatively cheap, but the interpretation is operator dependent. The role of imaging in the early detection of liver fibrosis is not satisfactory either due to its relatively low sensitivity and or specificity.[10,16] Transient elastography (i.e. FibroScan), is one of the novel techniques that measure liver stiffness based on ultrasound technology.[2,16] The test is non-invasive, may not require specialist operation, but it is expensive and is widely unavailable in most hospitals in Nigeria.

The use of a cheap, readily available, non-invasive screening tool for the detection of fibrosis is currently being advocated in LIMCs to detect early liver fibrosis and in addition, advanced liver fibrosis that is otherwise not clinically evident.[2,5] The goal of this approach is aimed at initiating early interventions such as antiviral therapy.[2,17] This strategy has been found to retard the progression of liver fibrosis and in some instances reverse it.[11, 17]

Non-invasive scoring tools such as the APRI and FIB-4 scores consist of indirect markers of fibrosis such as ALT, AST and platelet count. These tests can be readily carried out in Nigeria, due to the fact that they are relatively cheap to conduct, do not require any expertise in their interpretation, and can be readily applied in our clinical setting. The FIB-4 score is an index score calculated from platelet count, alanine transaminase (ALT), aspartate transaminase (AST) and age. It is predictive of advanced hepatic fibrosis and cirrhosis.[2] While the APRI score was initially designed to predict fibrosis in hepatitis C patients, but has been found to be useful in other causes of liver disease.[2, 18] These markers of fibrosis have a high specificity but low sensitivity for

significant fibrosis and cirrhosis at their specific cut-off ranges (hence individuals with advanced fibrosis and cirrhosis can be missed).[2] APRI and FIB-4 use two cut-off points for diagnosing specific stages of fibrosis.[2] A single cut-off value would result in suboptimal sensitivity and specificity. Based on this premise WHO proposes a high cut-off for APRI and FIB-4 test greater than equal to 2 and 3.25 respectively, while a low cut-off value of less than equal to 1 and 1.45 respectively.[2] A FIB-4 test > 3.25 has been found to have a positive predictive value of 82.1% to establish the presence of significant fibrosis, while a score < 1.45 is said to have a negative predictive value of 94.7%.[19]

Other uses of these NITs could be seen in McComb's study which found that an elevated FIB-4 test could predict the significant risk of liver-related events and death, even at FIB-4 as low as 1.45 in a cohort of chronic hepatitis C patients.[19] While Deng et al revealed that both the APRI and FIB-4 score, had a modest diagnostic accuracy of oesophageal varices in liver cirrhosis.[20] Earlier work done by Zambam de Mattos et al demonstrated that the APRI score was low at predicting oesophageal varices in liver cirrhosis.[21] Zambam de Mattos and Deng's studies more or less concluded that these NITs were not appropriate non-invasive screening methods for oesophageal varices and invariably cannot replace the use of upper gastrointestinal endoscopy for the diagnosis of oesophageal varices.[20, 21]

Researchers in Yale, found the FIB-4 test to be useful in predicting liver cancer in a large cohort of HIV patients.[22] They further postulated that the FIB-4 test may be valuable in identifying persons at highest risk of developing liver cancer, even before clinically evident cirrhosis.[22] Among a cohort of Korean HBsAg carriers a high FIB-4 score was found to be a highly predictive risk factor for liver cancer.[23]

Based on the emerging role of NITs in the assessment of CLD patients, this study aimed to compare two NITs (i.e. the APRI and FIB4 score) in the evaluation of the severity of liver disease in a cohort of CLD patients.

MATERIAL AND METHODS

Study Population and Eligibility Criteria

This was a cross-sectional descriptive study involving patients with chronic liver disease seen at the Gastroenterology Unit of the University of Calabar Teaching Hospital (UCTH). The University of Calabar Teaching Hospital is a tertiary health institution acting as a major referral centre to Cross River State and neighboring states like Akwa Ibom, Abia and Benue.

One hundred and six adult patients (18 years and above) seen consecutively at the Gastroenterology Unit (within a nine month period) were recruited into the study, after obtaining an informed (written) consent. Patients were included in the study once they had symptoms and signs of chronic liver disease/or positive HBsAg or anti-HCV serological test which has lasted for more than 6 months. In addition, patients were investigated for the characteristic haematological, biochemical, ultrasonographic and histologic features of CLD.

Data Collection

All patients were evaluated using a semi-structured interviewer, administered questionnaire which sought symptoms and signs suggestive of chronic liver disease (sleep reversal, jaundice, finger clubbing, leuconychia, wasting of the thenar/ hypothenar eminences, palmer erythema, asterixis, superficial distended abdominal veins, and ascites etc). Also the presence of hepatomegaly that is firm or hard, nodular, tender or non-tender with a blunt edge or a shrunken liver was elicited on physical examination.

Blood samples were taken for assay of HBsAg, and anti-HCV, liver function test including; aspartate amino and alanine transaminase assay, total protein and albumin estimation. Heamatologic work up was done including; full blood count estimation, prothrombin time test (PT) and international normalized ratio (INR).Initial clinical and laboratory data obtained were used to calculate the FIB-4 index, APRI and CTP scores.

The formula for the APRI score was calculated as; AST (IU/l)/ (upper limit of normal) X 100 /platelet count (X 10^9/litre).

The APRI score of patients was categorized as follows; low (1.0), intermediate (1-2) and high cut offs (>2), similarly the FIB-4 index of patients were grouped as low (<1.45), intermediate (1.45-3.25) and high cut offs (>3.25).

The FIB-4 score was calculated as; Age (years) X AST (IU/l)/platelet count (X 10^9/litre) X √ALT (IU/l).

The CTP score was calculated based on ascites (none = 1, mild = 2, moderate-severe = 3) encephalopathy (none = 1, grade 1-2 = 2, grade 3-4 =3), serum albumin (>35mg/dl = 1, 28-35mg/dl = 2, <28mg/dl = 3), total serum bilirubin (<2mg/dl = 1, 2-3mg/dl = 2, >3mg/dl = 3) and prolongation of prothrombin time in seconds (<4s = 1, 4-6s = 2, >6s = 3). The total points were converted into three classes (A = 5-6points, B = 7-9 points, C = 10-15points).

Ethical Issues

Ethical clearance for this study was obtained from the Health Research Ethics committee of UCTH, assigned number; UCTH/HREC/33/92.

Statistical Analysis

Analysis of data was done using the Statistical Package for Social Sciences version 18 (PASW statistics 18). Quantitative data were expressed as the mean and standard deviation (SD). The ANOVA test statistic was used to compare mean values for more than two groups (the Bonferroni test was used for intra group comparison). Qualitative/ categorical variables were compared using the Chi-square tests (p-value significance level was set at 5%). Pearson correlation was used to compare the linear relationship between two continuous variables.

RESULTS

Bivariate analysis revealed that male CLD patients tended to have a higher FIB-4 score and APRI score when compared to females (probably due to the greater population of male CLD patients seen in the study), however this observation was not statistically significant (p=0.337). Regarding the age of CLD patients, a low (24, 36.4%) to intermediate (32, 48.5%) FIB-4 score was seen mostly in patients between the ages of 18 to 40 years. However patients greater than 40 years had a high FIB-4 score, and this was found be statistically significant (p < 0.001), see table 1.

Table 1 Showing the FIB-4 Score among Chronic Liver Disease Patients

Variable	FIB 4 <1.45 n(%)=33	FIB 4 1.45-3.25 n(%) =44	FIB 4 >3.25 n(%)= 29	Total (N=106) Frequency (%)	Chi-square tests	P-Value
Gender						
Male (%)	21 (28.8)	29 (39.7)	23(31.5)	73 (68.9)	2.316	0.337
Female (%)	13 (39.4)	14 (42)	6 (18.2)	33 (31.1)		
Age (Years)						
18-40 (%)	24 (36.4)	32 (48.5)	10 (15.5)	66 (62.3)		
41-60 (%)	8 (29.6)	10 (37.0)	9 (33.3)	27 (25.5)	19.183*	0.001
>60 (%)	2 (15.4)	1 (7.7)	10 (76.9)	13 (12.3)		
Body Mass Index (Kg/m²)						
Underweight (<18.5)	7 (33.3)	9 (42.9)	5 (23.8)	21 (19.8)		
Normal (18.5- 24.9)	16 (25.0)	27 (42.2)	21 (32.8)	64 (60.4)		
Overweight (25- 29.9)	6 (54.5)	4 (36.4)	1 (9.1)	11 (10.4)	10.241*	0.194
Obesity Class 1 (30-34.9)	5 (62.5)	1 (12.5)	2 (25.0)	8 (7.5)		
Obesity Class2 (35-39.9)	0 (0)	2 (100.0)	0 (0)	2 (1.9)		
HBsAg						
Positive	23 (34.8)	30 (45.5)	13 (19.7)	66 (62.3)	5.202	0.076
Negative	11 (27.5)	13 (32.5)	16 (40.0)	40 (37.7)		
Anti-HCV						

Positive	4 (30.8)	4 (30.8)	5 (38.5)	13 (12.3)	1.098	0.701
Negative	30 (32.3)	39 (41.9)	24 (25.8)	93 (87.7)		
Co-infection						
Positive	1 (50.0)	1 (50.0)	0 (0)	2 (1.9)	0.985*	1.000
Negative	33 (31.7)	42 (40.4)	29 (27.9)	104 (98.1)		
Child- Pugh Score						
Class A	17 (58.6)	10 (34.5)	2 (6.9)	29 (27.4)	16.321*	0.002
Class B	13 (25.5)	20 (39.2)	18 (35.3)	51 (48.1)		
Class C	4 (15.4)	13 (50.0)	9 (34.6)	26 (24.5)		

Fisher's exact test was used where counts are less than 5 in any cell.

In the APRI score category most patients who were aged between 18 to 40 years (36, 54.5%) and 41 to 60 years (17, 63.0%) had a low APRI score, however this finding was not statistically significant, see table 2.

Table 2 Showing the APRI Score among Chronic Liver Disease Patients

Variable	APRI <1 n(%)= 59	APRI 1-2 n(%)=27	APRI >2 n(%)=20	Total (N=106) Frequency (%)	Chi-square tests	P-Value
Gender						
Male (%)	36 (49.3)	18 (24.7)	19 (26.0)	73 (68.9)	6.560*	0.037
Female (%)	23 (69.7)	8 (24.2)	2 (6.1)	33 (31.1)		
Age						
18-40	38 (54.5)	17 (25.8)	13 (19.7)	66 (62.3)	2.810*	0.593
41-60	17 (63.0)	4 (14.8)	6 (22.2)	27 (25.5)		
>60	6 (46.2)	5 (38.5)	2 (15.4)	13 (12.3)		
Body Mass Index (Kg/m^2)						
Underweight (<18.5)	15 (71.4)	3 (14.3)	3 (14.3)	21 (19.8)	11.004*	0.141
Normal (18.5- 24.9)	28 (43.8)	19 (29.7)	17 (26.6)	64 (60.4)		
Overweight (25- 29.9)	9 (81.8)	1 (9.1)	1 (9.1)	11 (10.4)		
Obesity Class 1 (30-34.9)	5 (62.5)	3 (37.5)	0 (0)	8 (7.5)		
Obesity Class 2 (35-39.9)	2 (100.0)	0 (0)	0 (0)	2 (1.9)		
HBsAg						
Positive	38 (57.6)	16 (24.2)	12 (18.2)	66 (62.3)	0.356	0.829
Negative	21 (52.5)	10 (25.0)	9 (22.5)	40 (37.7)		
Anti-HCV						
Positive	6 (46.2)	5 (38.5)	2 (15.4)	13 (12.3)	1.549*	0.439
Negative	53 (57.0)	21 (22.6)	19 (20.4)	93 (87.7)		
Co-infection						
Positive	2 (100.0)	0 (0)	0 (0)	2 (1.9)	0.945*	1.000
Negative	57 (54.8)	26 (25.0.0)	21 (20.2)	104 (98.1)		
Child- Pugh Score						
Class A	24 (82.8)	3 (10.3)	2 (6.9)	29 (27.4)	14.512*	0.005
Class B	26 (51.0)	15 (29.4)	10 (19.6)	51 (48.1)		
Class C	9 (34.6)	8 (30.8)	9 (34.6)	26 (24.5)		

Fisher's exact test was used where counts are less than 5 in any cell.

The mean age CLD patients with a low and high FIB-4 score was 34.6 (±11. 94) and 51.86 (±15.78) respectively and this was statistically significant (p< 0.001), see table 3.

Table 3 Comparison of the Mean Values of FIB-4 by Categories of Attributes among the Study Participants

	FIB-4 (<1.45)	FIB-4 (1.45-3.25)	FIB-4 (>3.25)	Mean square	P-value
Age	34.62±11.94	36.79±10.15	51.86±15.78	2751	0.001
BMI (Kg/m²)	22.55±5.04	22.34±5.32	21.38±3.8	12.133	0.600
Alkaline phosphatase (U/L)	101.34±106.99	103.14±83.87	116.07±117.4	2010.10	0.823
Total bilirubin (µmol/L)	38.74±53.98	33.71±32.37	47.47±54.36	1640.8	0.471
Gamma-glutamyl transferase (U/L)	195.72±300.5	169.03±177.5	249.11±295.1	48850	0.479
Prothrombin time (Secs)	3.65±7.23	4.47±4.12	6.76±5.71	80.585	0.91

Post-hoc testing (i.e. Bonferroni test) revealed the difference in the mean age of patients in the <1.45 and 1.45-3.25 FIB-4 categories was 2.2 years but this was not statistically significant (p=1.000). However, the difference in the mean age of patients in the <1.45 and >3.25 FIB-4 categories was 17.3 years and this was statistically significant (p<0.001). Similarly, the mean age of patients in the 1.45 – 3.25 and >3.25 FIB-4 categories was 15.1 and this was also statistically significant (p<0.001), see table 4.

Table 4 Post-hoc Tests Comparing the Mean Values of Variables by FIB-4 Score Categories among the Study Participants

VARIABLE	FIB-4 score categories Row mean of variable – Column mean of variable p-value		
Age		<1.45	1.45 – 3.25
	1.45 – 3.25	(36.8-34.6 =2.2) 1.000	
	>3.25	(51.9-34.6=17.3) ***< 0.001***	(51.9-36.8=15.1) ***<0.001***

However the mean age of CLD patients with a low and high APRI score was 39.63 (± 13.37) and 42.95 (±14.69) respectively but this was not statistically significant. The mean prothrombin was however found to be significantly deranged (i.e. 7.1 seconds) in CLD patients who had an APRI score > 2, see table 5.

Table 5 Comparison of the Mean Values of APRI Score by Categories of Attributes among the Study Participants

	APRI <1	APRI 1-2	APRI >2	Mean-square	P-value
Age	39.63±13.37	40.78±16.6	42.95±14.69	120.22	0.56
BMI (Kg/m²)	22.43±5.62	22.39±4.30	20.98±2.39	16.727	0.494
Alkaline phosphatase (U/L)	91.23±89.1	125.67±94.35	123.6±134.1	14757	0.235
Total bilirubin (µmol/L)	30.74±42.96	43.20±39.4	58.18±59.33	59300	0.062
Gamma-glutamyl transferase (U/L)	171.54±237.3	255.24±243.5	216.09±313.0	54731	0.438
Prothrombin time (Secs)	3.53±5.78	6.0±4.56	7.1±6.61	120.22	0.027

The difference in the mean prothrombin time of patients (i.e. post hoc test) in the <1 and 1-2 APRI categories was 2.5 seconds but this was not statistically significant (p=0.200). Whereas, the difference in the mean prothrombin time of patients in the <1 and > 2 APRI categories was 3.6 seconds and this was statistically significant (p=0.049). In the 1 – 2 and > 2 APRI categories the mean prothrombin time was 1.1 seconds but this was not statistically significant (p =1.000), see table 6.

Table 6 Post-hoc Tests Comparing the Mean Values of Variables by APRI Score Categories among the Study Participants

VARIABLE	APRI score categories Row mean of variable – Column mean of variable p-value		
Prothrombin Time (Secs)		<1	1 – 2
	1 – 2	(6-3.5) =2.5 0.200	
	>2	(7.1-3.5) = 3.6 0.049	(7.1-6.0)= 1.1 1.000

Pearson correlation analysis revealed a direct relationship between FIB-4 score with age and prothrombin time and an inverse relationship with platelet count and this was statistically significant. Whereas the APRI score had a direct relationship with the prothrombin time and CTP score, it also showed an inverse relationship with the platelet count and this was statistically significant. Abdominal ultrasound scan findings revealed that most patients with a low APRI score had a heterogeneous echotexture pattern, see table 7.

Table 7 Correlation of Variables with FIB-4 and APRI Score

FIB-4		
Variables	Correlation coefficient	p-value
Age	0.420**	0.001
Alkaline phosphatase	-0.021	0.829
Albumin	0.021	0.827
Platelet count	-0.426**	0.001
Prothrombin time	0.326**	0.001
Child-Tourette Pugh score	0.236*	0.015
APRI score	0.701	0.001
APRI Score		
Age	-0.009	0.927
Alkaline phosphatase	0.131	0.182
Albumin	0.066	0.502
Platelet count	-0.446**	0.001
Prothrombin time	0.425**	0.001
Child-Tourette Pugh score	0.291**	0.002
FIB-4 score	0.701**	0.001

Inversely patients with an intermediate to high FIB-4 score had a heterogeneous echotexture pattern, however these findings were not statistically significant, see table 8.

Table 8 Comparison of APRI and FIB-4 Scores with Abdominal Ultrasonographic Findings among Study Participants

APRI						
Ultrasonographic findings	APRI <1	APRI 1-2	APRI >2	Total (N=106) Frequency (%)	Chi-square tests	P-value

Homogenous echotexture	16 (69.6)	5 (21.7)	2 (8.7)	23 (21.7)	2.765*	0.237
Heterogeneous echotexture	43(40.6)	22 (20.8)	18(17.0)	83 (78.3)		
FIB-4						
Ultrasonographic findings	**FIB-4 (<1.45)**	**FIB-4 (1.45-3.25)**	**FIB-4 (>3.25)**	**Total (N=106) Frequency (%)**	**Chi-square**	**P-value**
Homogenous echotexture	9 (34.8)	10(43.5)	5 (21.7)	23 (21.7)	0.792	0.834
Heterogeneous echotexture	25 (23.6)	34 (32.1)	24 (22.6)	83 (78.3)		

DISCUSSION

This was an observational study which aimed to use the APRI and FIB4 score to evaluate the severity of liver disease in a cohort of CLD patients. The APRI and FIB-4 cut-off are traditionally validated with several histologic (fibrosis staging) scoring systems such as, Knodell Ishak, Metavir, or Batts and Ludwig scores.[16]

Liver biopsy remains the gold standard for staging liver fibrosis. The quality and reliability of staging through histopathological evaluation of liver tissue depends majorly on the size of the specimen and the number of portal tracts.[16] The optimum size of liver tissue that is required for the appropriate staging of fibrosis is 2-3 cm long with more than 11 portal tracts being visible.[16] However in reality, tissue adequacy may be difficult to achieve. A typical liver specimen reflects only about 1/50,000 of the entire liver. Hence, adjacent stages of fibrosis (i.e. F1 vs. F2 or F2 vs. F3) may be difficult decipher.[16]

In this study only 15 patients met the criteria for liver biopsy, a major reason being that most of the CLD patients had either CTP class B (48%) or class C (27%) disease. This would suggest that most patients either had significant functional compromise (i.e. prothrombin time ranging between 4-6seconds) or advanced liver disease with decompensation (e.g. prothrombin time > 6 seconds).[24] Ndububa et al had a similar finding, they concluded that CLD patients seen in their practice commonly presented with advanced liver disease.[4] They graded their CLD patients into either Class A (1.6%), CTP B (32.8%) or CTP C (65.6%). More than half of patients in this study already had coagulopathy, making them ineligible for liver biopsy.[4] An abnormal prothrombin time or international normalized ratio (i.e. greater than 3 seconds or 1.5 respectively) is a relative contraindication to liver biopsy due to the increased risk of bleeding.[25]

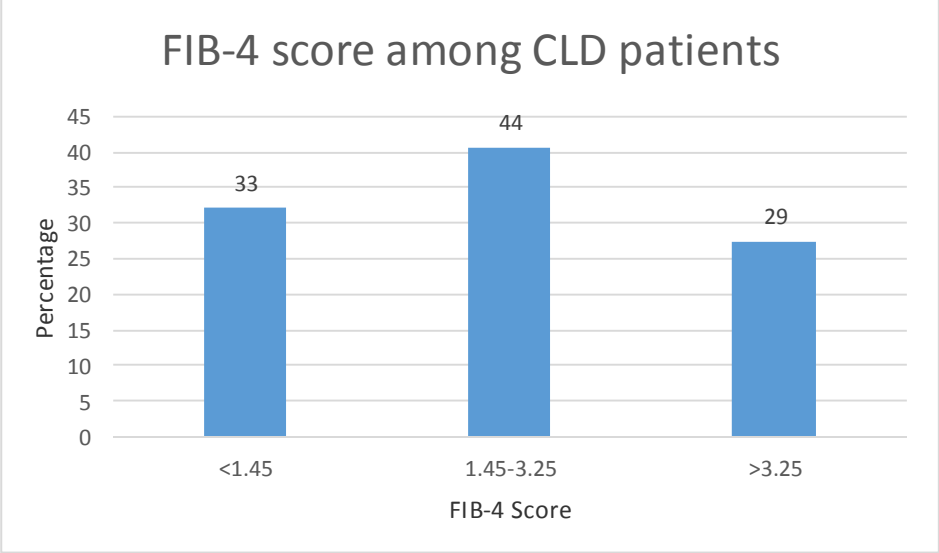

Fig 1 Frequency Distribution of the FIB-4 Score among CLD Patients

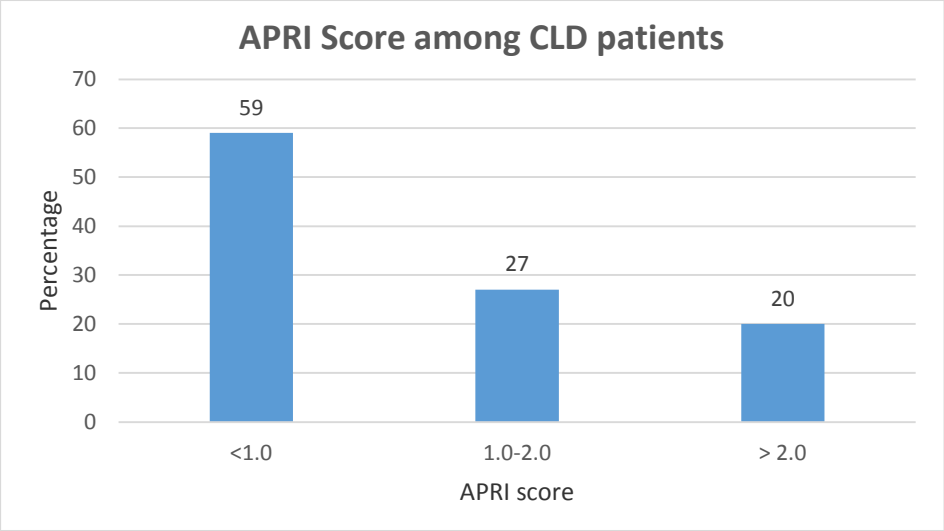

Fig 2 Frequency Distribution of the APRI Score among CLD Patients

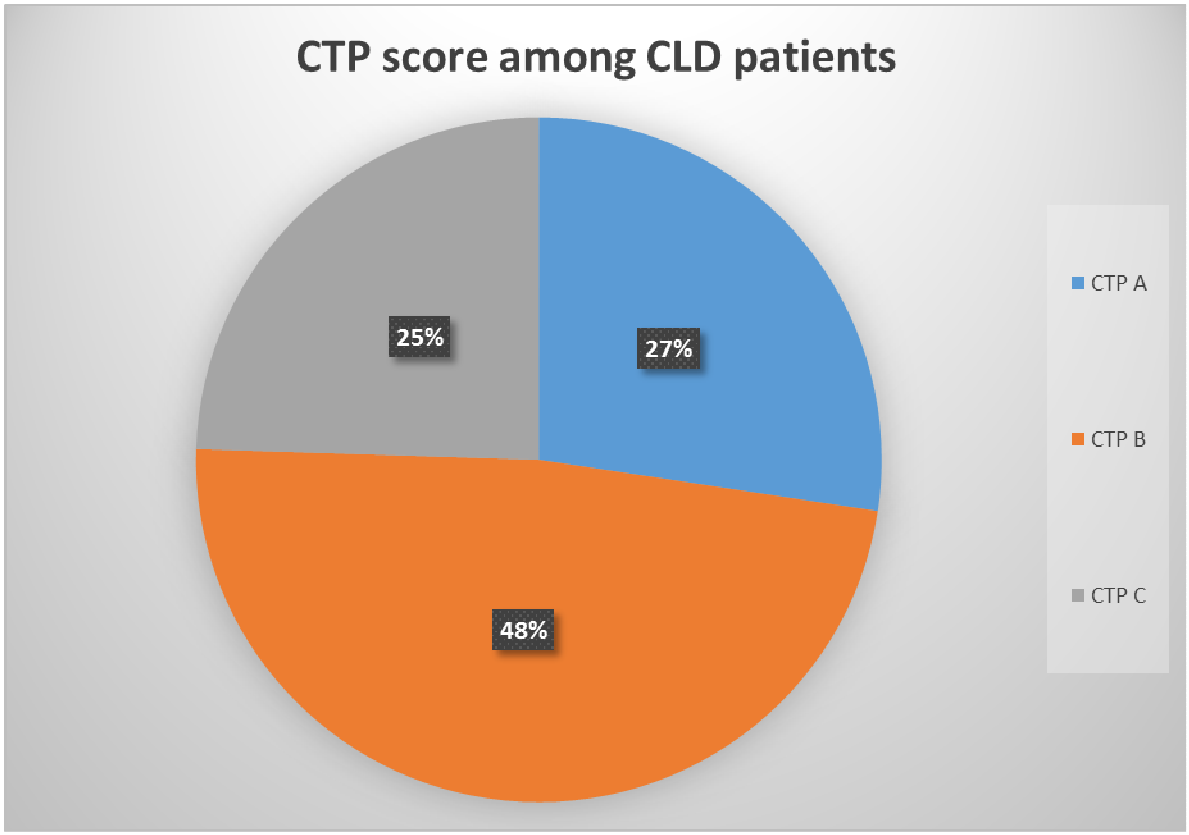

Fig 3 Frequency Distribution of the Child – Tourette Pugh (CTP) Score among CLD Patients

The APRI and FIB-4 scores were further compared with the severity of CLD (using the Child-Pugh score to grade severity). Most CLD patients had mild fibrosis using the APRI score (i.e. 58%), while the FIB-4 score revealed that more CLD patients had either moderate (43%) or severe fibrosis (29%), see figure 1 and 2. Furthermore, it was observed that patients with CTP class A also had a low FIB-4 score, in addition the higher the FIB-4 score the greater the CTP score. These findings were found to be statistically significant. In one study, though the FIB-4 and APRI had a comparable overall performance rate, the proportion of patients further classified using the FIB-4 score represented a greater number of liver biopsies that could be correctly avoided when compared with the APRI score.[26] Since these NITs are predictors of fibrosis which contributes to the features of CLD and its ensuing complications, it is practical to consider these non-invasive methods where liver biopsy is contraindicated or inaccessible in a resource poor setting.

Bivariate analysis revealed that most of the patients with low to intermediate FIB-4 and APRI score where < 60 years of age and this was statistically significant only in the patients classified using the FIB-4 score. Li et al demonstrated in their study that the APRI and FIB-4 have better diagnostic performances for significant fibrosis and cirrhosis in older (≥30 years) chronic hepatitis B patients compared with younger patients (<30 years).[27] Pearson correlation analysis done, further revealed a strong relationship between the APRI and FIB-4 score with age. Research has revealed that the likelihood of significant fibrosis and cirrhosis is higher when chronic hepatitis B patients are older than 30 years.[27]

Abdomino-pelvic ultrasound scan can be a useful tool in assessing the liver parenchyma/structure. It is relatively cheap and widely available in most Nigerian hospitals. However with an APRI score of < 1, most patients in this category interestingly had a heterogenous echotexture of the liver on ultrasound scan (43, 51.8%). Whereas, a moderate to severe FIB-4 score better correlated with the presence of a heterogenous echotexture of the liver (though this was not statistically significant). The accuracy, sensitivity and specificity of abdominal ultrasound scan for the diagnosis of liver cirrhosis is reported to be a modest 64–79%, 52–69% and 74–89%, respectively.[10]

The APRI score correlated with a higher mean prothrombin time than the FIB-4 score. Pearson correlation analysis showed a strong relationship between APRI and FIB-4 score with prothrombin time. The finding of coagulopathy is usually common in cirrhotic patients and is due to a reduction in hepatic mass from cirrhosis leading to a reduction in the synthesis of vitamin K–dependent clotting factors.[3]

Traditionally the FIB-4 and APRI score have been validated to non-invasively predict the severity of hepatic fibrosis.[2] Although few patients had a liver biopsy done in this study, the severity of liver disease arising from fibrosis or cirrhosis could be inferred by using these NITs. This study revealed that patients with a high FIB-4 index when compared with a high APRI score better selected CLD patients that were classified with either CTP class B or C. A comparable finding was reported by Wang et al who demonstrated that the FIB-4 index predicted advanced fibrosis and cirrhosis better than the APRI score in chronic hepatitis C patients. Like other non-invasive scoring tools such as estimated glomerular filtration rate (eGFR) for predicting kidney function, these NITs may be useful in a low medium income setting such as ours, to further asses and classify CLD patients.[28]

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