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**ORIGINAL ARTICLE**

# Analyze the Efficacy of the AST to Platelet Ratio (APRI) and the Fibronectin Fibrinolysis-4 (FIB-4) using Transient Elastography (FIB-SCAN) in Patients with Chronic Hepatitis C

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## ABSTRACT

**Objective:** The purpose of this study was to compare the effectiveness of AST to platelet index (APRI) and FIB-4 with transient elastography, also known as fibro scan, in patients who suffered from chronic Hepatitis C.
**Study Design:** Retro-prospective/ Cross-sectional
**Place & Duration:** Khalifa Gulnawaz Teaching Hospital Bannu Pakistan, From August, 2021 to May, 2022.
**Material and Methods:** This research included 360 men and women. After obtaining written consent, detailed demographics of all cases were recorded. In 360 HCV infected individuals, the diagnosis comprised CBC, LFTs, ELISA, PCR, and fibro. We compared AST, apric, FIB-4, and fibro scans for detecting HCV fibrosis progression. SPSS 22.0 was used to analyze all data.
**Results:** There were majority males 220 (61.1%) and 140 (38.9%) females. 85 (23.6%) had age 20-30 years 180 (50%) cases had age 31-40 years and 95 (26.4%) patients had age >40 years. We found that 210 (58.3%) patients had fibrosis stage F0-F1, F2 stage was in 28 (7.8%) cases, F3 stage was in 52 (14.4%) patients and F4 stage in 70 (19.4%) cases. Among 360cases, genotype 3a was found in 260 (72.2%) patients, genotype 1b in 70 (20.8%) cases and genotyped 1a in 30 (8.3%) cases.
**Conclusion:** In this study, we found that the AST to Platelet Index (APRI) and FIB 4 were able to successfully identify among cirrhotic and non-cirrhotic phases among HCV-infected patients.
**Keywords:** Liver, Hepatitis C, Fibrosis

## INTRODUCTION

Before being renamed Hepatitis C Virus (HCV), non-A non-B (NANB) hepatitis was a common cause of parenterally transferred hepatitis until 1989. Worldwide, 122-185 million people are infected with HCV, a frequency of 2%-3%. [1] Liver inflammation and fibrosis can range from mild to severe. Acute and chronic hepatitis are both caused by HCV infection, which damages liver cells. Most people with acute HCV infection don't have any symptoms at all, while others get a mild viral sickness for a few weeks or even jaundice. It is not uncommon for nonalcoholic steatohepatitis C (CHC) infection to be discovered by routine diagnostic procedures. Between 15 to 25 percent of those with acute HCV infection recover completely on their own, whereas the rest go on to acquire chronic infection. Over the course of 20–25 years, chronic hepatitis C infection induces liver fibrosis, which subsequently rapidly advances to cirrhosis, decompensation, HCC, and ultimately death. [2] In patients with chronic hepatitis C infection, the severity of liver fibrosis is a major factor in how the virus and its complications are treated.

In spite of the fact that a biopsy is the holy grail for the histological evaluation of fibrosis status, it is a very intrusive procedure fraught with rare but possibly fatal consequences. Transient elastography (TE) for measuring liver stiffness has recently replaced Doppler ultrasound as the gold standard for noninvasively diagnosing hepatic fibrosis worldwide. [3] Due to its reliability and high levels of inter- and intraobserver agreement, TE has found widespread use, and it has been verified in a large number of studies, all of which have demonstrated a strong association with histological evaluation by liver biopsy. [4-6] However, there are drawbacks to TE as well; it needs a specialised apparatus that is prohibitively expensive for many locations, and it has been noted that some groups of patients (those with ascites, obesity, restricted rib space, etc.) are unable to produce an accurate TE reading. [7]

The aspartate aminotransferase to platelet ratio index (APRI) and the fibrosis index based on the four variables (Fibrosis-4 index; FIB-4) are two of the most recent serum markers of liver fibrosis [8,9]. The diagnostic relevance of these two blood indices for identifying liver fibrosis in various populations has been evaluated via significant research over the past two decades (18–20). APRI and FIB-4 have been examined more than any other blood noninvasive assays for assessing liver fibrosis[10].

Recently, the use of these two blood indices in identifying liver fibrosis has been the subject of several meta-analyses. Researchers Lin et al. [11] examined the efficacy of APRI in identifying hepatitis C virus-related liver fibrosis by pooling the results of many investigations (HCV). In order to evaluate the relative efficacy of APRI or FIB-4 in the diagnosis of liver fibrosis caused by the hepatitis B virus, Xiao et al. [12] performed a meta-analysis. More recently, Xiao et al. [13] meta-analyzed APRI and Projects for staging liver fibrosis in patients having nonalcoholic fatty liver disease to evaluate their diagnostic accuracy (NAFLD). External validation studies of these two noninvasive models for predicting liver fibrosis in individuals with AIH have generated conflicting results in recent years. The diagnosis performance of APRI or FIB-4 in AIH patients in terms of fibrosis staging has only been evaluated in a single meta-analysis to our knowledge. [14,15]

We evaluate the benefits and limitations of noninvasive methods for evaluating liver fibrosis in the management of individuals with hepatitis virus B or C.

## MATERIAL AND METHODS

This cross-sectional study was carried out at Khalifa Gulnawaz Teaching Hospital Bannu Pakistan, From August, 2021 to May, 2022 and comprised of 360 cases. After receiving written consent from each patient, we recoded their detailed medical information, which included their age, gender, and body mass index. Patients who suffered from any chronic liver illness or detected any indications of liver cancer and did not offer any written consent to participate in this study were not considered for participation.

Patients with chronic HCV infection who tested positive primarily for hepatocellular carcinoma (HCC) antibodies were found among those who sought treatment at the Hepatitis Clinic in the General Hospital of Lahore. The Hepatitis Clinic was located within the hospital. Those who were infected with HBV and HCV, as well as patients who were infected with HCV and HIV, were not

allowed to participate in the research. The baseline viral load, which was obtained using polymerase chain reaction, as well as biomarkers (the LFTs), albumins, bilirubins, and complete blood counts (CBC), were used to quantitatively estimate FibroScan scores (Liver Stiffness Index). The FibroScan score and the Metavir Method were utilised in order to ascertain the fibrosis stages of the patients. We made the discovery that the results of the FibroScan were trustworthy if the IQR/medium value was less than 30%. The mean value was determined after 10 separate FibroScans were performed. Ziol transient elastography cutoffs were then used for MFS staging; FibroScan levels between 8.9 and 14.6 are categorized as F3, while values between 9.7 and 14.6 are defined as F4. Values between 2.5 and 8.8 are classified as F0 to F1. FibroScan is a method of diagnostic imaging that does not include any invasive procedures. It is commercially known as "F3." We performed a thorough examination of the patients' AAR, APRI, FI, FIB-4, API, Pohl, and FCI serum values, as well as our recently written NFI serum FIs. In terms of the p-value of 0.05, there hasn't been much of an increase or decrease in death rates.

## RESULTS

Among all cases, 85 (23.6%) patients had age 20-30 years 180 (50%) cases had age 31-40 years and 95 (26.4%) patients had age >40 years.(figure-1)

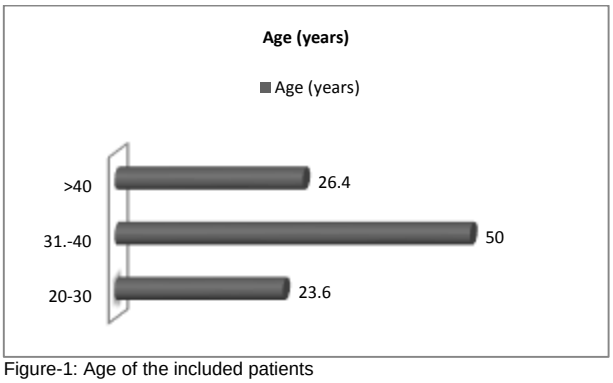


Figure-1: Age of the included patients

There were majority males 220 (61.1%) and 140 (38.9%) females. Mean BMI of the cases was 23.16±14.38 kg/m$^2$. (table 1)

Table 1: Gender and body mass index of all cases.

| Variables | Frequency No. | %age |
|---|---|---|
| Gender | | |
| Male | 220 | 61.1 |
| Female | 160 | 38.9 |
| Mean BMI (kg/m$^2$) | 420 | 36.5 |

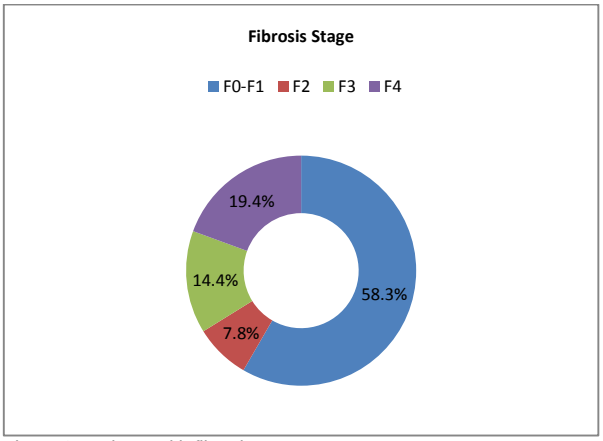


Figure-2: Patients with fibrosis stage

According to fibrous stage of 360 HCV patients, 210 (58.3%) patients had fibrosis stage F0-F1, F2 stage was in 28 (7.8%) cases, F3 stage was in 52 (14.4%) patients and F4 stage in 70 (19.4%) cases.(figure 2)

Among 360cases, genotype 3a was found in 260 (72.2%) patients, genotype 1b in 70 (20.8%) cases and genotyped 1a in 30 (8.3%) cases. (Figure 3)

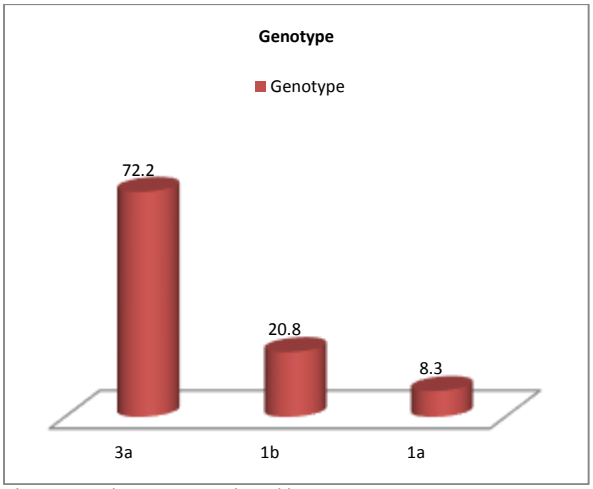


Figure-3: Patients presentation with genotype

Validation of APRI serum AST platelet ratios and Fibrosis 4 was accomplished through the use of ROC Curve analysis, as well as the determination of sensitivity, specificity, and cutoff criteria.(Figure 4)

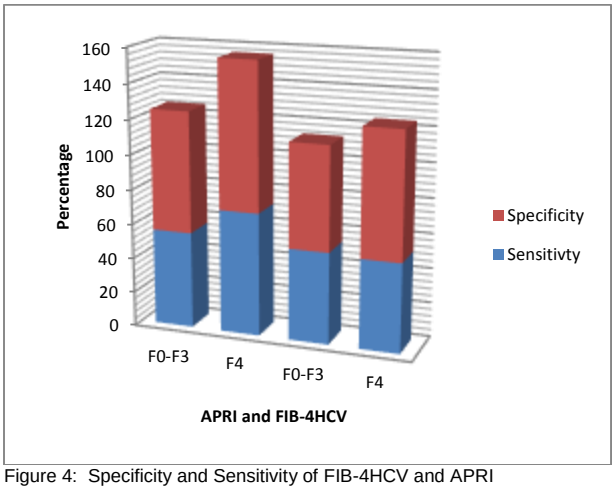


Figure 4: Specificity and Sensitivity of FIB-4HCV and APRI

## DISCUSSION

Cirrhosis of the liver, caused by non-alcoholic fatty liver disease and persistent HCV infection, is a leading cause of mortality from chronic illness. Cirrhosis does not develop in all patients at the same time, although it takes around 30 years for a median infection to occur in patients of varying ages, which range from 15 to 55 years. Symptoms of cirrhosis include fibrosis in the connective tissue and the progression of that fibrosis into the liver tissue that occurs when HCV is present. [16,17] The most prevalent HCV genotype in our sample was 3a, which lends credence to previously conducted research in Pakistan on the topic of the frequency of other HCV genotypes. Many of the F0-F1 individuals had no fibrosis or only early fibrosis, and then they developed cirrhosis (F4). There was no fibrosis stage at any point.

In current study 360 patients of both genders were presented. There were majority males 220 (61.1%) and 140 (38.9%) females. 85 (23.6%) had age 20-30 years 180 (50%) cases had age 31-40 years and 95 (26.4%) patients had age >40 years. These results were comparable to the previous researches.[18,19] With an AUROC of 0.796 and 0.814, respectively, for predicting cirrhosis, we discovered that APRI and FIB4 performed well, and these results are consistent with the AUROC of APRI and FIB4 score for cirrhosis in the prior meta-analysis with liver biopsy as the gold standard. [20] When comparing the APRI score with the FIB4 score for predicting SF status, the AUROC for the former was 0.844 and that for the latter was 0.804 (P 0.001). Despite the fact that the low and high cutoff values of the APRI score give sensitivity and specificity identical to the prior report, the AUROCs for both are numerically greater than the previous meta-analysis. Since the APRI score is easier to calculate and has superior diagnostic performance than the FIB4 score, we recommend using it for hepatic fibrosis evaluation in the management of CHC patients.

It was determined that APRI cutoff values of 0.5 and 0.3 had a sensitivity of 55.6% and 70.8%, respectively, for ruling out cirrhosis and SF. In our investigation, we used a lower cutoff value for APRI of 0.5 to rule out cirrhosis, which is comparable to the results of a recent Australian study[21] in which a cutoff level of 0.49 generated an amazing NPV of 95%. This lower cutoff value of 0.5 and 0.3 to rule off cirrhosis and SF, however, cannot be recommended at this time since we employed TE as the standard reference in our research, and it was not a gold standard. Additional research is required to identify low cutoff values for use as a screening instrument to exclude hepatitis and SF and to validate such values. The findings are in line with those of a previous study which found that liver stiffness levels were just as effective as HVPG readings in predicting individuals who will have clinical decompensation and portal hypertension problems. [22] Different noninvasive techniques for survival and headache prediction have been examined in recent French[23] (TE, FibroTest, APRI and FIB-4)

Multiple studies have pinpointed host variables important in the progression from fibrosis to HCC. Their use is congruent with the goal of eliminating the drawbacks of invasive biopsy using noninvasive techniques. Different treatment plans are based on the degree of liver fibrosis. Those with moderate fibrosis tend to be younger than those with intermediate or severe fibrosis, and there is minimal correlation between gender and fibrosis severity, according to this study. Our research and the new guidelines we've developed indicate that liver biopsies should only be performed when there is strong opposition from less invasive methods. However, blood indicators can also be used to predict cirrhosis and severe stages of fibrosis, such as in obese individuals, in cases when transient elastophobia are not readily available, cost-effective, or diagnosis rates are low.[24,25]

## CONCLUSION

In this study, we found that the AST to Platelet Index (APRI) and FIB 4 were able to successfully identify among cirrhotic and non-cirrhotic phasses among HCV-infected patients.

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