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Evaluation of Aspartate Aminotransferase to Platelet Ratio Index as A Marker for Cirrhosis: A Study from A Tertiary Care Center in Nepal

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ABSTRACT

Background: Liver cirrhosis is a leading cause of morbidity and mortality worldwide, including Nepal. Liver biopsy, the gold standard for fibrosis assessment, is invasive and carries various risks. The Aspartate Aminotransferase to Platelet Ratio Index (APRI) offers a non-invasive, cost-effective alternative. However, data on its utility in Nepalese populations are limited.

Method: This cross-sectional study enrolled 58 cirrhotic patients and 58 healthy controls at Bir Hospital from April 2019 to January 2020. Clinical examinations, laboratory tests, and ultrasonography were performed. APRI with a cut-off of 0.5 was evaluated using SPSS version 23, applying chi-square and ANOVA tests.

Result: Among 116 participants, APRI at a 0.5 cut-off demonstrated 88.3% sensitivity, 82.5% specificity, 90.1% positive predictive value, and 70.2% negative predictive value (p = 0.002, 95% CI).

Conclusion: APRI is a reliable non-invasive tool for diagnosing liver fibrosis in cirrhotic patients, offering high sensitivity and specificity. It is practical for bedside use, especially in resource-limited settings.

Key words: APRI; cirrhosis; liver fibrosis; aspartate aminotransferase; platelet count.

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INTRODUCTION

Cirrhosis is one of the common causes of death in the world. It is estimated to have been around one million deaths worldwide in a year due to complications of cirrhosis. Alcohol is the major cause of cirrhosis worldwide and around two billion people regularly consume alcohol out of which 75 million people are diagnosed with alcohol-use disorders and are at risk of alcohol-associated liver disease.[1] It could be just a tip of ice-berg as early stage or compensated liver diseases are often asymptomatic and they seek medical advice only when decompensated or presenting with other complications of cirrhosis. Alcohol consumption is a major health problem and alcohol related liver disease is one of the most common diseases in Nepal, however national data on the exact burden of the disease is lacking.[2] Liver cirrhosis is the outcome of chronic liver disease. Chronic inflammation of the hepatocytes due to various etiologies leads to healing process in the form of nodular regeneration resulting in alteration of normal lobular organization of liver and subsequent scarring leading to fibrosis. The most common causes of cirrhosis are enlisted as alcoholic liver disease (ALD), chronic viral hepatitis including Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infection and nonalcoholic fatty liver disease (NAFLD) which account for about 80% of cases of cirrhosis. Previously it had been thought cirrhosis was never reversible. Recent case reports have documented that the early stage of fibrosis is reversible as was apparent after successful treatment of chronic HCV infection and hemochromatosis. Alcoholic liver disease was reversible to some extent in early stages after complete discontinuation of alcohol consumption. Early detection of fibrosis would also allow for timely information to the patients, undertaking necessary precautions and interventions including initiation of anti-fibrotic therapies and prevention of cirrhosis. Liver biopsy as the gold standard for the evaluation of liver fibrosis is invasive and has significant side effects like pain, intraperitoneal bleeding, hematoma formation, infections, peritonitis, organ injury, and malignant needle-track seeding in cases of Hepatocellular Carcinoma. APRI was initially proposed in chronic HCV infected patients in predicting the extent of

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fibrosis.[9] It is simpler, cost-effective and easier to calculate than MELD (Model for End-stage Liver Disease) score. Hence, the present study is to evaluate APRI as a useful marker of fibrosis in patients with chronic liver disease in the Nepalese population and determine its sensitivity and specificity as a diagnostic tool.

METHODS

An analytical cross-sectional study was conducted in the department of Internal Medicine Bir Hospital, Kathmandu from April 2019 to January 2020. Ethical clearance for the research was obtained from the Institutional Review Committee (IRC) of the National Academy of Medical Sciences (NAMS). The study included all the liver cirrhosis adult patients of age more than 18 years attending OPD and inpatient in Bir hospital for therapeutic and diagnostic purposes. A total of 116 patients composed of 58 patients with cirrhosis and 58 healthy controls without having any clinical and USG evidence of liver diseases were enrolled in this comparative study. A detailed proforma of the participants divided into two groups as cases and healthy controls inclusive of Name, Age, Gender, Occupation, Clinical Features, Risk Factors, Amount of Alcohol Consumption, Ultrasonographic findings, Laboratory values of AST and platelets were collected. After collecting data from pre define questionnaire. Data was entere and analyzed by using SPSS-17. Data was analyzed by using descriptive and inferential statistical tools. In the descriptive statistics for categorical variable frequency and percentage were calculated while for continuous variables mean and SD were calculated. In the inferential statistics to compare the mean value between two group independent t test were used. p-vaue <0.05 was considered as satistically significant.

RESULTS

In a total of 116 patients, 58 patients with liver cirrhosis among which 41 (70.7%) were male and 17 (29.3%) were female with a M:F ratio of 2.41:1 and 58 healthy persons among which 30 (51.7%) were male and 28 (48.3%) were female with a M:F ratio of 1.07:1 were enrolled. The Maximum age of participants with liver cirrhosis was 87 years and minimum age was

Table 1. Gender differences of cases. (n=58)

Gender	Frequency (%)
Male	41(70.7)
Female	17(29.3)

Table 2. Gender differences in healthy controls. (n=58)

Gender	Frequency (%)
Male	30 (51.7)
Female	28 (48.3)

Table 3. Age-wise differences of participants.

Age Group (Years)	Case (n=58)	Control (n=58)
	Frequency (%)	Frequency (%)
10-20	-	1(1.72)
20-30	-	6(10.34)
30-40	8(13.79)	7(12.06)
40-50	20(34.48)	4(6.89)
50-60	14(24.13)	8(13.79)
60-70	12(20.68)	13(22.41)
70-80	2(3.44)	14(24.13)
80-90	2(3.44)	5(17.85)

Table 4. Etiology of liver cirrhosis. (n=100)

Causes	Frequency (%)
Alcohol	54(93.1)
Chronic Hep B Infection	5(8.6)
Chronic Hep C Infection	1(1.72)
Others	1(1.72)

Table 5. Child Pugh Classification. (n=58)

Child Pugh Class	Frequency (%)
Class A	-
Class B	16 (27.6)
Class C	42 (72.4)

Table 6. APRI values in the participants. (n=58)

Participants	Minimum	Maximum	Mean	SD
Case	0.18	4.72	2.1029	1.24235
Healthy Control	0.05	0.95	0.3419	0.2037

Table 7. Differences in Mean among the participants.

Variables	Control	Case	p-value
AST	29.21±15.222	92.62±61.108	p<0.05
Platelet Count	245724.14±92955.902	128913.79±73571.372	p<0.05
APRI	0.3417±0.20427	2.1029±1.24235	p<0.05

Table 8. Accuracy of APRI.

Cut-off	Sensitivity	Specificity	PPV	NPV
0.5	88.30%	82.50%	90.10%	70.20%

32 years with mean of 51.41 and SD of 11.951. The maximum age of healthy participants was 86 years, and minimum age was 19 years with mean of 56.36 and SD of 18.861. Maximum number of liver cirrhosis patients were in the range 40 to 50 years (34.4 %).

DISCUSSION

The present study evaluated the accuracy of APRI as a useful non-invasive marker fibrosis in the Nepalese population. The simple blood test of AST and Platelet level and simple mathematical calculation make APRI a useful, cost-effective and bedside test.[9] Liver cirrhosis in various stages with various clinical features and varied etiologies like Alcohol consumption, Chronic Hepatitis infections and others, and classified as Child Pugh B of total 16 patients (27.6%) and Child Pugh C of total 42 patients (72.4%) were studied among total 58 cases. The study showed that alcohol consumption was the most common cause of liver cirrhosis (93.1%) followed by chronic hepatitis B infection (8.6%), chronic hepatitis C infection (1.72%) and other causes (1.72%). Both alcohol consumption and chronic hepatitis B infection were found in 3.44% and both alcohol consumption and chronic hepatitis C infection were found in 1.72% of liver cirrhosis patients. In the study, using ascites, bilirubin level, PT/INR value, albumin level and encephalopathy as variables, Child Pugh class A was classified with score 5 to 6 points, class B with score 7 to 9 points and class C with score 10 to 15 points. Among 58 patients analyzed, 72.4 % of the patients were in Child Pugh class C, 27.6 % were in Child Pugh class B and none were in Child Pugh class C. The study showed that the mean AST value among cases (n=58) was 92.62 with standard deviation of 61.108 whereas the mean AST value among controls (n=58) was 29.21 with standard deviation of 15.222. There was statistically significant difference observed between mean AST values among cases and healthy controls with p value <0.05. The mean platelet count among cases was 128913.79 with standard deviation of 73571.372 cells/mm3 and among controls was 245724.14 with standard deviation of 92955.902 cells/mm3. There was statistically significant difference observed between mean platelet count among cases and controls with p value <0.05. Similarly, the mean APRI value among cases was 2.1029 with maximum value of 4.72 and minimum value of 0.18 with standard deviation of 1.24235 whereas the mean APRI value among controls was 0.3417 with maximum value of 0.95 and minimum value of 0.05 with standard deviation of 0.20427. There was a statistically significant difference between mean APRI value among cases and controls with p value <0.05. The diagnostic accuracy of the APRI model in predicting cirrhosis was found to be 88.3 % sensitive and 82.5 % specific with positive predictive value of 90.1 % and negative predictive value of 70.2 %. Similar results were obtained in a study done by Princi et al,[13] in 2015 for evaluation of the APRI with the mean APRI score of the case and healthy cohort were 2.178±1.224 and 0.364±0.137 respectively. The difference was statistically significant (p-value = <0.001) ROC curve for diagnostic accuracy of the APRI model in predicting cirrhosis. The diagnostic accuracy of the APRI in predicting fibrosis was found to have sensitivity of 96.1% and specificity of 96%.

CONCLUSIONS

The major conclusion was drawn based on the objectives and study findings. The study findings conclude that aspartate to platelet ratio index (APRI) with a cutoff value of 0.5 has sensitivity of 88.3 % and specificity of 82.5 %, positive predictive value of 90.1 % and negative predictive value of 70.2 % (p=0.002, CI=95 %). we conclude that the APRI is a useful marker of liver fibrosis. There was no significant difference observed between male and female patients in APRI level. It can be used as a useful tool in predicting fibrosis in remote areas of Nepal where facilities for liver biopsy and Fibro scan are not available. This study also found a correlation between Child Pugh class and APRI, the higher the class, the higher the value and prediction of liver fibrosis. Hence, APRI was a useful marker for predicting liver fibrosis.

Limitations: This study highlights APRI as a practical, non-invasive, and cost-effective tool for assessing liver fibrosis, reducing the need for liver biopsy,

particularly in resource-limited settings. Its focus on the Nepalese population addresses a gap in the existing literature, enhancing the relevance of findings for this demographic. However, the study's single-center design limits generalizability, and the small sample size may affect statistical power. The absence of liver biopsy as a reference standard could impact the accuracy of the results. Additionally, the cross-sectional nature of the study does not allow for the assessment of APRI's effectiveness in monitoring fibrosis progression over time. Potential selection bias from recruiting inpatients and outpatients also limits the applicability of the findings to the broader population.

Conflict of Interest: None

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