# PAST Score a New Predictor Model for Advanced Fibrosis in a Cohort of Non-alcoholic Fatty Liver Disease

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## ABSTRACT

**Introduction:** Non-Alcoholic fatty liver disease (NAFLD) is increasing worldwide. Among the spectrum of NAFLD, presence of advanced fibrosis is associated with increased morbidity and if unchecked can progress to cirrhosis. Advanced fibrosis is also associated with cardiac dysfunction. Hence it is important to predict advanced fibrosis so that more intensive lifestyle changes and pharmacotherapy with emerging drugs can be tried. Aims and objectives: To evaluate a novel predictor model for advanced fibrosis in NAFLD.

**Material and Methods:**Present cross sectional study was performed on 500 patients with NFALD at Gastroenterology Department of Medical College Trivandrum. All the patients under went transient elastography(TE) after dividing them in to those having advanced fibrosis (TE>=10Kpa) and without advanced fibrosis (TE<10Kpa). Anthropometric and biochemical variables were assessed on the date of TE.Logistic regression was performed, coefficient of beta of independent variables was found out and a new score was proposed.

**Results:** Mean age of study cohort was 48.2±11.76 years which ranged from 18 to 74 years. Female preponderance (52.4%) was observed.Weight, body mass index (BMI), platelet count, fasting blood sugar (FBS), serum glutamic-oxaloacetictransaminas (SGOT), albumin, alkaline phosphatase and thyroid stimulating hormone (TSH) were independent predictors of advanced fibrosis. Logistic regression confirmed TSH, platelet count, albumin and SGOT as the independent predictors. New score has higher AUROC of 0.824(Cut off ≥ - 13.5 has 100% sensitivity in predicting advanced fibrosis) compared to BARD score (AUROC of 0.653) and APRI score (AUROC of 0.802).Specificity of the new score was less than 50%.

**Conclusion:** New score is a better prognostic model to predict advanced fibrosis than BARD score and APRI score. It is a simple bedside tool that can be in cooperated into day to day practice. Validity of the score needs to be checked in a different cohort.


**Keywords:** New Score, BARD Score, Non-Alcoholic Fatty Liver Disease, Sensitivity, Specificity

## INTRODUCTION

Non-Alcoholic fatty liver disease(NAFLD) will likely to become the most common cause of chronic liver disease in the near future.[1] A total 30% of adults have NAFLD globally.[2] NAFLD has three components, steatosis, inflammation and fibrosis. Among those with fibrosis>F2 fibrosis is termed as advanced fibrosis. Advanced fibrosis was associated with increased mortality and if unchecked can progress to cirrhosis.[3, 4]

Advanced fibrosis is also associated with cardiac dysfunction[5], increased risk of hepatocellular carcinoma and many cardio-vascular disorders. Hence it is important to predict advanced fibrosis so that more intensive lifestyle changes and pharmacotherapy with emerging drugs can be tried.

In present study we tried to find out predictor variables for advanced fibrosis in Indian population and to propose a new predictor model and to compare this model with that of existing models.

## MATERIAL AND METHODS

Five hundred patients with a diagnosis of fatty liver disease were studied in a cross-sectional study at Gastroenterology Department of Medical College Trivandrum. Detailed history with emphasis on the consumption of alcohol- duration, dose, period of abstinence etc. as well as any family history of liver disease was recorded.

All patients with USG documentation of fatty liver disease having age >18 years, no alcohol consumption or alcohol consumption < 20g/d in females and < 40g/d in males were included.

Patients having age <18 years, no alcohol consumption or alcohol consumption > 20g/d in females and > 40g/d in males, other disorders with fatty liver like viral hepatitis, wilson's disease and autoimmune hepatitis were excluded.

Anthropometric evaluation was performedincluding height, weight, BMI(body mass index) and waist circumference. Documentation of blood pressure (BP) was made. Other essential blood investigations including viral markers, iron studies, ANA, serum ceruloplasmin to rule out other

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etiologies along with fasting lipid profile and HbA1c were performed.

After ruling out all etiologies, advanced fibrosis (TE >=10 KPA) was assessed using fibroscan machine. All variables were analyzed to find out, predictors for advanced fibrosis and statistically significant variables were put for logistic regression and independent predictors of advanced fibrosis were found out. These independent predictors were used to propose a new score and the new score was compared with few existing scores.

All the data analysis was performed using IBM SPSS ver. 20 software. Qualitative data is expressed as mean and standard deviation whereas categorical data is expressed as percentage. Student t test was performed to compare the mean. Multiple logistic regressionswere performed to evaluatethe independent predictor of advanced fibrosis. P value of <0.05 is considered as significant.

| Variable | Sig. (2-tailed) |
|---|---|
| Height | .072 |
| Weight | .179 |
| Hemoglobin | .444 |
| Total Cholesterol | .161 |
| Platelet count | .000 |
| Cholesterol | .274 |
| Triglyceride | .745 |
| Low density Lipoprotein | .210 |
| High density Lipoprotein | .992 |
| Fasting Blood sugar | .011 |
| Glycated hemoglobin | .046 |
| SGOT | .000 |
| SGPT | .243 |
| Ptn | .474 |
| Serum Albumin (Alb) | .000 |
| ALP | .352 |
| Blood Urea | .553 |
| Serum Creatinine | .775 |
| Thyroid stimulating hormone (TSH) | .022 |
| Bilirubin | .021 |

Statistically significant variables were put for logistic regression to find out independent predictors of advanced fibrosis (Table 2). Of them TSH, SGOT, platelet count and albumin were found to be independent predictor of advanced fibrosis. Co-efficient of Beta was calculated.Each independent predictor (TSH, SGOT, platelet count and albumin) was multiplied by its coefficient of beta (B in table 2) and were added or subtracted basis of positive or negative coefficient of beta and a new score was proposed as follows.

New Score =TSH*0.3+SGOT*0.02-Platelet count –Albumin *2.4

**Table-1:** T test to find out significant variables for advanced fibrosis

## RESULTS

Out of 500 patients, 238 were males (47.6%) and 262 were females (52.4%). Mean age of the study population was 48.2±11.76 years which ranged from 18-74 years.

Age, height, weight, waist, Hb, total count, platelet count, ESR, cholesterol, triglycerides, HDL, LDL, HBA1C, FBS, PPBS, SGOT, SGPT, protein, Albumin, ALP, urea, creatinine, TSH, INR, BMI,AAR and bilirubin were analyzed for significance in predicting advanced fibrosis (Table 1) and found out that weight, BMI, platelet count, FBS, PPBS, HbA1C, SGOT, AST/ALT ratio,Albumin, ALP and TSH were statistically significant.

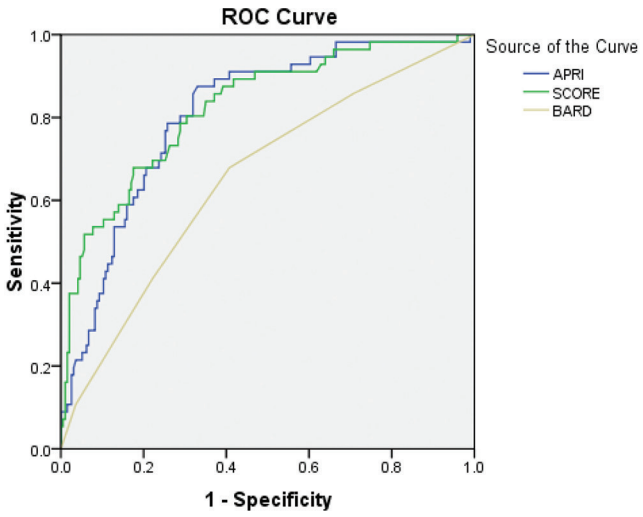


**Figure-1:** Diagonal segments are produced by ties

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Weight | .020 | .025 | .625 | 1 | .429 | 1.020 |
| BMI | .098 | .074 | 1.776 | 1 | .183 | 1.104 |
| PLC | -1.065 | .288 | 13.692 | 1 | .000 | .345 |
| FBS | -.005 | .010 | .235 | 1 | .628 | .995 |
| HbA1c | -.295 | .194 | 2.319 | 1 | .128 | .744 |
| SGOT | .020 | .006 | 12.909 | 1 | .000 | 1.020 |
| AAR | .580 | .365 | 2.520 | 1 | .112 | 1.786 |
| Alb | -2.373 | .511 | 21.587 | 1 | .000 | .093 |
| ALP | .000 | .002 | .016 | 1 | .898 | 1.000 |
| TSH | .296 | .138 | 4.561 | 1 | .033 | 1.344 |
| Constant | 3.921 | 2.498 | 2.464 | 1 | .116 | 50.461 |

New score has AUROC of 0.824 (Cut off ≥-13.5 has 100% sensitivity in predicting advanced fibrosis) compared to BARD score (AUROC of 0.653) and APRI score (AUROC of 0.802).

**Table-2:** Logistic regression of significant variables for advanced fibrosis

## DISCUSSION

Liver biopsy is the gold standard for detectingliver fibrosis. However, liver biopsy had many limitationof being a risky procedure and extensive procedure. Due to these limitation patients find it difficult to undergo for liver biopsy frequently.[4, 6]

Most of the patients with NFALD stay asymptomatic until the late stages. Due to that clinician find it difficult to recommend biopsy. Since than many of the authors are working for the other models for the diagnosis of advanced fibrosis. Ultrasound, computed tomography (CT) or magnetic resonance imaging (MRI) has been tried but due to higher cost they are being used at limited places.[7]

Different models use demographic and clinical variables for its development for predicting liver fibrosis in NFALD patients. Of them, many are not specific to NFALD and other requires a liver fibrosis panel. [5, 8]

In present study we evaluated a novel predictor model for advanced fibrosis in NAFLD.

New Score =TSH*0.3+SGOT*0.02-Platelet count –Albumin *2.4

Previous research has shown the association of age, platelet count, albumin, bilirubin, triglyceride, impaired fasting glucose leveland hypertensionwith the advanced liver fibrosis. Out of these factors most of them were used in other models.[9-11] In present study we analyzed age, height, weight, waist, Hb, total count, platelet count, ESR, cholesterol, triglycerides, HDL, LDL, HBA1C, FBS, PPBS, SGOT, SGPT, protein, Albumin, ALP, urea, creatinine, TSH, INR, BMI, AAR and bilirubin for significance in predicting advanced fibrosis (Table 1) and found out that weight, BMI, platelet count, FBS, PPBS, HbA1C, SGOT, AST/ALT ratio, Albumin, ALP and TSH were statistically significant in predicting fibrosis.

In present study New score has AUROC of 0.824 (Cut off ≥-13.5 has 100% sensitivity in predicting advanced fibrosis) compared to BARD score (AUROC of 0.653) and APRI score (AUROC of 0.802). Previous reports of BARDI score has shown an AUROC 0.881 of the BARDI scorewhich is comparable to the AUROC of New score of present series.[2]

AUROC of 0.824 is also comparable to the previous models including BAAT[12], FIB-4[13], OELF[11] and ELF[11] where AUROC was 0.84, 0.80, 0.87, 0.90 respectively.

Sensitivity of present study new score was 100% in predicting the advanced fibrosis which is highest as compared to other available model such as FIB-4 [13], OELF [11] and ELF [11] which had sensitivity of 67.1%, 89% and 80% respectively. However BAAT has shown a sensitivity of 100% in many previous studies. [12]

The present study has few limitations; small sample size was the major one. There is a need of comparing the present new score with other available models in larger population.

## CONCLUSION

New score is a better prognostic model to predict advanced fibrosis than BARD score and APRI score. It is a simple bedside tool that can be in cooperated into day to day practice. Validity of the score needs to be checked in a different cohort.

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