ORIGINAL ARTICLE

CORRELATION OF FIB-4 AND CHILD PUGH SCORE IN PATIENTS WITH LIVER CIRRHOSIS

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ABSTRACT

OBJECTIVE: To determine the correlation of the FIB-4 Score with the Child Pugh Score in patients with liver cirrhosis, presenting to Khyber Teaching Hospital, Peshawar, Pakistan

MATERIALS AND METHODS: We conducted this cross-sectional study from October 1, 2023, to December 31, 2024, in the Medical Department of Khyber Teaching Hospital, Peshawar. Patients with liver cirrhosis were enrolled after providing written informed consent. All data, including age, gender, disease duration, BMI, Child-Pugh Score, and FIB-4, were recorded on an approved pro forma.

RESULTS: According to the inclusive criteria, 81 patients were included. The mean age was 49 years, with a standard deviation of 10.91 years. Of these, 65 (80%) were males, and 16 (20%) were females. The mean FIB-4 score was 5.69 ± 0.903, and the mean Child-Pugh score was 9.08 ± 1.014. A statistically significant but modest positive correlation was observed between FIB-4 score and Child-Pugh score ($r = 0.329$, $p = 0.0003$).

CONCLUSION: The FIB-4 score demonstrated a statistically significant yet modest positive correlation with the Child-Pugh score in patients with liver cirrhosis and may serve as an adjunct rather than a surrogate marker.

KEY WORDS: Correlation, FIB-4 Score, Child Pugh Score, Cirrhosis

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INTRODUCTION

Liver cirrhosis results from chronic injury, and healing leads to the formation of nodules and fibrosis, which alter the normal lobular architecture of the liver. Laennec introduced the term cirrhosis, impressed by the brawny color of the liver in this condition.

The essential feature is diffuse parenchymal destruction and replacement by fibrous tissue, disrupting the normal lobular structure of the liver. There is active hepatocyte regeneration while fibrosis progresses. [2-4]

The more common causes of liver cirrhosis are alcoholic liver disease, hepatitis C virus (HCV), and non-alcoholic steatohepatitis (NASH) in the developed world, while in the developing world, HCV and hepatitis B virus (HBV) are the main causes. [5]

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The worldwide prevalence of cirrhosis is unknown; however, it has been estimated to be between 0.15% and 0.27% in the United States. [3] Hyperdynamic circulation, portal hypertension, and related complications are the main causes of mortality and morbidity in patients with liver cirrhosis.[6]

Patients with liver cirrhosis may remain asymptomatic until decompensation occurs. Therefore, physicians must be vigilant for early diagnosis and management. Nonspecific symptoms include easy fatigability, sleep disturbance, and poor appetite [7-11].

The remaining symptoms depend on the underlying causes and complications. For accurate diagnosis, thorough clinical examination followed by ultrasound is essential; it may reveal features suggestive of cirrhosis, but the gold standard remains a liver biopsy [12, 13].

The Child-Pugh-Turcotte (CPT) score has traditionally been used to evaluate the prognosis of patients with cirrhosis, as it correlates with the severity of liver disease. It includes three continuous variables (serum albumin, serum bilirubin, and prothrombin time), while encephalopathy and ascites are categorical variables.

Three distinct groups—A, B, and C—represent increasing severity, determined by these five variables and their respective cut-off values. Points 1, 2, and 3 are assigned to these variables. The total score, obtained by summing these points, ranges from 5 to 15. Patients with scores of 5-6 are classified as Group A, those with scores of 7-9 as Group B, and those with scores of 10-15 as Group C. [14-17]

FIB-4 score is a noninvasive scoring for the assessment of liver fibrosis, particularly in patients with chronic liver diseases like hepatitis B and C, nonalcoholic fatty liver disease, and liver cirrhosis. It comprises four parameters.

1. Age: older age is associated with more advanced disease
2. Platelet Count, thrombocytopenia is associated with advanced disease
3. S. AST; its elevated level indicated advanced disease
4. S. ALT: Elevated level indicates damage to the liver
5. The formula for the calculation of FIB-4 is as follows;

FIB-4= [age (years)×AST (IU/L)] / [PLT (10^9/L) ×ALT1/2 (IU/L)].

A score <1.45 indicates lower risk of fibrosis, an intermediate score of 1.45-3.25 indicates moderate risk, and a score>3.25 indicates advanced fibrosis or cirrhosis. [2]

As several studies have shown a close link between Child-Pugh-Turcotte (CPT) and FIB-4 scores and the development of liver cirrhosis, we conducted this study to evaluate the relationship between FIB-4 score and Child-Pugh-Turcotte (CPT) score in our patients with chronic liver disease or cirrhosis. [4,5]

MATERIALS AND METHODS

This hospital-based cross-sectional observational study was carried out in the Medical Department of Khyber Teaching Hospital, Peshawar, from 1st October 2023 to 31st December 2024. All consecutive patients aged 14 years or older with clinically and radiologically diagnosed cirrhosis presenting to the outpatient department were screened for inclusion. Patients who refused consent, had decompensated cirrhosis, or had hepatocellular carcinoma were excluded.

The lower age limit of 14 years was used because younger patients are managed in the Paediatric Department. The diagnosis of cirrhosis was based on clinical assessment and ultrasound findings obtained in the hospital radiology department. Liver biopsy was not performed in patients with straightforward clinical and radiological evidence of cirrhosis.

For each participant, age, sex, disease duration, body mass index, Child-Pugh score, and FIB-4 score were recorded on a structured pro forma. Laboratory workup included complete blood count, serum albumin, prothrombin time, liver biochemistry, renal function tests, and viral hepatitis screening where indicated. Potential confounding variables, including age, sex, body mass index, and disease duration, were documented and examined in subgroup analyses. No multivariable adjustment was performed because of the limited sample size. Data were analyzed using SPSS version 23.

RESULTS

We included 81 patients; 9 (11%) were in the 18-35 years age group, and 72 (89%) were in the 36-60 years age group. The mean age was 49 years, with a standard deviation of 10.91 years.

Males made up 65(80%) of the patients, while 16(20%) were females. In 9 (11%) patients, the duration of disease was <3 years, whereas in 72 (89%) patients, it was >03 years. Regarding BMI, 64(79%) patients had a BMI ≤30 kg/m^2, and 17(21%) had a BMI >30 kg/m^2. The mean FIB-4 score was 5.69 ± 0.903, and the mean Child Pugh score was 9.08 ± 1.014.

The correlation coefficient r = 0.329 indicates a positive relationship between the FIB-4 score and the Child Pugh score. (Table no 3) Correlations between the Child-Pugh score and the FIB-4 score with respect to age, sex, duration of disease, and body mass index are shown in Tables 4–7.

DISCUSSION

In this study, the mean age of the patients was 49 ± 10.91 years, and males made up 80% of the sample. Most patients had a disease duration of more than 3 years, and 79% had a body mass index of 30 kg/$m^{2\ or\ less}$. The mean FIB-4 score was 5.69 ± 0.903, while the mean

Table No 1: Mean FIB Score was 5.69±0.903

FIB-4 SCORE	FREQUENCY	PERCENTAGE
≤ 5	**33**	41%
> 5	48	59%
Total	81	100%

Mean Child Pugh Score was 9.08± 1.014

Table No 2: CHILD PUGH SCORE

CHILD PUGH SCORE	FREQUENCY	PERCENTAGE
Class A (5 to 6 points)	**28**	35%
Class B (7 to 9 points)	34	%53
Class C (10 to 15 points)	10	%12
Total	81	%100

Mean Child Pugh Score was 9.08± 1.014

Table No 3: CORRELATION OF FIB-4 SCORE WITH CHILD PUGH SCORE (n=81)

FIB-4 SCORE (Mean and SD)	CHILD PUGH SCORE (Mean and SD)	P value SCORE	Pearson correlation
5.69± 0.903	9.08± 1.014	**0.0003**	r = 0.329

Table No 4: CORRELATION OF FIB-4 SCORE WITH CHILD PUGH SCORE W.R.T AGE DISTRIBUTION (n=81)

AGE	FIB-4 SCORE (Mean and SD)	CHILD PUGH SCORE (Mean and SD)	P value	Pearson correlation
18-35 years (n=9)	5.33± 0.707	**1.166 ±9.11**	0.281	r = 0.404
60-36 years (n=72)	5.74± 0.919	**1.166 ±9.11**	0.005	r = 0.330

Table No 5: CORRELATION OF FIB-4 SCORE WITH CHILD PUGH SCORE W.R.T GENDER DISTRIBUTION

GENDER	CHILD PUGH SCORE (Mean and SD)	FIB4- SCORE (Mean and SD)	P value	Pearson correlation
Male (n=65)	0.973 ±5.77	**1.045 ±9.04**	0.188	r = 0.292
Female (n=16)	0.883 ±5.66	**1.011 ±9.10**	0.007	r = 0.348

Table No 6: CORRELATION OF FIB-4 SCORE WITH CHILD PUGH SCORE W.R.T DURATION OF DISEASE

DURATION OF DISEASE	CHILD PUGHSCORE (Mean and SD)	FIB4- SCORE (Mean and SD)	P value	Pearson correlation
≤ 3 years (n=9)	1.054 ±5.89	**0.333 ±8.88**	0.047	r = 0.672
> 3 years (n=72)	0.888 ±5.67	**1.068 ±9.11**	0.004	r = 0.336

Table No 6: CORRELATION OF FIB-4 SCORE WITH CHILD PUGH SCORE W.R.T BMI DISTRIBUTION

BMI	CHILD PUGHSCORE (Mean and SD)	FIB4- SCORE (Mean and SD)	P value	Pearson correlation
≤ 30 Kg/m2 (n=64)	0.913 ±5.73	**0.920 ±9.09**	0.004	r = 0.351
> 30 Kg/m2 (n=17)	0.874 ±5.53	**1.344 ±9.05**	0.258	r = 0.291

Child-Pugh score was 9.08 ± 1.014.

A statistically significant positive correlation was observed between FIB-4 and Child-Pugh scores, but the strength of the relationship was modest, with a correlation coefficient of r = 0.329. This finding suggests that FIB-4 may indicate increasing severity of liver disease, but it should not be considered a direct replacement for Child-Pugh scoring. In our study, only 35% of patients were in Child-Pugh class A, compared to Adeel AB et al., who reported 89.7% in Child-Pugh class A.

This difference may be due to variation in disease severity and patient characteristics between the two populations. Similar findings were reported by Adeel AB et al., who studied 21,116 patients with HCV-related liver cirrhosis over five years to assess hepatic decompensation, hepatocellular carcinoma, and all-cause mortality. [2]

They found that 89.7% of patients were in Child-Pugh class A, 79.9% had a MELD score below 09, and 43.4% had a FIB-4 score below 1.45. At 1, 3, and 5 years, the AUROC for hepatic decompensation was lower for MELD (0.70-0.76) than for FIB-4 (0.84-0.86), with a P value less than 0.001.

At the same intervals, the AUROC for HCC was between 0.61 and 0.68 for Child-Pugh and MELD scores, but 0.81-0.82 for FIB-4 ($P < 0.001$). For all-cause mortality, the AUROC at 3 and 5 years ranged from 0.65 to 0.68. The cut-off scores for identifying individuals at lower risk of complications were: Child-Pugh score below 5; MELD score below 8; FIB-4 less than 3 for hepatic decompensation and HCC; and FIB-4 less than 0.2 for all-cause mortality. They concluded that the FIB-4 score was a better predictor of hepatic decompensation and hepatocellular carcinoma in patients with HCV infection. A FIB-4 score below 3 was associated with a lower risk of liver decompensation and HCC at 1 and 3 years after HCV diagnosis. Hsieh YC et al. also reported a significant correlation between non-invasive fibrosis markers and hepatic venous pressure gradient in cirrhosis, with the ALBI score showing the strongest correlation ($r = 0.307$, $p = 1.4$) and low serum sodium. Zhou P et al. reported that 9.3% (46/495) of patients developed PHLF. The area under the ROC curve for the FIB-4 index in predicting PHLF was higher than that of the Child-Pugh score (0.744 versus 0.621; $P = 0.044$). The optimal cut-off value of the FIB-4 index for predicting PHLF was 4.16. Multivariable analyses showed that the FIB-4 index was an independent predictor of PHLF regardless of the hepatectomy subgroup, while the Child-Pugh Score was only a significant predictor in the minor hepatectomy group. The FIB-4 index of 4.16 not only divided patients into two distinct survival groups ($P = 0.006$), but also classified those with Barcelona Clinical Liver Cancer (BCLC) stages 0 and A into two survival groups ($P = 0.001$ and $P = 0.034$, respectively). [16]

This study has several limitations. It was conducted at a single center and included only 81 patients, which limits generalizability. Male patients were overrepresented, which may have influenced the findings. Patients with decompensated cirrhosis were excluded, so the results may not apply to the full clinical spectrum of cirrhosis. Liver biopsy was not performed, and the diagnosis was based on clinical and radiological assessment. In addition, the cross-sectional design does not allow evaluation of temporal relationships or long-term outcomes.

Despite these limitations, the study has significant strengths. It emphasizes FIB-4 as a simple, non-invasive, and affordable tool that aligns with the Child-Pugh score. By offering local data, it provides practical value for clinicians working in resource-limited settings.

CONCLUSION

Our findings show a positive link between FIB-4 score and Child-Pugh score in patients with liver cirrhosis. This supports using FIB-4 as a practical tool in everyday clinical practice, especially in resource-limited settings where invasive procedures may not be feasible. While larger multicenter studies are needed to confirm these results, our work lays the groundwork for including FIB-4 in the diagnostic and prognostic assessment of cirrhotic patients.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Ullah N	✓	✓	×	×	✓	×
Shehzad A	✓	×	✓	✓	✓	×
Iqbal MD	✓	✓	×	×	×	✓

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This study was approved by the Institutional Review and Ethics Board of Khyber Teaching Hospital, Peshawar

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