

DIAGNOSTIC VALUE OF FIBROSCAN FOR LIVER FIBROSIS IN ALCOHOLIC LIVER DISEASE PATIENTS

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SUMMARY

Objectives: To determine the diagnostic value of Fibroscan for liver fibrosis in alcoholic liver disease patients. **Subjects and methods:** A cross-sectional descriptive study with analysis was conducted on 60 inpatients with alcoholic liver disease who were treated at Military Hospital 103 from January 2015 to July 2017. The research indicators are Fibroscan and histopathology. **Results and conclusion:** Fibroscan had high accuracy in diagnosing liver fibrosis in patients with alcoholic liver disease. Having liver fibrosis (\geq F1): Liver stiffness cut-off value $>$ 5.3 kPa (AUROC: 0.84 \pm 0.09; Se: 89.28%; Sp: 75.0%; PPV: 98.03%; NPV: 33.33%. Significant liver fibrosis (\geq F2): Liver stiffness cut-off values $>$ 9.95 kPa (AUROC: 0.88 \pm 0.05); Se: 76.92%, Sp: 88.24%; PPV: 83.33%; NPV: 83.33%. Severe liver fibrosis (\geq F3): Liver stiffness cut-off values $>$ 10.40 kPa, (AUROC: 0.96 \pm 0.03), Se: 94.74%; Sp: 87.80%; PPV: 78.26%; NPV: 97.30%. Cirrhosis (F4): Liver stiffness cut-off values $>$ 15.30 kPa (AUROC: 0.93 \pm 0.05); Se: 90.0%; Sp: 92.0%; PPV: 69.23%; NPV: 97.87%.

* **Keywords:** Alcoholic liver disease; Fibroscan; Diagnostic value.

INTRODUCTION

Currently, there are many different techniques to evaluate liver stiffness such as transient elastography, ARFI imaging, magnetic resonance elastography (MRE)... Transient elastography by Fibroscan has been applied since 2004 and is now applied in many countries around the world to assess and predict liver cirrhosis [1, 2, 3, 4, 5].

According to Dao Nguyen Khai et al. (2013), the higher the fibrosis stage, the higher the stiffness of the liver ($r = 0.628$). The average value of Fibroscan was 10.53 \pm 6.93 kPa in group F0; 12.90 \pm 6.87 kPa in group F1; 15.77 \pm 6.04 kPa in group F2; 18.67 \pm 6.02 kPa in group F3, and lower (23.34 \pm 6.54 kPa) at the stage

of significant fibrosis (F2) than in the stage of cirrhosis (34.67 \pm 6.02 kPa). Fibroscan had the best diagnostic value for cirrhosis with a cut-off of 18.5 kPa, area under the Receiver Operating Characteristic curve (AUROC = 0.910) and significant fibrosis (\geq F2) of 14.1 kPa with AUROC = 0.868 [1].

Lu Quoc Hung (2018) studied patients with hepatitis B and C virus and showed that in stages F2, F3 and F4, the area under the ROC curve was 0.886; 0.849 and 0.829, respectively. The threshold for diagnosis of liver fibrosis stages was 12.5 kPa, 14.45 kPa and 16.6 kPa, respectively with a sensitivity (Se) of 86.7%, 82.85% and 82.5%, respectively; specificity (Sp) of 90.6%, 80.8% and 85.4%, respectively ($p < 0.05 - 0.001$) [3].

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To determine the accuracy and optimal liver stiffness cut-off value of Fibroscan in the diagnosis of liver fibrosis, ROC curve is often used. However, between the non-fibrosis stages (F0) and liver fibrosis stages F1, F2 easily overlap. Determining the liver stiffness cut-off value for differential diagnosis between liver fibrosis stages F2, F3 and F4 is more important than distinguishing between no fibrosis (F0) and liver fibrosis stages F1 and F2 [6, 7, 8, 9].

Therefore, the study was conducted: *To determine the diagnostic value of Fibroscan for liver fibrosis in patients with alcoholic liver disease.*

SUBJECTS AND METHODS

1. Subjects

60 inpatients with alcoholic liver disease were treated at Military Hospital 103, from January 2015 to July 2017.

2. Methods

** Research design:*

Cross-sectional descriptive study with analysis.

** Indicators:*

- Liver stiffness (transient elastography) was measured by Fibroscan 502 Touch of Echosens (France), unit is kPa.

- Histological features: Classification of liver fibrosis stages according to Metavir: No fibrosis (F0), mild liver fibrosis (F1), significant liver fibrosis (F2), severe liver fibrosis (F3) and liver cirrhosis (F4).

** Data processing:*

- The research data was processed by the biomedical statistical method according to the program SPSS 22.0.

+ The cut-off value and accuracy were calculated based on the Receiver Operating Characteristic curve (ROC).

+ Sensitivity (Se), specificity (Sp), positive predictive value (PPV) and negative predictive value (NPV) were calculated by the decision matrix method.

RESULTS

The area under the ROC curve in the diagnosis of liver fibrosis stages ranges from 0.84 ± 0.09 to 0.96 ± 0.03 (table 1).

Table 1: Area under the ROC curve in the diagnosis of liver fibrosis stages.

METAVIR fibrosis	AUROC ($\bar{X} \pm SD$) [95%CI]
$\geq F1$	0.84 ± 0.09 [0.65 - 1.00]
$\geq F2$	0.88 ± 0.05 [0.79 - 0.97]
$\geq F3$	0.96 ± 0.03 [0.91 - 1.00]
F4	0.93 ± 0.05 [0.82 - 1.00]

Table 2: Diagnostic value of Fibroscan for liver fibrosis in patients with alcoholic liver disease.

METAVIR fibrosis	Cut-off (kPa)	Se (%)	Sp (%)	PPV (%)	NPV (%)
≥ F1	5.3	89.28	75.0	98.03	33.33
≥ F2	9.95	76.92	88.24	83.33	83.33
≥ F3	10.40	94.74	87.80	78.26	97.30
F4	15.30	90.0	92.0	69.23	97.87

The diagnostic value of Fibroscan for liver fibrosis:

- Having liver fibrosis (≥ F1), liver stiffness cut-off value > 5.3 kPa: Se: 89.28%; Sp: 75.0%; PPV: 98.03%; NPV: 33.33%.

- Significant liver fibrosis (≥ F2): Liver stiffness cut-off value > 9.95 kPa, Se: 76.92%, Sp: 88.24%; PPV: 83.33%; NPV: 83.33%.

- Severe liver fibrosis (≥ F3): Liver stiffness cut-off value > 10.40 kPa, Se: 94.74%; Sp: 87.80%; PPV: 78.26%; NPV: 97.30%.

- Cirrhosis (F4): Liver stiffness cut-off value > 15.30 kPa, Se: 90.0%; Sp: 92.0%; PPV: 69.23%; NPV: 97.87%.

DISCUSSION

1. Diagnostic value of Fibroscan for liver fibrosis (≥ F1) in patients with alcoholic liver disease

With liver stiffness cut-off values > 5.3 kPa, there is a higher risk of having liver fibrosis (≥ F1) (AUROC: 0.84 ± 0.09); Se: 89.28%; Sp: 75.0%; PPV: 98.03%; NPV: 33.33%. The diagnostic value of Fibroscan for liver fibrosis (≥ F1) in our study compared with some other studies is presented in *table 3*.

Table 3: Diagnostic value of Fibroscan for liver fibrosis (≥ F1) compared with some studies.

Research	n	Cause	Cut-off (kPa)	AU ROC	Se (%)	Sp (%)	PPV (%)	NPV (%)
Ng-Khac (2008) [8]	103	ALD	5.9	0.84	83.0	86.0	97.6	35.3
Ngo Anh The (2017) [4]	90	HCV	6.0	0.91	88.6	81.8	97.2	50.0
Lu Quoc Hung (2018) [3]	92	HCV, HBV	8.5	0.855	83.8	100	-	-
Results (2021)	60	ALD	5.3	0.84	89.2	75.0	98.0	33.3

Thus, the accuracy of Fibroscan in diagnosing liver fibrosis (≥ F1) was quite good (area under the ROC curve from 0.8 to 0.9).

2. Diagnostic value of Fibroscan for significant liver fibrosis (≥ F2) in patients with alcoholic liver disease

With liver stiffness cut-off values > 9.95 kPa, there was a risk of significant liver fibrosis (≥ F2) (AUROC: 0.88 ± 0.05), Se: 76.92%, Sp: 88.24%; PPV: 83.33%; NPV: 83.33%. The diagnostic value of significant liver fibrosis (≥ F2) of Fibroscan is similar to some other studies (*table 4*).

Table 4: Diagnostic value of Fibroscan for significant liver fibrosis (≥ F2) compared with some studies.

Research	n	Cause	Cut-off (kPa)	AU ROC	Se (%)	Sp (%)	PPV (%)	NPV (%)
Foucher J. (2006) [6]	711	many reasons	7.2	0.8	64.0	85.0	90.0	52.0
Ng Khac (2008) [8]	103	ALD	7.8	0.91	80	90.5	93	70
Tran Bao Nghi (2016) [0]	92	many reasons	7.3	0.95	92.0	90.9	84.1	95.7
Ngo Anh The (2017) [4]	90	HCV	7.2	0.84	96.4	69.7	84.6	92.0
Lu Quoc Hung (2018) [3]	92	HCV, HBV	12.5	0.886	86.7	90.6	-	-
Results (2021)	60	ALD	9.95	0.88	76.9	88.2	83.3	83.3

Thus, the accuracy of Fibroscan in diagnosing liver fibrosis (≥ F1) is quite good (area under the ROC curve from 0.8 to 0.9).

3. The diagnostic value of Fibroscan for severe liver fibrosis (≥ F3) in patients with alcoholic liver disease

With liver stiffness cut-off values > 10.40 kPa, there is a risk of severe liver fibrosis (≥ F3) (AUROC: 0.96 ± 0.03), Se: 94.74%; Sp: 87.80%; PPV: 78.26%; NPV: 97.30%. The accuracy of Fibroscan in diagnosing severe liver fibrosis (≥ F3) is at a good level (area under the ROC curve from 0.9 to 1.0). This is similar to some other studies (*table 5*).

Table 5: Diagnostic value of Fibroscan for severe liver fibrosis (≥ F3) compared with some studies

Research	n	Cause	Cut-off (kPa)	AU ROC	Se (%)	Sp (%)	PPV (%)	NPV (%)
Foucher J. (2006) [6]	711	many reasons	12.5	0.90	65.0	95.0	90.0	80.0
Nguyen-Khac (2008) [8]	103	ALD	11.0	0.90	86.7	80.5	81.8	84.3
Tran Bao Nghi (2016) [0]	92	many reasons	8.7	0.93	100	83.7	60.7	100
Ngo Anh The (2017) [4]	90	HCV	12.3	0.80	71.7	78.4	71.7	78.4
Lu Quoc Hung (2018) [3]	92	HCV, HBV	14.45	0.849	82.8	80.8	-	-
Results (2021)	60	ALD	10.40	0.96	94.7	87.8	78.2	97.3

4. Diagnostic value of Fibroscan for cirrhosis (F4) in patients with the alcoholic liver disease

With liver stiffness cut-off values > 15.30 kPa, there is a risk of cirrhosis (F4) (AUROC: 0.93 ± 0.05), Se: 90.0%; Sp: 92.0%; PPV: 69.23%; NPV: 97.87%. This result is similar to some other studies (Table 6).

Table 6: Diagnostic value of Fibroscan for cirrhosis (F4) in patients with alcoholic liver disease compared with some studies.

Research	n	Cause	Cut-off (kPa)	AU ROC	Se (%)	Sp (%)	PPV (%)	NPV (%)
Foucher J. (2006) [6]	711	many reasons	17.6	0.96	77.0	97.0	91.0	92.0
Nguyen-Khac (2008) [8]	103	ALD	19.5	0.92	85.7	84.2	68.6	87.9
Tran Bao Nghi (2016) [0]	92	many reasons	12.9	0.94	95.0	85.4	44.2	99.3
Ngo Anh The (2017) [4]	90	HCV	14.3	0.81	76.1	88.4	66.6	92.4
Lu Quoc Hung (2018) [3]	92	HCV, HBV	16.6	0.829	82.5	75.4	-	-
Results (2021)	60	BGDR	15.30	0.93	90.0	92.0	69.2	97.8

Thus, the accuracy of Fibroscan in diagnosing cirrhosis (F4) is at a good level (area under the ROC curve from 0.9 to 1.0).

CONCLUSION

Fibroscan has high accuracy in diagnosing liver fibrosis in patients with alcoholic liver disease:

- Having liver fibrosis (≥ F1): Liver stiffness cut-off value > 5.3 kPa (AUROC: 0.84 ± 0.09; Se: 89.28%; Sp: 75.0%; PPV: 98.03%; NPV: 33.33%.

- Significant liver fibrosis (≥ F2): Liver stiffness cut-off values > 9.95 kPa (AUROC: 0.88 ± 0.05); Se: 76.92%, Sp: 88.24%; PPV: 83.33%; NPV: 83.33%.

- Severe liver fibrosis (≥ F3): Liver stiffness cut-off values > 10.40 kPa, (AUROC: 0.96 ± 0.03), Se: 94.74%; Sp: 87.80%; PPV: 78.26%; NPV: 97.30%.

- Cirrhosis (F4): Liver stiffness cut-off values > 15.30 kPa (AUROC: 0.93 ± 0.05);

Se: 90.0%; Sp: 92.0%; PPV: 69.23%; NPV: 97.87%.

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