

## Factors Associated with Hepatitis B and Hepatitis C among Infected Patients in Indonesia and Their Knowledge and Attitude: A Multicenter Observational Study

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**ABSTRACT**

**Background:** Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections are global health problems, including in Indonesia. The purpose of this study was to assess the knowledge and attitudes about HBV and HCV infection among infected patients in Indonesia. **Methods:** This cross-sectional study used a questionnaire survey. The questionnaire was adapted and translated into Indonesian language, and trialed with 27 HBV and 27 HCV patients. The final validated questionnaire was later used in the target population. Patients diagnosed with Hepatitis B or Hepatitis C were included. The patients were enrolled from November 2019 until February 2020 in sixteen multicenter locations. Multivariate analysis with logistic regression was conducted to determine the factors that are associated with the knowledge and attitude among HBV and HCV patients toward their illness. **Results:** A total of 931 HBV patients and 254 HCV patients were included in this survey. The proportion of infected patients with adequate knowledge of Hepatitis B and Hepatitis C was 72.1% and 53.9%, respectively. Positive attitudes about Hepatitis B and Hepatitis C were 28.5% and 41.3%, respectively. Multivariate analysis revealed that higher education level, higher income level, diagnosis duration of more than 5 years, and receiving of antiviral therapy were independent factors associated with adequate knowledge about Hepatitis B among HBV patients. Among HCV patients, independent factors associated with adequate knowledge about Hepatitis C were being married, higher education level, higher income level, and receiving antiviral therapy. Moreover, older age and receiving of antiviral therapy were independent factors associated with positive attitudes towards Hepatitis B among HBV patients. However, only higher education level was found to be an independent factor associated with positive attitudes towards Hepatitis C among HCV patients. **Conclusion:** The knowledge and attitude of patients regarding HBV and HCV were quite low among infected patients in Indonesia.

**Keywords:** Knowledge, Attitude, Hepatitis B, Hepatitis C.

**INTRODUCTION**

Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are global health problems, including in Indonesia. According to a national study of Basic Health Research 2013 in Indonesia, the prevalence of chronic hepatitis B and C in Indonesia was 7.1% and 1%, respectively.<sup>1</sup> Within 10-20 years, 20-50% of chronic hepatitis B patients and 10-20% of chronic hepatitis C patients may develop cirrhosis.<sup>2,3</sup> In the long term, chronic hepatitis B and C can result in severe liver problems, such as liver cirrhosis, decompensation of liver cirrhosis (esophageal variceal, hepatic encephalopathy, hepatorenal syndrome), liver cancer, and death.<sup>4</sup>

HBV and HCV pathogens are transmitted through blood and certain body fluid, primarily through blood contact with an infected person's blood, sexual contact, sharing of needles, or from

an infected mother to her baby during vaginal birth, which is more common in Hepatitis B.<sup>5</sup> Patients with inadequate knowledge tend to have misconceptions about their disease, which can contribute to the continued transmission of the virus, missed opportunities for medical treatment, and poor health outcomes.<sup>6</sup> Chronic hepatitis B and C require long-term anti-viral medication. For most HBV patients, therapy of antiviral requires lifelong therapy and reactivation may occur after discontinuation of the medication. Inadequate knowledge about medication can lead to poor adherence to treatment, resulting in disease progression.<sup>7</sup> Despite clinical medication, psychosocial issues are a rising concern as an important component of the quality of life for patients. Patients with chronic HBV and HCV might involve serious aspects of psychosocial impairment such as fear, anxiety, stigma, and

a lack of social support.<sup>8</sup> Psychosocial issues related to knowledge and attitudes about chronic HBV and HCV greatly affect patients' quality of life. Misunderstandings can lead to fear, anxiety, and stigma, while lack of social support worsens the situation.

Studies examining the knowledge and attitudes of individuals living with chronic hepatitis B and C in Indonesia are currently limited. This scarcity of data underscores the importance of conducting research to better understand the specific challenges faced by patients in Indonesia. Local data is essential for developing targeted interventions aimed at improving education, support, and the overall quality of life for individuals affected by these conditions in Indonesian context. A study of 520 patients in India who tested positive for HBsAg and anti-HCV revealed that only two-thirds of the respondents were knowledgeable about transmission and prevention. Additionally, only one-third of the respondents provided correct answers about the consequences of chronic HBV and HCV infection.<sup>9</sup> Addressing inadequate knowledge is essential not only to prevent the spread of these infections but also to improve the quality of life for those affected.<sup>10</sup> The purpose of this study was to evaluate the knowledge and attitude about HBV and HCV infection in infected patients. The findings of this study could serve as evidence to provide education and interventions for improving the quality of life of infected patients.

## METHODS

### Setting and Participants

A cross-sectional study with a questionnaire survey was used to perform this study. A pilot study was conducted to pretest the questionnaire. The reliability of the questionnaire was evaluated with Cronbach Alpha, while validity was evaluated with Pearson correlation. Patients aged above 18 years who were diagnosed with Hepatitis B/Hepatitis C (proven by HBsAg/Anti-HCV positive) and voluntarily agreed to participate in the survey were included. The study was conducted between November 2019 and February 2020, with a member of Ina ASL/PPHI in each region acting as the study

investigator. Each center had a research assistant who was trained by the study investigator to collect survey data through face-to-face interviews and conducted interviews in the native Indonesian language.

### Co-variates

Age is categorized into two groups: participants who are younger than 40 years old (< 40 years) and those who are 40 years old or older ( $\geq$  40 years) according to the mean age of the subjects. Sex is classified as either women or men. Marital status includes three categories: married, single, and divorced. Education status is divided into primary (0-9 years of formal education), secondary (10-12 years of formal education), and tertiary (more than 12 years of formal education, including college or university degrees). Income level is divided into low (below Rp 3.000.000), middle (Rp 3.000.000 – 7.000.000), and high (above Rp 7.000.000) based on the income of patients from the 1st to the 3rd quartile. The years of diagnosis are classified into two groups based on the third quartile data, which aligns with Mohamed et al's<sup>11</sup> findings that the longer a patient has been diagnosed with hepatitis B, the lower their level of worry about the disease. Participants are categorized as diagnosed less than 5 years ago (< 5 years) and those diagnosed 5 years ago or more ( $\geq$  5 years) from the time they were initially diagnosed as positive for hepatitis B or C. Anti-viral therapy is defined as a patient who already nucleotide analog for HBV patients and direct-acting antivirals for HCV patients. Cirrhosis was determined based on ultrasound results or transient elastography indicating a fibrosis stage above F4, as reported by patient interviews.

### Survey Instrument

Patients with HBV and HCV in each center who agreed to participate in this study were informed about the aim of this survey and sign the informed consent. Participants of the study were asked to fill out a questionnaire containing the demography, knowledge, and attitude about HBV and HCV. The questionnaire was adapted and translated into Indonesian language and trialed with 10% of minimal sample sizes. The final validated questionnaire was later used in

the target population. The section of knowledge consists of 17 items. One score was given for each correct answer, while zero score was given for each wrong or does not know the answer. The participants were classified in two group (non-adequate vs. adequate knowledge) based on the mean of the overall knowledge score (11 out of 17). A participant's score of less than 50% (1 – 7 score) was considered as non-adequate knowledge, while a score of more than 50% (8-11 score) was considered as adequate knowledge. The section on attitude consists of 12 items. Score range from -2 to +2. A participant was classified into two groups (negative vs. positive attitude) based on the overall attitude score. A participant with more positive score was defined as positive attitude, while a less or negative score was defined as negative attitude. The cut-off values of variables knowledge and attitude were set based on the median scores from the study result.

#### Statistical Analysis

The data that has been collected was analyzed with SPSS 25 IBM Corporation United States. Demographic data were processed descriptively. Numerical data was displayed as mean with a standard deviation and categorical data was displayed as percentage. Multivariate analysis with logistic regression was conducted to determine the factors that associate with the knowledge and attitude among HBV and HCV patients towards their illness. Variable with p value below 0.05 was considered as statistically significant.

#### Ethical Statement

The authors declare that all procedures performed in studies involving human participants were following the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. This study was approved by the Ethics Committee of Faculty Medicine Universitas Indonesia, with the registered protocol number 19-10-1205. All participants signed the informed consent before the study. All data collected in this study were kept confidential and can only be accessed by the principal investigator and co-investigator.

## RESULTS

### Characteristic of Study Population

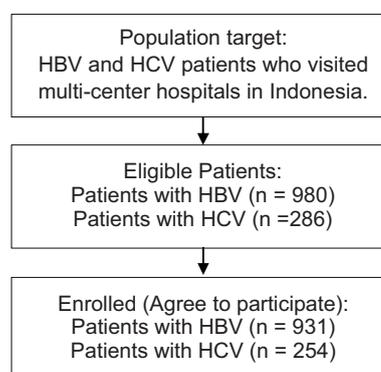
Out of 980 HBV patients and 286 HCV patients were sampled consecutively for the study. Out of those assessed, 931 HBV patients and 254 HCV patients agreed to participate in this survey. The participant rate was 94.9% for HBV patients and 88.8% for HCV patients. **Figure 1.**

The mean age of HBV patients was  $43 \pm 12.74$  years and that of HCV patients was  $48 \pm 12.98$  years. Major of HBV and HCV patients were male (57.6%, 62.6%, respectively). Most of level education were secondary education in HBV patients (54.4%), while most of level education were tertiary education in HCV patients (44.5%). Most of them in low-income category (60.4% in HBV patients and 58.7% in HCV patients). Characteristic of study population were summarized in **Table 1.**

### Knowledge of Hepatitis B and Hepatitis C Among Infected Patients

A 29-item questionnaire assessing knowledge and attitude was evaluated in the patients. For HBV patients, the reliability of the knowledge and attitude sections showed Cronbach's alpha values of 0.920 and 0.830, respectively. For HCV patients, these values were 0.808 and 0.813, respectively. Regarding the questionnaire's validity, 10% of the questions demonstrated a moderate correlation ( $r = 0.4 - 0.6$ ), while the remaining 90% showed a strong correlation ( $r > 0.6$ ).

Out of the 931 HBV patients, 808 (86.8%) patients were aware that the etiology of Hepatitis B was a viral infection. Most HBV patients knew



**Figure 1.** Flowchart of sample selection

**Table 1.** Characteristic of study population.

Variables	HBV Patients (n = 931)	HCV Patients (n = 254)
Age, mean $\pm$ SD	43 $\pm$ 12.74	48 $\pm$ 12.98
Age, n (%)		
< 40 years	387 (41.6)	68 (26.8)
$\geq$ 40 years	544 (58.4)	186 (73.2)
Sex, n (%)		
Women	395 (42.4)	95 (37.4)
Men	536 (57.6)	159 (62.6)
Marital status, n (%)		
Married	760 (81.6)	206 (81.1)
Single	128 (13.7)	20 (7.9)
Divorced	43 (4.6)	28 (11.0)
Education status, n (%)		
Primary (0 – 9 years)	107 (11.5)	35 (13.8)
Secondary (10-12 years)	506 (54.4)	106 (41.7)
Tertiary (above 12 years)	318 (34.2)	113 (44.5)
Income level, n (%)		
Low	562 (60.4)	149 (58.7)
Middle	327 (35.1)	66 (26.0)
High	42 (4.5)	39 (15.4)
Years of Diagnosis, n (%)		
< 5 years	747 (80.2)	187 (73.6)
$\geq$ 5 years	184 (19.8)	67 (26.4)
Has received anti-viral therapy, n (%)		
No	386 (41.5)	148 (58.3)
Yes	545 (58.5)	106 (41.7)
Has diagnosed cirrhosis, n (%)		
No	756 (81.2)	204 (80.2)
Yes	175 (18.8)	50 (19.8)

that Hepatitis B might cause chronic inflammation of the liver 773 (83.0%), liver failure 697 (74.9%), and liver cancer 717(77.0%). Poor knowledge of transmission of Hepatitis B was found in sharing personal food equipment 352 (37.8%), coughing and sneezing 528 (56.7%). Only 639 (68.6%) patients knew that antiviral for Hepatitis B was available for therapy. Of 734 (78.8%) patients knew that the hepatitis B vaccine can prevent of HBV infection.

Overall, HBV patients have better knowledge than HCV patients. Out of the 254 HCV patients, only 202 (79.5%) patients knew the etiology of Hepatitis C is viral infection. HCV patients knew Hepatitis C can cause chronic inflammation of the liver 191 (75.2%), liver failure 168 (66.1%), and liver cancer 170 (66.9%). Similar to HBV patients, poor knowledge of transmission of Hepatitis C among HCV patients was found in sharing personal food equipment 90 (35.4%), coughing and sneezing 139 (54.7%). Only 165 (65.0%)

patients knew that an antiviral for Hepatitis C was available for therapy. The knowledge of item HBV and HCV infection among infected patients was summarized in **Table 2**.

#### Attitude of Hepatitis B and Hepatitis C Among Infected Patients

The attitudes of infected patients toward HBV and HCV infection are summarized in **Table 3**. Emotional instability among HBV patients was dominated by fear of developing liver cancer 779 (83.6%), fear of transmitting the disease to other people 779 (83.6%), and fear that Hepatitis B disease will worsen and damage the liver 771 (82.8%). Most HBV patients believed that Hepatitis B could be controlled with medication 812 (87.2%) and could be cured 808 (86.8%). Of 468 (50.3%) patients who were unlike to talk about hepatitis B to others, 327 (35.2%) patients were kept thinking about their disease all the time, while 416 (44.6%) patients saw life differently after diagnosed with hepatitis

**Table 2.** Knowledge of Hepatitis B and Hepatitis C among infected patients.

Knowledge (N = 931)	Correct Answer, n (%)	Knowledge (N = 254)	Correct Answer, n (%)
<b>Hepatitis B etiology</b>		<b>Hepatitis C etiology</b>	
Viral infection	808 (86.8)	Viral infection	202 (79.5)
<b>Hepatitis B effect</b>		<b>Hepatitis C effect</b>	
Chronic inflammation of the liver	773 (83.0)	Chronic inflammation of the liver	191 (75.2)
Liver failure	697 (74.9)	Liver failure	168 (66.1)
Liver cancer	717 (77.0)	Liver cancer	170 (66.9)
<b>Hepatitis B transmission</b>		<b>Hepatitis C transmission</b>	
Blood	788 (84.6)	Blood	202 (79.5)
Sexual intercourse	737 (79.2)	Sexual intercourse	172 (67.7)
Unsterilized needles	812 (87.2)	Unsterilized needles	193 (76.0)
Tattoo	690 (74.1)	Tattoo	178 (70.1)
Mother to child during childbirth	706 (75.8)	Mother to child during childbirth	156 (61.4)
Sharing personal food equipment	352 (37.8)	Sharing personal food equipment	90 (35.4)
Coughing and sneezing	528 (56.7)	Coughing and sneezing	139 (54.7)
Casual contact with infected person	616 (66.2)	Casual contact with infected person	170 (66.9)
Sharing toothbrush or razor	631 (67.8)	Sharing toothbrush or razor	149 (58.7)
<b>Hepatitis B symptom</b>		<b>Hepatitis C symptom</b>	
Tiredness	781 (83.9)	Tiredness	184 (72.4)
Asymptomatic	697 (74.9)	Asymptomatic	169 (66.5)
<b>Hepatitis B therapy</b>		Hepatitis C therapy	
Available antiviral for hepatitis B	639 (68.6)	Available antiviral for hepatitis C	165 (65.0)
<b>Hepatitis B prevention</b>			
Vaccination hepatitis B	734 (78.8)		

B. As a result of having Hepatitis B, patients felt difficult to get a job or school 296 (31.8%) and made them ostracized from their environment 154 (16.5%).

Similar to HBV patients, emotional instability among HCV patients was dominated by fear of developing liver cancer 197 (77.5%), fear of transmitting the disease to other people 188 (74%), and fear that Hepatitis C disease will worsen and damage the liver 197 (77.6%). Most HCV patients believed that Hepatitis C could be controlled with medication 210 (82.7%) and could be cured 211 (83.1%). Of 127 (50%) patients who were unlike to talk about hepatitis C

to others, 86 (33.8%) patients were kept thinking about their disease all the time, while 98 (38.6%) patients saw life differently after diagnosed with hepatitis C. As a result of having Hepatitis C, patients felt difficult to get a job or school 53 (20.9%), and made them ostracized from their environment 40 (15.7%).

**Knowledge and Attitudes Scores of Hepatitis B and Hepatitis C**

Among HBV patients, mean scores for knowledge about Hepatitis B was 12 ± 4 out of 17. Patients with adequate knowledge of Hepatitis B was 671(72.1%). Only 265 (28.5%) patients have a positive attitude towards Hepatitis

**Table 3.** Attitude of Hepatitis B and Hepatitis C among infected patients.

Attitudes	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
<b>In patients with HBV (n = 931)</b>					
<b>Hepatitis B – related emotional instability</b>					
Worried about suffering from liver cancer due to hepatitis	342 (36.7%)	431 (46.3%)	84 (9.0%)	58 (6.2%)	16 (1.7%)
Worried about transmitting my disease to others	357 (38.3%)	422 (45.3%)	71 (7.6%)	66 (7.1%)	15 (1.6%)
Worried that my illness will worsen and damage the liver	362 (38.9%)	409 (43.9%)	70 (7.5%)	66 (7.1%)	24 (2.6%)
Hepatitis B makes me feel guilty	105 (11.3%)	238 (25.6%)	219 (23.5%)	316 (33.9%)	53 (5.7%)
Often feel sad and helpless because of hepatitis B	114 (12.2%)	249 (26.7%)	202 (21.7%)	319 (34.3%)	47 (5.0%)

Attitudes	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
<b>Hepatitis B – related confidence</b>					
Believe hepatitis B can be controlled with medication	308 (33.1%)	504 (54.1%)	86 (9.2%)	24 (2.6%)	9 (1.0%)
Sure there will be a cure for hepatitis B	400 (43.0%)	408 (43.8%)	85 (9.1%)	32 (3.4%)	6 (0.6%)
<b>Hepatitis B – related fear of deprivation</b>					
Do not like to talk about my hepatitis B to others	143 (15.4%)	325 (34.9%)	236 (25.3%)	184 (19.8%)	43 (4.6%)
Thinking about hepatitis B all the time	88 (9.5%)	239 (25.7%)	249 (26.7%)	296 (31.8%)	59 (6.3%)
Seeing life differently since I was diagnosed with hepatitis B	127 (13.6%)	289 (31.0%)	195 (20.9%)	279 (30.0%)	41 (4.4%)
<b>Hepatitis B – related social withdrawal</b>					
Hepatitis B makes it difficult for me to get a job/school	106 (11.4%)	190 (20.4%)	192 (20.6%)	349 (37.5%)	94 (10.1%)
Hepatitis B made me ostracized from my environment	42 (4.5%)	112 (12.0%)	189 (20.3%)	425 (45.6%)	163 (17.5%)
<b>In patients with HCV (n = 254)</b>					
<b>Hepatitis C – related emotional instability</b>					
Worried about suffering from liver cancer due to hepatitis C	88 (34.6%)	109 (42.9%)	37 (14.6%)	16 (6.3%)	4 (1.6%)
Worried about transmitting my disease to others	88 (34.6%)	100 (39.4%)	37 (14.6%)	24 (9.4%)	5 (2.0%)
Worried that my illness will worsen and damage the liver	99 (39.0%)	98 (38.6%)	36 (14.2%)	16 (6.3%)	5 (2.0%)
Hepatitis C makes me feel guilty	32 (12.6%)	73 (28.7%)	58 (22.8%)	76 (29.9%)	15 (5.9%)
Often feel sad and helpless because of hepatitis C	36 (14.2%)	63 (24.8%)	59 (23.2%)	74 (29.1%)	22 (8.7%)
<b>Hepatitis C – related confidence</b>					
Believe hepatitis B can be controlled with medication	99 (39.0%)	111 (43.7%)	27 (10.6%)	16 (6.3%)	1 (0.4%)
Sure there will be a cure for hepatitis C	118 (46.5%)	93 (36.6%)	31 (12.2%)	10 (3.9%)	2 (0.8%)
<b>Hepatitis C – related fear of deprivation</b>					
Do not like to talk about my hepatitis C to others	41 (16.1%)	86 (33.9%)	76 (29.9%)	43 (16.9%)	8 (3.1%)
Thinking about hepatitis B all the time	27 (10.6%)	59 (23.2%)	78 (30.7%)	79 (31.1%)	11 (4.3%)
Seeing life differently since I was diagnosed with hepatitis C	32 (12.6%)	66 (26.0%)	75 (29.5%)	67 (26.4%)	14 (5.5%)
<b>Hepatitis C – related social withdrawal</b>					
Hepatitis C makes it difficult for me to get a job/school	21 (8.3%)	32 (12.6%)	79 (31.1%)	87 (34.3%)	35 (13.8%)
Hepatitis C made me ostracized from my environment	11 (4.3%)	29 (11.4%)	67 (26.4%)	97 (38.2%)	50 (19.7%)

B. Meanwhile among HCV patients, mean scores for knowledge about Hepatitis C was lower than HBV patients  $10 \pm 4$  out of 16. Patients with adequate knowledge of Hepatitis C was 137 (53.9%). Positive attitude towards Hepatitis C was observed higher in HCV patients than HBV patients 105 (41.3%) (Table 4).

**Factor Associated with Knowledge and Attitudes of Hepatitis B**

In multivariate analysis, independent factors associated with adequate knowledge Hepatitis B among HBV patients were education level (AOR high education level 9.25 (CI 95%: 5.18 – 16.5,

p-value <0.001) and AOR middle education level = 3.92 (CI 95%: 2.46 – 6.26), p-value <0.001), income level (AOR high-income level = 5.56 (CI 95%: 1.24 – 25.1, p-value <0.025) and AOR middle-income level = 1.52 (CI 95%: 1.04 – 2.23), p-value 0.033), diagnosis above 5 years (AOR = 1.82 (CI 95%: 1.13 – 2.93), and has received antiviral therapy (AOR = 1.89 (CI 95%: 1.36 – 2.63, p-value <0.001). Independent factors associated with positive attitude Hepatitis B among HBV patients were age older (AOR= 1.99 (CI 95%: 1.42 – 2.80, p-value <0.001) and received antiviral therapy (AOR = 1.59 (CI 95%:

**Table 4.** Knowledge and Attitudes Scores of Hepatitis B and Hepatitis C

Variables	
<b>In patients with HBV (n = 931)</b>	
Knowledge about Hepatitis B	
Number of correct answers	0-17
Overall Score, mean ± SD	12 ± 4
Knowledge about Hepatitis B, n (%)	
Adequate	671 (72.1)
Non-Adequate	260 (27.9)
Attitude about Hepatitis B, n (%)	
Positive	265 (28.5)
Negative	666 (71.5)
<b>In patients with HCV (n = 254)</b>	
Knowledge about Hepatitis C	
Number of correct answers	0-16
Overall Score, mean ± SD	10 ± 4
Knowledge about Hepatitis C, n (%)	
Adequate	137 (53.9)
Non-Adequate	117 (46.1)
Attitude about Hepatitis C, n (%)	
Positive	105 (41.3)
Negative	149 (58.7)

1.16 – 2.18, p-value <0.004). (Table 5)

**Factor Associated with Knowledge and Attitudes of Hepatitis C**

In multivariate analysis, independent factors associated with adequate knowledge of Hepatitis C among HCV patients were marital status (AOR single = 0.25 (CI 95%: 0.08 - 0.78, p-value 0.017), an education level (AOR high education level 7.45 (CI 95%: 2.50 – 22.19, p-value <0.001) and AOR middle education level = 4.34 (CI 95%: 1.55 – 12.19), p-value 0.005), income level (AOR high-income level = 2.68 (CI 95%: 1.02 – 6.99, p-value <0.045, and has received antiviral therapy (AOR = 1.97 (CI 95%: 1.09 – 3.58, p-value <0.025). Independent factors associated with positive attitude Hepatitis C among HCV patients was only education level (AOR middle education level= 3.25 (CI 95%: 1.32 – 7.99, p-value 0.010). (Table 6)

**Table 5.** Multivariate factorstitudes of Hepatitis B

Variables	Knowledge		AOR (95% CI)	P value	Attitude		AOR (95% CI)	P value
	Non-Adequate	Adequate			Negative	Positive		
Age, n (%)								
< 40 years	97 (25.1)	290 (74.9)	Ref		308 (79.6)	79 (20.4)	Ref	
≥ 40 years	163 (30.0)	381 (70.0)	0.93 (0.65 – 1.33)	0.684	358 (65.8)	186 (34.2)	1.99 (1.42 – 2.80)	<0.001
Sex, n (%)								
Female	112 (28.4)	283 (71.6)	1		292 (73.9)	103 (26.1)	1	
Male	148 (27.6)	388 (72.4)	0.76 (0.55 – 1.07)	0.112	374 (69.8)	162 (30.2)	1.14 (0.83 – 1.55)	0.412
Marital status, n (%)								
Married	215 (28.3)	545 (71.7)	Ref		535 (70.4)	225 (29.6)	Ref	
Single	32 (25.0)	96 (75.0)	1.16 (0.71 – 1.91)	0.557	100 (78.1)	28 (21.9)	0.99 (0.61 – 1.62)	0.981
Divorced	13 (30.2)	30 (69.8)	1.15 (0.55 – 2.43)	0.707	31 (72.1)	12 (27.9)	0.83 (0.41 – 1.68)	0.607
Education level, n (%)								
Primary (0 – 9 years)	70 (65.4)	37 (34.6)	Ref		78 (72.9)	29 (27.1)	Ref	
Secondary (10-12 years)	151 (29.8)	355 (70.2)	3.92 (2.46 – 6.26)	<0.001	356 (70.4)	150 (29.6)	1.32 (0.81 – 2.16)	0.260
Tertiary (above 12 years)	39 (12.3)	279 (87.7)	9.25 (5.18 – 16.5)	<0.001	232 (73.0)	86 (27.0)	1.19 (0.68 – 2.09)	0.529
Income level, n (%)								
Low	199 (35.4)	363 (64.6)	Ref		400 (71.2)	162 (28.8)	Ref	
Middle	59 (18.0)	268 (82.0)	1.52 (1.04 – 2.23)	0.033	240 (73.4)	87 (26.6)	0.77 (0.54 – 1.10)	0.154
High	2 (4.8)	40 (95.2)	5.56 (1.24 – 25.1)	0.025	26 (61.9)	16 (38.1)	1.25 (0.61 – 2.54)	0.539
Years of Diagnosis, n (%)								
< 5 years	234 (31.1)	513 (68.7)	Ref		545 (73.0)	202 (27.0)	Ref	
≥ 5 years	26 (14.1)	158 (85.9)	1.82 (1.13 – 2.93)	0.014	121 (65.8)	63 (34.2)	1.21 (0.84 – 1.75)	0.301

Has received anti-viral therapy, n (%)								
No	139 (36.0)	247 (64.0)	Ref		301 (78.0)	85 (22.0)	Ref	
Yes	121 (22.2)	424 (77.8)	1.89	<0.001	365 (67.0)	180 (33.0)	1.59 (1.16 – 2.18)	0.004
			(1.36 – 2.63)					
Has diagnosed cirrhosis, n (%)								
No	207 (27.4)	549 (72.6)	Ref		548 (72.5)	208 (27.5)	Ref	
Yes	53 (30.3)	122 (69.7)	0.75	0.750	118 (67.4)	57 (32.6)	0.95 (0.65 – 1.38)	0.773
			(0.94 – 0.62)					

AOR: Adjusted Odd Ratio; CI: Confidence Interval

**Table 6.** Multivariate factors associated with Knowledge and Attitudes of Hepatitis C

Variables	Knowledge		AOR (95% CI)	P value	Attitude		AOR (95% CI)	P value
	Non Adequate	Adequate			Negative	Positive		
Age, n (%)								
< 40 years	20 (29.4)	48 (70.6)	Ref		44 (64.7)	24 (35.3)	Ref	
≥ 40 years	97 (52.2)	89 (47.8)	0.26	0.001	105 (56.5)	81 (43.5)	1.11	0.763
			(0.12 – 0.58)					
Sex, n (%)								
Female	46 (48.4)	49 (51.6)	Ref		58 (61.1)	37 (38.9)	Ref	
Male	71 (44.7)	88 (55.3)	0.74	0.351	91 (57.2)	68 (42.8)	0.85	0.603
			(0.40 – 1.39)					
Marital status, n (%)								
Married	89 (43.2)	117 (56.8)	Ref		115 (55.8)	91 (44.2)	Ref	
Single	10 (50)	10 (50)	0.25	0.017	16 (80.0)	4 (20.0)	0.34	0.093
			(0.08 – 0.78)					
Divorced	18 (64.3)	10 (35.7)	0.57	0.248	18 (64.3)	10 (35.7)	0.62 (0.25 – 1.55)	0.304
			(0.22 – 1.48)					
Education level, n (%)								
Primary (0 – 9 years)	29 (82.9)	6 (17.1)	Ref		26 (74.3)	9 (25.7)	Ref	
Secondary (10-12 years)	54 (50.9)	52 (49.1)	4.34	0.005	48 (45.3)	58 (54.7)	3.25	0.010
			(1.55 – 12.19)					
Tertiary (above 12 years)	34 (30.1)	79 (69.9)	7.45	<0.001	75 (66.4)	38 (33.6)	1.04	0.933
			(2.50 – 22.19)					
Income level, n (%)								
Low	82 (55.0)	67 (45.0)	Ref		90 (60.4)	59 (39.6)	Ref	
Middle	27 (40.9)	39 (59.1)	1.26	0.508	37 (56.1)	29 (43.9)	1.54	0.219
			(0.63 – 2.52)					
High	8 (20.5)	31 (79.5)	2.68	0.045	22 (56.4)	17 (43.6)	1.75	0.194
			(1.02 – 6.99)					
Years of Diagnosis, n (%)								
< 5 years	24 (35.8)	43 (64.2)	Ref		33 (49.3)	34 (50.7)	Ref	
≥ 5 years	93 (49.7)	94 (50.3)	0.68	0.252	116 (62.0)	71 (38.0)	0.60	0.092
			(0.35 – 1.32)					
Has received anti-viral therapy, n (%)								
No	78 (52.7)	70 (47.3)	Ref		87 (58.8)	61 (41.2)	Ref	
Yes	39 (36.8)	67 (63.2)	1.97	0.025	62 (58.5)	44 (41.5)	1.03	0.905
			(1.09 – 3.58)					
Has diagnosed cirrhosis, n (%)								
No	97 (47.5)	107 (52.5)	Ref		122 (59.8)	82 (40.2)	Ref	
Yes	20 (40.0)	30 (60.0)	1.34	0.444	27 (54.0)	23 (46.0)	1.04	0.915
			(0.64 – 2.82)					

AOR: Adjusted Odd Ratio; CI: Confidence Interval

## DISCUSSION

Characteristics of education in Indonesia were a little different from the result of Indonesia Education Statistics 2020. National data suggested that 50.9% of residents had completed secondary education, while only 9.5% had completed tertiary education.<sup>12</sup> In this study, we found that 34.2% of HBV patients and 44.5% of HCV patients had completed tertiary education, which is higher than the data in the census. It might reflect that individuals person with higher education have more awareness and accessibility to healthcare service utilization and seek medical treatment than the population in general.<sup>13</sup> The discrepancy in education levels between the general population and the Hepatitis B (HBV) and Hepatitis C (HCV) patients in the study may influence the applicability of the results to the broader population. In this study, HBV and HCV patients with higher education levels are overrepresented compared to the general population due to the use of consecutive sampling techniques.

However, this study obtained the proportion of HBV patients with adequate knowledge of Hepatitis B was 72.1%, while adequate knowledge of Hepatitis C in HCV patients was 53.9%. Dwiartama reported that the knowledge level among the HBV respondents in four cities in Indonesia was very high, with an average index level of knowledge was 86.7.<sup>14</sup> This variation might happened as a result of differences in geographical study locations. Compared to other countries, the overall average scores of knowledge HBV patients in Indonesia were higher than Malaysia and Gambia ( $12/17 \pm 4$  vs.  $12.57/20 \pm 4.4$  in Malaysia,  $11.09/20 \pm 4.89$  in the Gambia), but lower than Singapore and Canadian ( $12/17 \pm 4$  vs.  $10.4/14 \pm 0.1$  in Singapore,  $10/14$  in Canadian).<sup>11,15,16,17</sup> There's no data of knowledge Hepatitis C in Indonesia. In this study, we found that patients with adequate knowledge were slightly low in Hepatitis C compared to Hepatitis B patients. All the thought HCV patients in thibeingbeing s studying have a level of income comparable to HBV patients, however, there was a difference oof of the level of knowledge amfrom from ong these professionals Consultation with healthcare professionals

as reliable sources was essential to provide knowledge about evidence-based Hepatitis B and Hepatitis C, especially in patients with newly diagnosed. A study from Ul Haq<sup>18</sup>, Pak A<sup>19</sup>, Velvzhi G<sup>20</sup>, and Gambhir R<sup>21</sup> reports a similar finding, which underscores the importance of implementing extensive health educational campaigns in a diverse research population, including the healthy population<sup>18</sup>, medical students<sup>19,20</sup>, and healthcare workers<sup>21</sup>.

In this study, we found that HBV and HCV patients have good knowledge about etiology and the consequences of HBV and HCV Hepatitis, but less knowledge of transmission in items of sharing personal food equipment, coughing, and sneezing. The common myths about HBV and HCV transmission such as mosquito bites, sharing toilets, and sharing cup was also observed among patients in Poland.<sup>22</sup> The myth of transmission in patients could be a barrier to social interaction because of fear of spreading the virus to others. Public health education might have a role in preventing the myth of HBV and HCV transmission, especially in the general population.

The differential attitudes towards HBV and HCV have significant impacts. The result data showed differing attitudes between HBV and HCV patients, impacting their emotional well-being and social interactions. While both express worry about transmission and health consequences, HCV patients, on the other hand, display slightly more confidence in treatment outcomes. Before the availability of DAA medication, Enescu et al.'s<sup>23</sup> study reported that more drop was seen in HCV patients than in HBV patients regarding psychiatric components. However, this study found the opposite, which may be linked to the high effectiveness of DAA in treating hepatitis C patients.<sup>24</sup> Socially, both groups report difficulties in employment or education, with HBV patients experiencing slightly more challenges. This is also consistent with a systematic review of Asian populations, which reported that up to 30% of patients with HBV experience workplace discrimination.<sup>25</sup>

Our study revealed that education level, income level, and antiviral therapy were factors linked to contributing adequate knowledge in

patients, while marital status was only found significant for contributing adequate knowledge in Hepatitis C patients. Several studies support this result. A study in Malaysia also reported that tertiary education level was a significant factor in the higher knowledge of patients. HBV and HCV patients with higher degrees of education might have an easier understanding of information regarding their health status.<sup>11</sup> A study in Europe revealed that people with lower education and low socio-economic were vulnerable to having limited health literacy.<sup>26</sup> Ever received antiviral therapy in HBV and HCV patients also associated with higher knowledge of patients. The possibility of duration consultation with doctors perhaps can be explained that the patients who have received antiviral therapy have better knowledge compared with not yet received anti-viral therapy.<sup>27</sup> Being single is associated with less knowledge of hepatitis C. Ministry of Health Indonesia reported that the distribution of HCV is concentrated in injecting drug users (IDU), hemodialysis, and blood donors. The prevalence of HCV among IDUs in Indonesia was reported high accounting for 13.8 % - 31.1%.<sup>28</sup> The IDUs in Indonesia were relatively high in young adults with initiation of injecting occurring in age 15-34 years old.<sup>29</sup> It might explain why single patients have less knowledge of Hepatitis C. The young adult likes to explore the risk behavior, including the use of IDUs. Pre-marital screening and counseling for hepatitis might be important to get a person tested and informed about the transmission of hepatitis.<sup>30</sup>

Hepatitis B/C-related concerns was qualitative explored in this study. This study demonstrates the perspective of patients toward life since being diagnosed with hepatitis. Above 80% of subjects in this study have a fear of developing liver cancer, fear of transmitting the disease to other people, and fear that Hepatitis B will worsen and damage the liver. These results are similar to the most common concern of patients related to fear and worries about having Hepatitis B in Australia.<sup>31</sup> HBV and HCV patients, especially newly diagnosed patients might be shocked for the first time knowing diagnosed with hepatitis. Counseling

services from healthcare professionals were urgently needed to provide emotional support to this group of patients. This service should be available to reduce the psychological stressor the first time diagnosed and the entire time during the treatment. This study provides information that patients with HBV and HCV might have social implications. About 30-50% of patients were unlike to talk about their hepatitis to others, kept thinking about their disease all the time, and seeing life differently after being diagnosed with hepatitis. That perspective could lead them to become self-isolated and avoid social life.

This study also revealed that 20 – 30% of HBV and HCV patients found it difficult to get a job or school as a consequence of social withdrawal due to having hepatitis. Patients with HBV and HCV often face discrimination during the selection of students or employment.<sup>32,33</sup> Many companies in Indonesia have a trend to conduct HBsAg testing as a tool for selecting employees to be accepted, where a person with positive HBsAg is considered an unhealthy person to be employed. Meanwhile the Labor laws from Director Labor number NO. SE-07/B MW/1997 already exists to guarantee the legal rights of hepatitis patients in Indonesia. The companies should provide guidance and workplace programs for HBV and HCV workers rather than avoid them from working in their companies. A person with Hepatitis B/C-related illness may have the ability to work and be productive as long as they are medically performed and fit to work. The government has the responsibility to protect the HBV and HCV workers from stigma by giving education to the companies.

In this study, fears and anxiety were less found in increasing age and patients who have ever received antiviral therapy among Hepatitis B patients. The increasing age might linger with obtaining information from medical treatment and already not worried about a job since they were already employed at a young age. Among patients with Hepatitis C, the level of education was associated with less fear and anxiety. Education might strengthen the knowledge. The knowledgeable patients seem not to worry about their illness because they already know the

characteristics of the disease and how to prevent their illness for not getting worse by obtaining medical treatment.

## CONCLUSION

Despite the relatively high prevalence of HBV and HCV in Indonesia, the knowledge and attitude of patients regarding HBV and HCV were quite low. The myth of transmission and social discrimination against HBV and HCV also exists in Indonesia. As a suggestion, the physician should have a package program to educate patients about the route of transmission and treatment, especially in patients with newly diagnosed. Counseling service is also needed to reduce anxiety and social implications related to HBV and HCV. Discrimination about not hiring HBV and HCV patients to work is not following the Labor laws in Indonesia. The government has implications to protect HBV and HCV workers from stigma by giving eduimplicationshe companto ies. For non-modfollowingch such as marital status, education level, and income level take into account these socio-economic variables to ensure equitable access to healthcare and improve knowledge and attitudes towards HBV and HCV.

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## ABBREVIATIONS

AOR: Adjusted Odds Ratio; HBV: Hepatitis B Virus; HCV: Hepatitis C Virus; CI: Confidence Interval; Ina ASL/PPHI: The Indonesian Association for the Study of the Liver

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