



Liver Diseases in South Korea: A Pulse Check of the Public's Knowledge, Awareness, and Behaviors

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Purpose: National surveys in Korea have spotlighted suboptimal levels of awareness among the public towards liver-related health and diseases, leading to progressive reform of national policies and education efforts. This study aimed to assess the status of the Korean public's knowledge towards liver-related diseases.

Materials and Methods: A self-reported, cross-sectional, web-based questionnaire study was conducted between February–March 2020 among 1000 Korean adults. Questionnaire items assessed the knowledge, awareness, and behaviors towards liver-related health and diseases.

Results: About half (50.9%–52.1%) knew untreated/chronic viral hepatitis could lead to liver failure and/or cancer. Misconceptions pertaining to viral hepatitis transmission risks exist with only 26.3% knowing viral hepatitis B cannot be transmitted by dining with an infected individual. About one-fifth (22.2%) were aware of an available cure for viral hepatitis C. Less than half were aware of the risk factors associated with nonalcoholic steatohepatitis (NASH), despite 72.4% and 49.5% having heard of fatty liver disease and NASH, respectively. More than one-third were unlikely to seek medical consultation even if exposed to viral hepatitis risk factors or upon diagnosis with a liver condition. Reasons for this low urgency included costs-related concerns, perceptions of being healthy, and the viewpoint that the condition is not life-threatening.

Conclusion: The public's knowledge towards liver-related diseases in Korea was found to be lacking, which could account for a lower sense of urgency towards screening and treatment. More efforts are needed to address misperceptions and dispel stigma in an effort to encourage pro-health seeking behaviors.

Key Words: Hepatitis B, hepatitis C, nonalcoholic fatty liver disease, knowledge, awareness

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•Myunghwa Kim and Jin Youn are employees of Gilead Sciences, Korea. Shikha Singh is an employee of Kantar Health. Sang Hoon Ahn has acted as advisor and investigator for Gilead, Janssen, AbbVie, Roche, Assembly Biosciences, Arbutus, Bria, Vaccitech, GSK, Inovio, Aligos, Vir Biotechnology, SL Vaxigen, GeneOne Life Science, GreenCross, Yuhan, Samil and Ildong. Hye Won Lee declares no conflicts of interest.

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INTRODUCTION

Chronic liver diseases account for more than two million global deaths annually.^{1,2} Viral hepatitis remains the predominant etiology of liver cirrhosis, liver failure, and/or cancer and is considered a major global public health threat.³ Approximately 60%–80% of all liver cancer and cirrhosis incidences in South Korea (hereafter Korea) are reportedly due to chronic hepatitis B, while 10%–20% are due to chronic hepatitis C.^{4,5}

In the past, Korea has been considered as an area of intermediate hepatitis B endemicity, with a prevalence of approximately 2%–7%.⁶ This prevalence has decreased through intensive efforts of nationwide screening and hepatitis B virus (HBV) vaccination and immunization from the government and academic societies.⁷ However, the seroprevalence of hepatitis B surface

antigen (HBsAg) has remained at 2.9% and more effort is needed for the elimination thereof.⁸ The anti-hepatitis C virus (HCV) seropositivity among Korean adults aged 20 years and older was approximately 0.9%, according to Korea National Health and Nutrition Examination Survey (KNHANES) 2013–2018.⁹ The proportion of HBV and HCV infected individuals diagnosed in Korea was estimated at 75% and 48% in 2016, respectively.^{10,11} The proportion of infected individuals treated for the respective conditions was only 51% and 6%.^{10,11} This discordance in diagnosed individuals and treated individuals hints at a possible treatment gap in South Korea.

Many Korean patients infected with viral hepatitis have been found to not seek treatment due to their lack of awareness of the disease severity or their infection status.¹² National surveys have revealed that a substantial proportion of respondents had never tested for/did not know of their HBV (45%) or HCV (90%) infection status¹³ or held misperceptions pertaining to the transmission routes of viral hepatitis.^{12,13} This sparked a progressive reform of policies and education efforts to improve the public's knowledge and encourage health seeking behavior, including seeking early detection of and adopting appropriate treatment regimens upon diagnosis of viral hepatitis-related liver diseases.^{14,15} However, there is a paucity of recent information exploring the knowledge and attitudes in Korea towards liver health and diseases with which to assess the impact of these policies on the public's knowledge and to effectively manage and reduce transmission risks of hepatitis-related liver diseases within the community.

Nonalcoholic fatty liver disease (NAFLD) reportedly contributes to the incidence of liver cirrhosis and liver cancer, imposing a significant public health issue in Korea.⁵ The overall NAFLD prevalence in Korea was 30.3%–31.5%,^{16,17} with approximately one-third having moderate-to-severe NAFLD.¹⁶ Only 27.9% of Koreans responding to the 2013 Korean Association for the Study of the Liver (KASL) national survey were aware of fatty liver status and less than half had adopted liver health maintenance practices despite majority (>90%) being aware of fatty liver disease risk factors.¹³

Herein, we aimed to document the current levels of knowledge and awareness of, as well as to identify any gaps in the knowledge, attitudes, and behaviors towards, liver-related diseases among the Korean public.

MATERIALS AND METHODS

Study design and population

This study was conducted as part of a cross-sectional, multi-national, online survey-based study conducted in 11 countries/territories within Asia.¹⁸ Respondents aged 18 years and older, residing in Korea, with internet access, and were able to read Korean were considered eligible to partake in this study survey. There were no exclusion criteria. Potential respondents

were recruited via email through an existing, general purpose (i.e., not healthcare specific) web-based commercial-based consumer panel (Kantar Profiles Network and panel partners) within a pool of pre-profiled consumers who had explicitly provided consent to participate in surveys.

Invitations to participate in the survey were distributed to potential respondents in continuous waves between February–March 2020 until 1000 responses were collected. Only responses from all respondents who completed the questionnaire and had provided informed consent online to participate in a 30-minute self-administered web-based survey were captured. Responses collected from 1000 adult individuals were considered sufficient to provide a descriptive estimate of 3.02% margin of error, assuming a 95% confidence interval and 50% response distribution.

The survey questionnaire assessing the awareness, perceptions, and attitudes towards liver-related health and diseases was part of the Asia-wide liver index study.¹⁸ As English is the common language across the region, the questionnaire was therefore first developed in English and later translated into local native languages accordingly. Both the protocol and survey questionnaire (#20-KANT-214) were part of a regional liver index study¹⁸ and were submitted to the Pearl Institutional Review Board for review.

Survey questionnaire

The survey questionnaire consisted of 25 questions from the regional liver index study,¹⁸ as well as additional questions specific to the Korean community.

Questions from the regional liver study were used to develop an overall liver index that served to monitor gaps in knowledge and awareness of liver health diseases (section 1: Q1–Q14), as well as the awareness of and attitudes towards liver disease prevention, screening, diagnosis, and treatment (section 2: Q15–Q25). The internal consistency of the questionnaire (Q1–Q25) was assessed by Cronbach's alpha ($\alpha > 0.7$).

Additional questions (section 3: Q26–Q32) were related to awareness among the Korean community pertaining to the treatment of liver diseases and NAFLD.

The protocol and questionnaire are part of a regional liver index study conducted in Hong Kong, India, Indonesia, Malaysia, Pakistan, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam and are administered centrally. Both protocol and questionnaire were submitted to Pearl Institutional Review Board (Indianapolis, IN, USA) for exemption determination and has been reviewed to be exempt for the life of the study. All eligible respondents explicitly agreed to join the panel and provided informed online consent to participate in the study.

Statistical methods

The responses in section 1 (Q1–14) were scored and normalized by a min-max feature of 0–100 scale for each respondent.

The section 1 index was measured as a weighted mean of the normalized question scores, with the same weight on each answered question (no-response question carrying zero weight).

Descriptive data analyses of the respondents' characteristics and responses to the survey questions are summarized and presented as text, tables and charts in frequencies and percentages.

Chi-square/Fisher exact tests were conducted to investigate if the respondents' characteristics (e.g., age, sex, education, income, and region) or whether they were ever-diagnosed with liver disease(s) would affect the knowledge and awareness of the respondents towards liver-related diseases. The statistical significance was assessed and considered at $p < 0.05$. Data analyses were conducted using R version 3.6.1 (R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

Study population characteristics

Among the respondents, 66.0% were aged ≥ 35 years, 51.0% were men, 66.6% had university education, 52.0% had a household income of ≥ 4000000 KRW, 55.4% were from metropolitan cities, and 24.0% did not attend health screening within the recent 2 years (Table 1). Among respondents who had ever been diagnosed with liver disease(s) ($n=232$) (Table 1), 40.9% (95/232), 37.9% (88/232), 9.1% (21/232), and 5.2% (12/232) were diagnosed with hepatitis B, fatty liver diseases, hepatitis C, and liver cancer, respectively (Table 1).

Knowledge and awareness of liver diseases (hepatitis B, hepatitis C, and NAFLD)

More respondents were aware of hepatitis B (88.1%) than hepatitis C (48.6%) (Fig. 1). Among those aware of hepatitis B and/or C, at least four in 10 were aware infection routes of hepatitis B and C: not airborne (56.1%; 56.2%) or hereditary (40.6%; 42.6%). While 67.1% responded that hepatitis B can be prevented by vaccination, only 16.0% recognized that hepatitis C cannot be prevented by vaccination (Fig. 1A). Less than one-quarter had rightly identified the relevant diagnostic tests for hepatitis B (14.1%) and hepatitis C (23.5%), and only 22.2% were aware there are treatments available that can cure chronic HCV infection (Fig. 1B).

At least two-fifths identified sexual intercourse (HBV: 40.4%; HCV, 47.3%) and pregnant mother-to-child transmission (63.8%; 65.8%) as transmission routes of hepatitis B and C (Fig. 1C). However, only about one-quarter were aware that hepatitis B and C cannot be transmitted by touching (HBV: 27.5%; HCV: 22.4%), dining with an infected person (26.3%; 25.5%), via the fecal-oral route (19.5%; 19.1%), or via contaminated raw seafood (21.1%; 24.3%) (Fig. 1C).

About half were aware that liver fibrosis and cirrhosis are key determinants of liver disease progression (54.1%) and that

Table 1. Demographic Characteristics of Respondents Participating in the Survey ($n=1000$)

Variables	Number of respondents, n (%)
Age group	
<25 yrs	150 (15.0)
25–34 yrs	190 (19.0)
35–44 yrs	210 (21.0)
45–54 yrs	230 (23.0)
55–64 yrs	181 (18.1)
≥ 65 yrs	39 (3.9)
Sex	
Male	510 (51.0)
Female	490 (49.0)
Level of education	
Primary school	1 (0.1)
Secondary school	258 (25.8)
Higher secondary school	3 (0.3)
University	66 (6.6)
Postgraduate	72 (7.2)
Household income	
Under 2000000 KRW	115 (11.5)
2000000–2990000 KRW	151 (15.1)
3000000–3990000 KRW	187 (18.7)
Above 4000000 KRW	521 (52.1)
Declined to disclose	26 (2.6)
Region	
Unknown	69 (6.9)
Metropolitan city	
Busan	59 (5.9)
Daegu	55 (5.5)
Daejeon	33 (3.3)
Gwangju	25 (2.5)
Incheon	57 (5.7)
Sejong	3 (0.3)
Seoul	303 (30.3)
Ulsan	19 (1.9)
Province	
Chungcheongbuk-do	18 (1.8)
Chungcheongnam-do	23 (2.3)
Gangwon-do	21 (2.1)
Gyeonggi-do	201 (20.1)
Gyeongsangbuk-do	34 (3.4)
Gyeongsangnam-do	34 (3.4)
Jeju-do	8 (0.8)
Jeollabuk-do	19 (1.9)
Jeollanam-do	19 (1.9)
Self-reported last health screening within 2 years	
Yes	760 (76.0)
No	240 (24.0)
Self-reported ever-diagnosed with liver disease(s)	
No	768 (76.8)
Yes	232 (23.2)

Table 1. Demographic Characteristics of Respondents Participating in the Survey (n=1000) (continued)

Variables	Number of respondents, n (%)
Proportion of self-reported liver disease diagnoses*	
Hepatitis B	95 (40.9)
Fatty liver disease	88 (37.9)
Hepatitis A	43 (18.5)
Alcohol-related liver disease	37 (15.9)
Hepatitis C	21 (9.1)
Liver cancer	12 (5.2)
Autoimmune hepatitis	6 (2.6)

*Respondents may have more than one diagnosis of liver disease(s).

chronic viral hepatitis can cause liver cancer (52.1%) or lead to complications, such liver failure or cancer (50.9%). However, only 10.6% were aware of the various stages of liver scarring/fibrosis (Supplementary Table 1, only online).

The majority (88.8%) were aware “fatty liver” is a disease that needs to be managed (Fig. 2A); 72.4% and 49.5% of all respondents had considered fatty liver disease and nonalcoholic steatohepatitis (NASH) as liver disease(s) (Supplementary Table 1, only online). Less than half of all respondents were aware that obesity (45.8%), lack of exercise (39.9%), and higher blood lipid levels (31.5%) were associated with an increased risk of developing advanced fibrosis NASH (AF-NASH) (Fig. 2B).

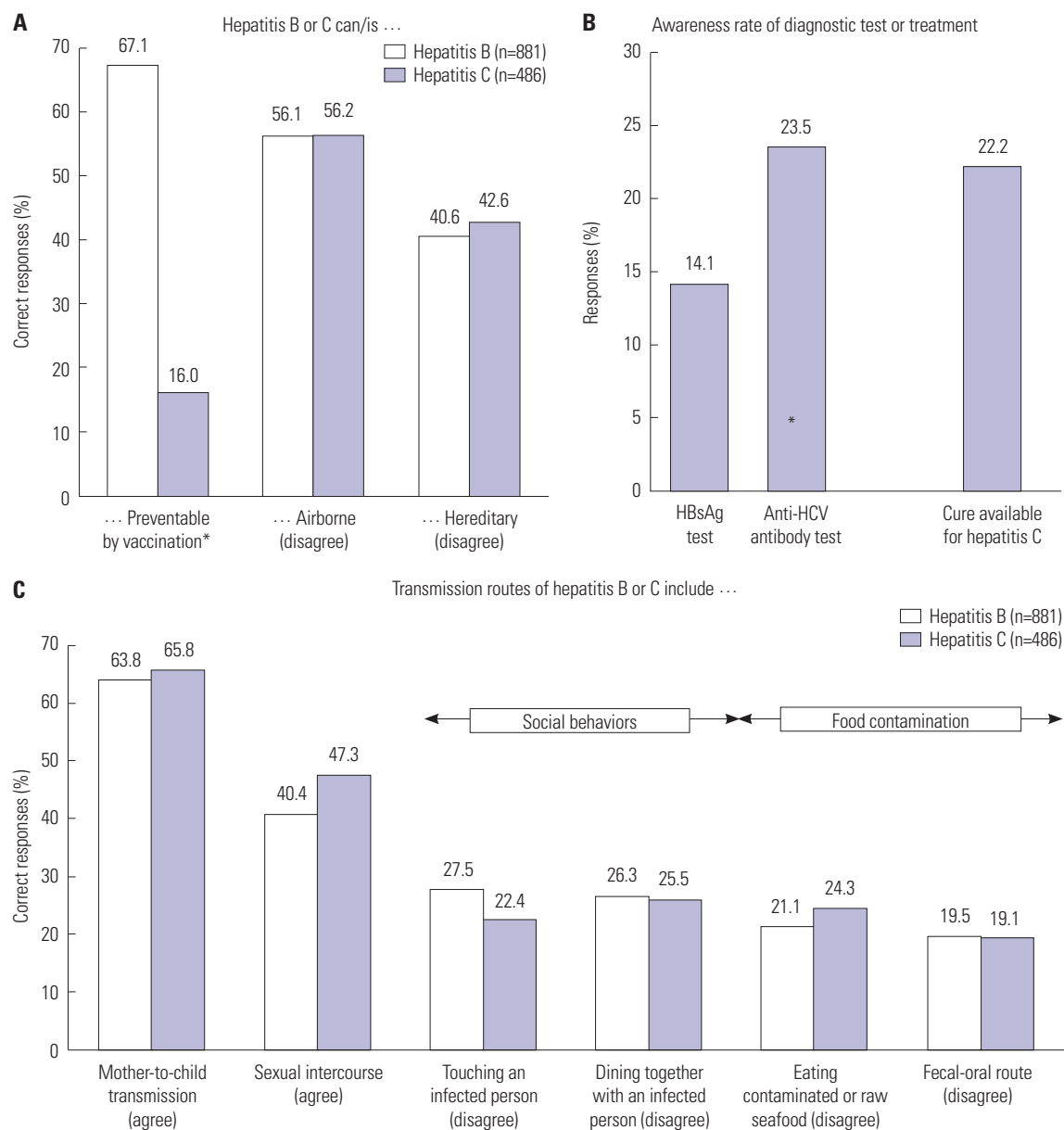


Fig. 1. Knowledge and awareness of Korean adults towards the features of (A), diagnostic test or treatment (B), and the transmission risks of (C) viral hepatitis B and C. Correct responses are indicated in brackets, unless otherwise indicated. *Correct responses for “...preventable by vaccination” are “agree” for hepatitis B and “disagree” for hepatitis C, respectively.

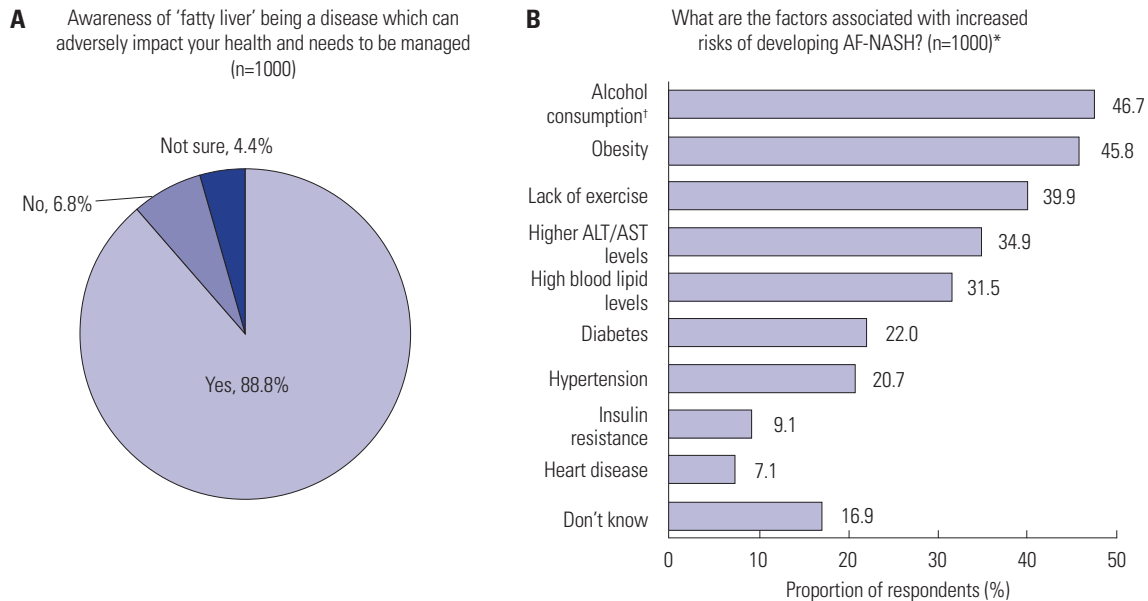


Fig. 2. Awareness and knowledge of adult Koreans towards fatty liver disease (A) and the associated risk factors of nonalcoholic fatty liver disease (B). *Multiple responses were allowed to the question; †Including excessive alcohol consumption. AF-NASH, advanced fibrosis nonalcoholic steatohepatitis; ALT, alanine aminotransferase; AST, aspartate aminotransferase.

Attitudes towards screening and treatment of liver diseases

Most of the respondents (95.9%) perceived regular screening and getting vaccinated as ways of protecting and maintaining their liver health (Supplementary Table 1, only online). Among the respondents who did not attend health screening in the recent 2 years, 91 respondents never attended a health screening in their lifetime (Fig. 3A). Reasons for not attending health screening included perceptions that health screening tests are expensive (49.5%) and that they were feeling healthy (46.2%) (Fig. 3A).

Among those who had ever been diagnosed with liver disease(s) (n=228), 31.6% sought treatment immediately upon diagnosis, while 39.0% never had a treatment for their condition (Fig. 3B). Reasons for not receiving treatment included beliefs that prescription treatment is too expensive (47.1%) and the condition is not life-threatening (40.0%), as well as physician-patient related reasons, such as doctors did not prescribe any treatment (37.1%) and that observation and follow-up were recommended without initiating treatment (32.9%) (Fig. 3C).

Impact of respondents' characteristics on the knowledge of liver diseases

Analyses of section 1 (knowledge and awareness of liver diseases) scores revealed five questions with scores <50.0, which are related to the knowledge and awareness of viral hepatitis (Q6, Q7, Q9, Q10, Q13) (Supplementary Fig. 1, only online). Respondents who had ever been diagnosed with any liver disease(s) (Supplementary Fig. 1, only online) had higher scores than respondents who had never been diagnosed with any liv-

er disease(s).

Compared to respondents without diagnosis of any liver disease(s), a significantly higher proportion of those who had ever been diagnosed with liver disease(s) were aware of 1) hepatitis B (92.7% vs. 86.7%, *p*=0.019) and hepatitis C (58.2% vs. 45.7%, *p*=0.001), 2) viral hepatitis being one of the key causes of liver failure in the world (29.3% vs. 17.1%, *p*<0.001), and 3) the various stages of liver scarring/fibrosis (17.2% vs. 8.6%, *p*<0.001) (Table 2).

More respondents who had ever been diagnosed with any liver disease(s) agreed that touching an infected person (hepatitis B: 31.2% vs. 26.3%; hepatitis C: 29.6% vs. 19.7%), fecal-oral route (hepatitis B: 24.2% vs. 18.0%), or contaminated/raw seafood (hepatitis B: 27.4% vs. 19.1%) are not transmission routes (Table 2). More respondents with any liver disease(s) diagnosis did not agree that sexual intercourse poses a transmission risk for hepatitis B than respondents without any liver disease(s) (42.8% vs. 32.4%) (*p*<0.05) (Table 2).

DISCUSSION

A recent Asia liver index study found that the overall liver index of Korea ranked 10th among the 11 participating countries/territories.¹⁸ This study serves as an extension and reports the country-specific findings pertaining to the current level of knowledge and awareness, as well as identifies gaps in the knowledge, attitudes, and behaviors, towards liver-related diseases among the public in Korea.

About one-quarter of the study respondents had a self-reported history of liver disease(s), which is higher than previ-

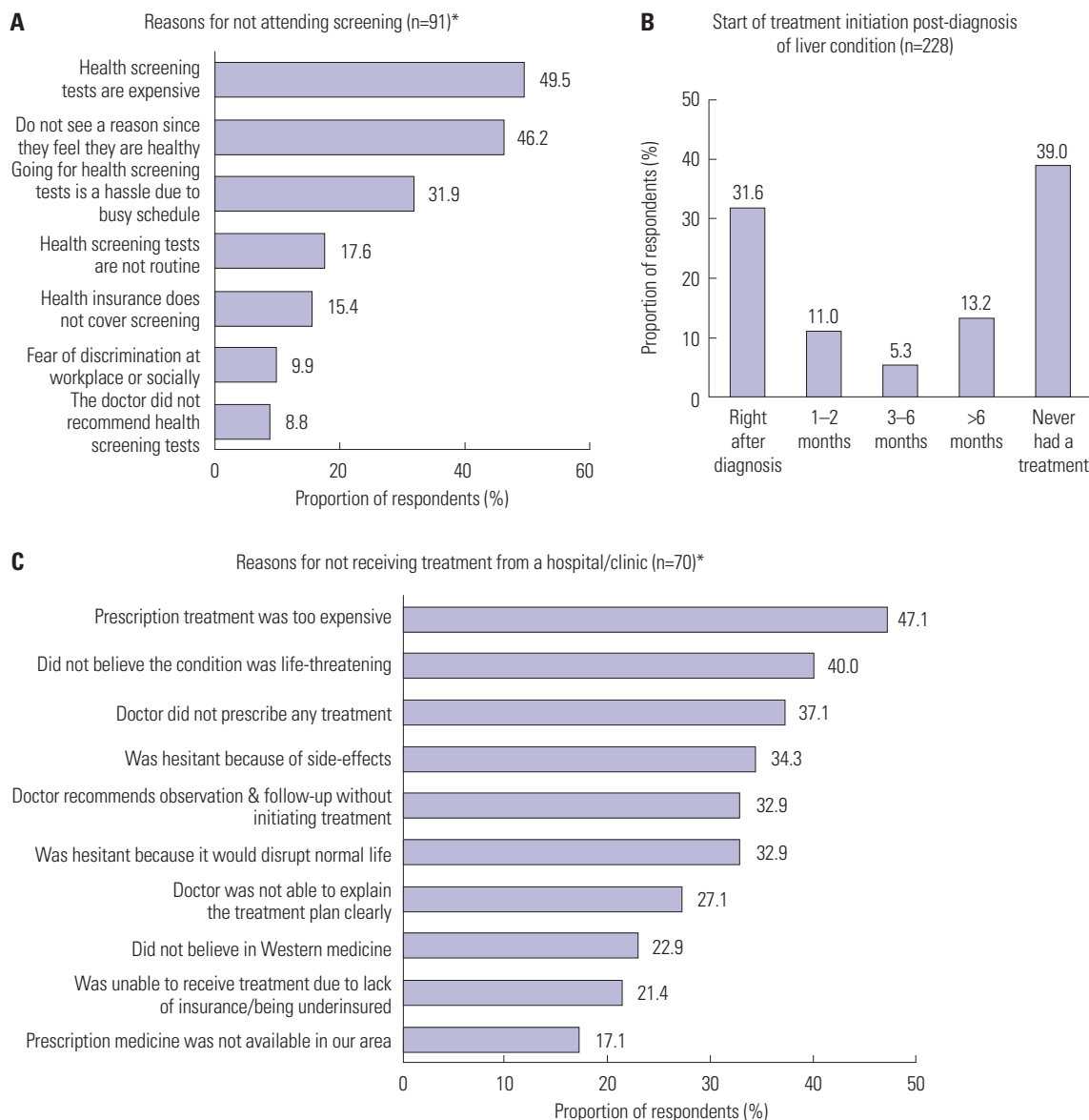


Fig. 3. Reasons perceived by Korean adults for not attending health screening or undergoing treatment upon diagnosis with viral hepatitis. (A) Reasons for not attending screening. (B) Timing of treatment initiation post-diagnosis of liver condition. (C) Reasons for not receiving treatment from a hospital/clinic. *Multiple responses were allowed.

ously reported prevalences of HBV and HCV,^{14,15} but comparable to the prevalence of NAFLD in Korea.¹⁶ This could be attributed to the nature of the study wherein respondents were asked about their history of liver disease during their lifetime instead of a defined period prior to the survey. Nevertheless, the knowledge and awareness of, and attitudes towards, liver diseases were suboptimal. The awareness levels of viral hepatitis transmission risks among respondents who had ever been diagnosed with any liver disease(s) was significantly higher than that of respondents who had never been diagnosed. However, this was confined to knowledge that touching an individual infected with viral hepatitis could not transmit hepatitis B and/or C or that sexual intercourse could transmit hepatitis B.

We did note some improvements, as well as deteriorations,

in the knowledge and awareness of liver diseases compared to previous local studies between 2013 and 2019 (Fig. 4).^{12,13,19} For instance, 50.9%–52.1% of this study’s respondents was aware of the sequelae of untreated or chronic viral hepatitis, while 40% and 22% of Korean adults in 2016 had, respectively, recognized hepatitis B and hepatitis C as causes of liver cirrhosis and liver cancer.¹² On the other hand, awareness that hepatitis B is not transmissible by dining with an infected person was found to be lower than that previously reported in 2013 (Fig. 4).¹³

More than half of the respondents in this study perceived day-to-day social interactions and food contamination as possible transmission routes of hepatitis B or C; the majority was also not aware that hepatitis C cannot be prevented by a vaccine. Misperceptions of viral hepatitis often underlie social dis-

Table 2. Knowledge and Awareness of Respondents Diagnosed With Any Liver Disease(s) Versus Respondents Not Diagnosed With Any Liver Disease(s) in Aspects of Lowest 5 Scored Knowledge Questions

Question	Diagnosed with any liver disease(s) (n=232)	Not diagnosed with any liver disease(s) (n=768)	p value (chi-square test)			
	n (%)	n (%)				
Q6. Have you heard of the following hepatitis infections? (n=1000)						
Hepatitis A	191 (82.3)	660 (85.9)	0.212			
Hepatitis B	215 (92.7)	666 (86.7)	0.019			
Hepatitis C	135 (58.2)	351 (45.7)	0.001			
Hepatitis D	14 (6.0)	27 (3.5)	0.132			
Hepatitis E	11 (4.7)	17 (2.2)	0.069			
None of the above	3 (1.3)	1 (4.0)	0.070			
Q7*. On a scale of 1 to 5, how would you rate your knowledge of hepatitis? (n=910/1000 from all respondents)						
(5) Excellent	10 (4.5)	6 (0.9)	<0.001			
(4) Good	30 (13.5)	53 (7.7)				
(3) Fair	88 (39.5)	196 (28.5)				
(2) Poor	76 (34.1)	285 (41.5)				
(1) Very poor	19 (8.5)	147 (21.4)				
Q10. Do you know that viral hepatitis is one of the key causes of liver failure in the world? (n=1000)						
Yes	68 (29.3)	131 (17.1)	<0.001			
No	120 (51.7)	459 (59.8)				
Not sure	44 (19.0)	178 (23.2)				
Q13. Are you aware of the various stages of liver scarring/fibrosis? (n=1000)						
Yes	40 (17.2)	66 (8.6)	<0.001			
No	192 (82.8)	702 (91.4)				
Question	Hepatitis B transmission		p value (chi-square test)	Hepatitis C transmission		p value (chi-square test)
	Diagnosed with any liver disease(s) (n=215)	Not any liver disease(s) (n=666)		Diagnosed with any liver disease(s) (n=135)	Not any liver disease(s) (n=351)	
	n (%)	n (%)		n (%)	n (%)	
Q9'. Please indicate if you agree or disagree with the following statements regarding transmission of hepatitis B and C from one person to another						
From pregnant mother to her baby at birth [agree]			0.351			0.291
Agree	129 (60.0)	433 (65.0)	0.002	93 (68.9)	227 (64.7)	0.064
Disagree	32 (14.9)	79 (11.9)		24 (17.8)	56 (16.0)	
Not sure	54 (25.1)	154 (23.1)		18 (13.3)	68 (19.4)	
Through sexual intercourse [agree]			0.002			0.064
Agree	87 (40.5)	269 (40.4)	0.005	68 (50.4)	162 (46.2)	0.025
Disagree	92 (42.8)	216 (32.4)		47 (34.8)	103 (29.3)	
Not sure	36 (16.7)	181 (27.2)		20 (14.8)	86 (24.5)	
By touching an infected person [disagree]			0.005			0.025
Agree	128 (59.5)	367 (55.1)	0.270	78 (57.8)	212 (60.4)	0.547
Disagree	67 (31.2)	175 (26.3)		40 (29.6)	69 (19.7)	
Not sure	20 (9.3)	124 (18.6)		17 (12.6)	70 (19.9)	
By dining together (e.g., sharing food) with an infected person [disagree]			0.270			0.547
Agree	118 (54.9)	370 (55.6)	0.270	74 (54.8)	192 (54.7)	0.547
Disagree	64 (29.8)	168 (25.2)		38 (28.1)	86 (24.5)	
Not sure	33 (15.3)	128 (19.2)		23 (17.0)	73 (20.8)	

Table 2. Knowledge and Awareness of Respondents Diagnosed With Any Liver Disease(s) Versus Respondents Not Diagnosed With Any Liver Disease(s) in Aspects of Lowest 5 Scored Knowledge Questions (continued)

Question	Hepatitis B transmission			Hepatitis C transmission		
	Diagnosed with any liver disease(s) (n=215)	Not any liver disease(s) (n=666)	p value (chi-square test)	Diagnosed with any liver disease(s) (n=135)	Not any liver disease(s) (n=351)	p value (chi-square test)
	n (%)	n (%)		n (%)	n (%)	
By eating contaminated or raw seafood (e.g., shellfish) [disagree]			0.012			0.608
Agree	114 (53.0)	360 (54.1)		67 (49.6)	185 (52.7)	
Disagree	59 (27.4)	127 (19.1)		37 (27.4)	81 (23.1)	
Not sure	42 (19.5)	179 (26.9)		31 (23.0)	85 (24.2)	
Fecal oral route [disagree]			0.044			0.689
Agree	127 (59.1)	392 (58.9)		86 (63.7)	221 (63.0)	
Disagree	52 (24.2)	120 (18.0)		28 (20.7)	65 (18.5)	
Not sure	36 (16.7)	154 (23.1)		21 (15.6)	65 (18.5)	

When any group count is small (e.g., <30), its p-value may not be reliable.

*Chi-squared tests for the following variables may be invalid due to the low number of observations: Q7; ¹Correct answers for Q9 are indicated in square brackets as [agree] or [disagree].

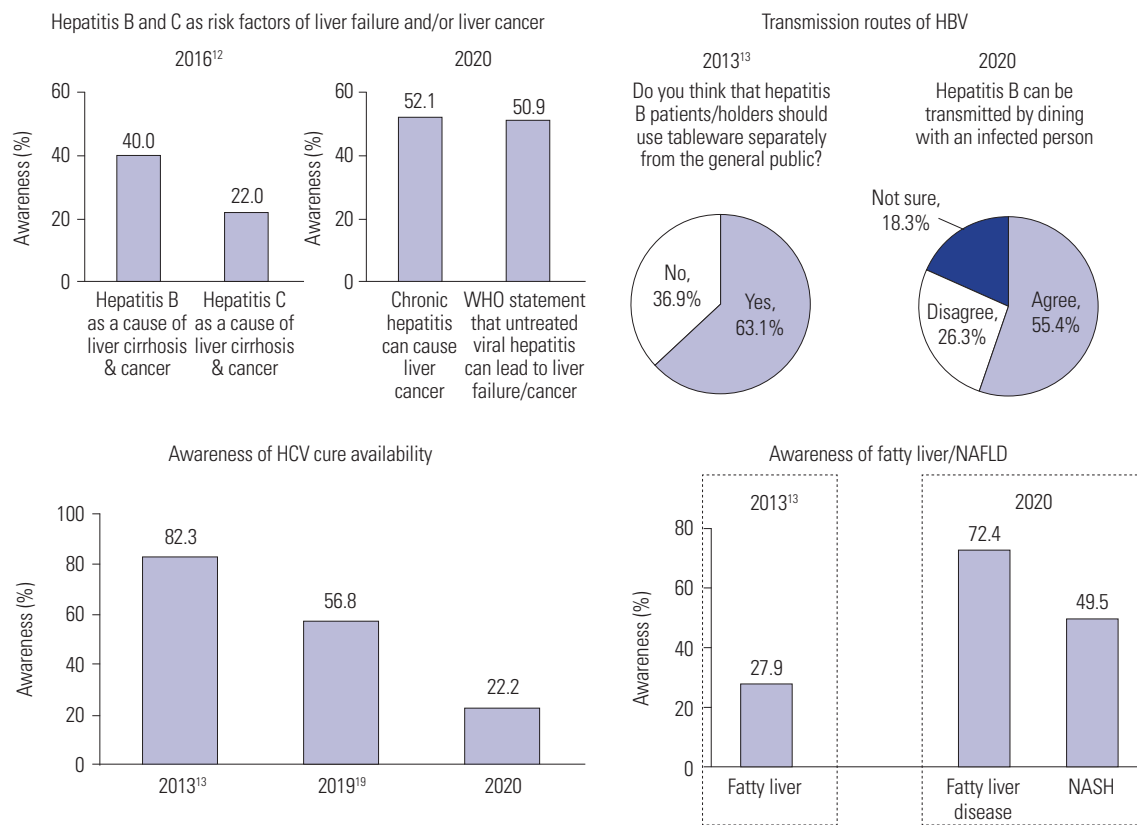


Fig. 4. Comparison of awareness towards knowledge of liver diseases in 2020 and 2013–2019.^{12,13,19} HBV, hepatitis B virus; HCV, hepatitis C virus; NAFLD, nonalcoholic fatty liver disease; NASH, nonalcoholic steatohepatitis.

crimination and treatment delays^{20,21} and could impede the uptake of proper measures that prevent transmission or effective disease management within the community.²⁰⁻²³ Additionally, the awareness rate of an available treatment cure for hepatitis C in this study (22.2%) was observed to be lower than awareness rates in 2013 (82.3%)¹³ and in 2019 (56.8%) (Fig. 4).¹⁹ Col-

lectively, the findings could be indicative of a larger than expected gap in current public health campaigns or policies to effectively manage viral hepatitis-related liver disease(s) within the local community.

The inclusion of one-time screening of the general population for HCV not only further improved the cost-effectiveness

of hepatitis C treatment, but also significantly reduced HCV-related morbidity and mortality.²⁴⁻²⁷ Screening all Koreans was projected to be more cost-effective than screening only high-risk individuals.²⁷ Therefore, there is a need to boost education initiatives and outreach for hepatitis C disease and treatment information to the public. Support from policy makers, health-care providers, and the community is essential to boost initiatives and outreach programs equipped with up-to-date information to encourage screening or pro-active health behaviors among Korean adults to achieve the World Health Organization's hepatitis elimination goal by 2030.

NAFLD-related decompensated cirrhosis, liver cancer cases, and annual mortality in Korea were projected to respectively increase by 85%, 80%, and 90%, respectively, between 2019 and 2030.²⁸ This is alarming since NAFLD/NASH was the second most common self-reported liver disease diagnosed among respondents and <50% were aware of AF-NASH risk factors. NAFLD is clinically asymptomatic at early stages and diagnosis usually occurs upon incidental findings of abnormal liver enzymes or ultrasonography or when it has presented itself at the advanced stages of the disease.²⁹⁻³¹ Since NAFLD can be effectively managed at the early stages of the disease through lifestyle and dietary modifications,^{30,31} it is, therefore, important to educate the community of NAFLD risk factors to prevent the disease progression of NAFLD/NASH towards liver cirrhosis and/or liver failure.

There was a low sense of urgency towards seeking medical screening in the event of viral hepatitis risk exposure due to cost concerns as one of the many factors. In Korea, liver cancer screening services are fully covered under the National Screening Program and individuals who are HBV or HCV carriers or have liver cirrhosis are prioritized for screening.^{32,33} It seems that more active advertisement and education are needed so that the public can recognize and use these systems accordingly.

The perceptions of feeling healthy or the condition being not life-threatening were also cited as reasons for not attending screening or seeking treatment. This is concerning as liver diseases are usually asymptomatic and the infected individuals may not recognize their infection status until their condition has reached advanced symptomatic disease stages,^{31,32,34} which pose a greater disease burden on self and the society.³⁵ It is, therefore, essential to educate the public with a special emphasis on liver-related disease severity, screening programs, and national health coverage to promote health-seeking behaviors. A substantial proportion of respondents (27.1%–37.1%) cited physician-related reasons for not receiving treatment from a hospital/clinic (i.e., their doctors did not provide a comprehensive explanation of the treatment plan or recommended observations without prescribing or initiating treatments). This implies a potential gap in physician-patient communication, which awaits further investigation to effectively manage HBV and HCV infections within the community.

Overall, the study highlighted that there is a basic awareness

of liver diseases within the population; however, in-depth knowledge of and attitudes towards liver diseases, including viral hepatitis and NAFLD, as well as understanding of associated risk factors, is significantly lacking. This study also indicates that knowledge, attitudes, and behaviors concerning liver-related diseases are under-explored or outdated, and more studies are required to identify additional barriers for effective management of liver disease(s) in Korea.

There are limitations within the study. As this is a self-reported web-based study, no causal association could be made. The age distribution of the respondents was not well-represented according to national census data.³⁶ Furthermore, respondents without access to the internet or internet-based technology may have been under-represented, as such the study population may not be representative of knowledge and awareness levels at the national level. However, 1000 adults from the general Korean population participated, and this is considered a relatively large sample size for a survey study and could provide some insights into the awareness of respondents with internet literacy. Further investigations with a larger, representative sample population will be required to understand factors associated with knowledge, attitudes, and behaviors concerning liver-related diseases in the local community.

Although this study explored the knowledge, awareness, and attitudes of respondents towards liver-related health and diseases using a set of questions, the limited number of questions might have resulted in an under-representation of the overall knowledge of and attitudes about liver diseases. Future studies with a more extensive questionnaire survey would be required to gather a more comprehensive understanding of Korean perspectives towards liver diseases.

The public's knowledge of liver-related health and diseases in Korea is still suboptimal, which could account for a lower sense of urgency towards screening and treatment. This current situation could be a barrier for viral hepatitis elimination in Korea. Therefore, vigorous efforts supported by national policy and public campaigns advocating liver health are needed to enhance the public's knowledge and awareness towards liver-related disease.

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