

## Public Misperceptions About Transmission of Hepatitis B Virus in Singapore

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### Abstract

**Introduction:** Hepatitis B virus (HBV) infection is endemic in Asia. Good public knowledge on disease transmission is one way of controlling spread of HBV. We aimed to study the general knowledge on HBV among the general public in Singapore, which is moderately prevalent with HBV. **Materials and Methods:** Before conducting a public education seminar on liver diseases, a 16-point questionnaire survey was conducted among the participants. Misperceptions (if any) were identified, and factors associated with knowledge score were analysed by multivariate analysis. **Results:** One hundred and ninety-two subjects completed the questionnaire. The mean age was 52 years, 78 (41%) were male, 183 (95%) were Chinese, 17 (9%) were known hepatitis B carriers and 73 (38%) had completed college education. The mean knowledge score was 10.7 (out of a maximum of 16). Most misperceptions were in the category of HBV transmission. At multivariate analysis, having college education was the only independent factor associated with a high knowledge score. **Conclusion:** Although HBV infection is moderately prevalent in Singapore, many misperceptions existed among the general public, especially on the mode of transmission. Better education was related to better knowledge of HBV. Further public education should be targeted to clear the misperceptions identified, and be specifically targeted to the less educated.

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**Key words:** Chronic hepatitis B, Knowledge, Public health

### Introduction

Chronic hepatitis B (CHB) is an important global health problem, with more than 350 million individuals affected worldwide. CHB is particularly important in Asia, as 4% to 10% of the total population are affected, and approximately 75% of patients with CHB worldwide reside in Asia.<sup>1,2</sup> During the course of hepatitis B virus (HBV) infection, an estimated 15% to 40% of CHB patients would develop complications such as acute exacerbation, liver cirrhosis and hepatocellular carcinoma (HCC).<sup>1-3</sup> HBV infection imposes a significant socioeconomic burden in many Asian countries.<sup>4,5</sup>

Singapore is a small, multiracial nation in Southeast Asia with a population of 4 million, and a racial distribution of 76% Chinese, 14% Malay, 8% Indian, and 2% others. HBV infection is intermediately prevalent in Singapore, affecting 4.1% of the total population. As a result, HCC is the 4<sup>th</sup> commonest cancer among Singaporean males, with an age-standardised rate of 18.9 per 100,000 person-year.<sup>5-9</sup>

HBV infection is a vaccine-preventable disease. However, despite the implementation of neonatal hepatitis B vaccination for all newborns since 1987, new acute HBV infection remains common in Singapore, with 64 cases reported in 2003, affecting those who are older and unvaccinated.<sup>10</sup> Besides mass public catch-up vaccination, public education, especially on the mode of transmission, is also an important means of preventing the spread of the disease.

Our previous studies showed that the knowledge of HBV infection among Singaporean patients with CHB is generally good, except for a few misperceptions.<sup>8,11</sup> We also found that CHB patients with less education tended to have poorer knowledge on the disease, and therefore should be specially targeted for health education. However, how the general public perceives CHB in Singapore has not been evaluated. Most studies were performed in North America. Thompson et al<sup>12</sup> evaluated public knowledge on HBV among 147 Canadian Chinese and found their knowledge

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on mode of HBV transmission poor, with education level, fluency in English, and household income being significantly related to knowledge on HBV. A similar study on 320 Cambodian Americans, also found education level to be significantly associated with knowledge on HBV.<sup>13</sup>

As public knowledge about HBV, particularly its transmission, is an important aspect of controlling spread of HBV, we set to assess the knowledge of HBV infection among the general public in Singapore, and to evaluate if there were subgroup(s) of the population that needed to be specially targeted for education.

## Materials and Methods

### Subjects

A public education seminar on liver diseases was jointly organised by our department, a tertiary university hepatology unit, and a local community centre. The aim of the seminar was to raise public awareness of hepatitis B virus and other aspect of liver diseases. Three topics were presented at the seminar by hepatologists: (1) liver and health supplements, (2) alphabets of viral hepatitis (on viral hepatitis A, B, and C), and (3) HCC. Prior to the seminar, all attendees were invited to take part in this study by answering a standard questionnaire. Five hundred people from the public attended the seminar, among which 192 (38%) completed a questionnaire on knowledge of HBV. All the study subjects gave their informed consent before taking part in the study.

### Survey Instrument

All subjects were surveyed using a standard questionnaire. The questionnaire consisted of questions on basic sociodemographic factors, and a 16-item quiz on general knowledge of HBV infection adapted from our previous studies (Table 1).<sup>8,11</sup> Questions were grouped into 3 categories: general aspect of hepatitis B, management of hepatitis B and transmission of hepatitis B.

### Data Analysis

Data were expressed as mean  $\pm$  standard error of means (SEM) unless otherwise stated, and analysed by SPSS v. 13.0 (SPSS Inc., Chicago, IL). The main outcome variables were level of knowledge about HBV. Each question was answered as “Yes”, “No”, or “Do not know”. A correct answer scored 1 point. An incorrect or “Do not know” answer scored 0 points. A summary score of knowledge was computed by summing correct responses to the 16-item quiz. Hence, the maximum score for each subject was 16 and the minimum 0.

Total knowledge score was first analysed as a continuous variable. Factors associated with total knowledge score, namely gender, age, ethnicity, education level, income level, family history of HCC and hepatitis B, were analysed

by multiple linear regression to evaluate the independent factors associated with knowledge score.

In addition, the knowledge score was arbitrarily dichotomised as “high” (11 or higher) and “low” (10 or less), and analysed as a categorical variable. Factors related to high knowledge scores were first analysed by univariate analysis, where categorical and continuous variables were analysed by Fisher’s exact test or Mann-Whitney U test as appropriate. Factors with  $P < 0.05$  from univariate analysis were further analysed by multivariate analysis using backward logistic regression to evaluate the significant independent factors associated with high knowledge scores.

## Results

### Patient Characteristics

One hundred and ninety-two subjects were evaluated. Age was  $52.4 \pm 0.9$  years, 78 (41%) were female, and 186 (97%) were Chinese by ethnicity. Seventy-nine (41%) earned S\$2000 (US\$1100) or more monthly, of which 20 (10%) earned S\$4000 (US\$2200) or more monthly. Seventy-three subjects (38%) had completed tertiary (college) education, 100 (52%) secondary (up to Grade 12) education, and 10 (5%) primary (up to Grade 6) education. Sixteen subjects (8.3%) had a known family history of CHB and 12 (6.3%) had a known family history of HCC. Seventeen subjects (9%) were known HBV carriers, and 8 (47%) of them had been on regular follow-up for their CHB over the last 12 months. Only 2 (1%) of the subjects consumed more than 3 drinks of alcohol per week.

### Hepatitis B Knowledge

Overall mean knowledge score was  $10.7 \pm 0.2$  out of a maximum of 16 (Table 1). More than 70% of study subjects were aware that hepatitis B carriers should not consume alcohol regularly and HBV could cause long-term complications such as liver cirrhosis or HCC, and treatment was available for hepatitis B, and that early liver cancer was curable. More than 70% of the subjects were also aware of the main modes of transmission such as blood and sharing of needles, and that vaccine was available to prevent hepatitis B.

Knowledge scores for the 3 components of HBV knowledge, i.e., general aspects, management, and transmission of HBV, were  $3.6 \pm 0.1$  (out of a maximum score of 5),  $3.4 \pm 0.1$  (out of a maximum score of 5), and  $3.8 \pm 0.1$  (out of a maximum score of 6). Knowledge score for transmission was particularly weak, and many misperceptions existed in the area of HBV transmission. Nearly half of the subjects were unaware that HBV infection could be transmitted through childbirth, and more than half of the subjects thought that hepatitis B could be transmitted by the sharing of food or by the consumption of seafood.

Other misperceptions included ability to recognise HBV carriers by appearance, and early liver cancer causes symptoms.

*Factors Associated with Better Knowledge*

Knowledge score was first analysed as a continuous variable. Multiple linear regression showed that having completed tertiary education ( $P < 0.012$ ) was the independent factor associated with knowledge score, after controlling for other potential confounding demographic factors.

Knowledge score was then analysed as a categorical variable as “high” and “low” knowledge score. Overall, 114 (59.4%) subjects had high knowledge scores of 11 points or more. Univariate analysis revealed that subjects with high knowledge scores were more likely to have received tertiary education, and have monthly income of more than S\$4000 (US\$2200) (Table 2). When these factors, together with gender and age, were analysed by logistic regression, having completed college (tertiary) education was the only independent factor associated with high knowledge scores. Those with tertiary (college) education were 3.2 times more likely (OR, 3.2; 95% CI, 1.5 to 6.8;  $P < 0.021$ ) to have high knowledge scores than those without college (tertiary) education.

**Discussion**

The overall knowledge among the respondents on HBV infection was reasonably good, with a mean knowledge score of 10.7 out of a maximum of 16, and 114/192 (59.4%) subjects having a high knowledge score, i.e., scoring 11 points or more. Surprisingly, the knowledge among the respondents in this study, which comprised members of the public who attended the health education talk, was similar to that of patients with CHB from our previous study, who had a mean knowledge of 10.3 on a similar questionnaire.<sup>11</sup> This implies general knowledge about HBV infection is good among both the general public and patients with CHB in Singapore.

In this study, we also identify many misperceptions among the respondents, most of which were similar to the

Table 1. Responses to Hepatitis B Knowledge Questions (n = 192)

Statements (correct response)	No. with correct response (%)
<b>General aspect of hepatitis B</b>	
Hepatitis B is infectious (Yes)	120 (63)
Hepatitis B causes liver cancer in the long run (Yes)	165 (86)
Hepatitis B causes liver cirrhosis in the long run (Yes)	153 (80)
Hepatitis B carriers can be recognised easily from their appearance (No)	110 (57)
Hepatitis B carriers can drink as much alcohol as non-carriers (No)	139 (72)
<b>Management of hepatitis B</b>	
Treatment is available for hepatitis B (Yes)	143 (75)
Early liver cancer causes symptoms (No)	65 (34)
Early liver cancer is curable (Yes)	140 (73)
My family members of hepatitis B carriers should be screened for hepatitis B (Yes)	131 (68)
Vaccines are available to prevent hepatitis B (Yes)	167 (87)
<b>Transmission of hepatitis B</b>	
Hepatitis B transmits through blood (Yes)	145 (76)
Hepatitis B transmits through sharing of needles (Yes)	142 (74)
Hepatitis B transmits through sharing of food (No)	89 (46)
Hepatitis B transmits through shaking hands (No)	159 (83)
Hepatitis B transmits through taking seafood (No)	87 (45)
Hepatitis B transmits through childbirth (Yes)	99 (52)

misperceptions among CHB patients identified in our previous study, namely that early HCC causes symptoms, and that HBV infection is transmittable by sharing food and consuming seafood.<sup>10</sup> Most of the misperceptions were in the category of HBV transmission, as only 52% of respondents were aware that HBV is transmittable through childbirth, and more than half of the respondents misperceived that HBV could be transmitted by sharing of food or intake of seafood. These misperceptions could hinder efforts in controlling the spread of HBV in the community. For instance, while doctors and public health officials advocate screening for the presence of HBs antigen if someone in the family is diagnosed with CHB, the general public is less likely to comply if they are not aware of the potential spread through childbirth.<sup>1-3</sup>

Table 2. Factors Associated with High and Low Scores on HBV Knowledge

Factors	Low scores ( $\leq 10$ ) n = 78	High scores ( $\geq 11$ ) n = 114	P value	
			Univariate analysis	Multivariate analysis
Age (y)	52 ± 12	53 ± 11	0.83	
Female (%)	44/76 (58)	70/112 (63)	0.55	
Chinese (%)	76/76 (100)	107/112 (94)	0.18	
Known carrier of HBV	5 (6)	12 (1)	0.100	
Monthly income $\geq$ S\$4000	3/61 (5)	17/104 (16)	0.046	
Family history of HBV (%)	10 (13)	6 (5)	0.323	
Family history of HCC (%)	5 (6)	7 (6)	0.566	
Tertiary education (%)	19/76 (26)	54/113 (47)	0.002	0.021

HBV: hepatitis B virus; HCC: hepatocellular carcinoma

Our findings are also consistent with prior studies on Asians who reside in North America,<sup>12-14</sup> where less than half of their respondents were aware that HBV infection cannot be spread by food. These misperceptions among the general public, if unchecked, could lead to the stigmatisation of HBV carriers, as in cases of patients with chronic hepatitis C and HIV.<sup>15-17</sup>

Similar to our previous study with HBV carriers, and another community study in Canada, subjects with tertiary (college) education, we found a significant association of higher educational level with better knowledge.<sup>11,13,14</sup> This finding is not surprising as subjects with better education are more likely to have read or heard about HBV infection in schools or through the mass media. Besides, subjects with better education were more likely to seek professional advice, and understand the complexity of various aspects of HBV infection. Our study strengthens the belief that further public education should be targeted at those with less or no education.<sup>11,13,14</sup>

However, unlike previous studies, increasing age and higher income did not correlate with high knowledge scores in our study.<sup>12-14</sup> This could be due to a different socio-economic structure in Singapore as compared to the West. In Singapore, as in most other developing Southeast Asian countries, the better educated are often the younger cohort of the general population. This difference in the findings highlights the importance of conducting local studies to plan public education programmes rather than utilising data from other countries with differing socio-demographic characteristics.

We acknowledge the limitations of our study. First and foremost, our study subjects were selected at a public education seminar on liver diseases. Therefore, they could belong to a more health-conscious group, which may have better knowledge of HBV, so our results may not be applicable to the general public at large. In fact, it is likely that the respondents represented a more educated and well-informed cohort, as compared to the non-respondents who attended the education seminar, as well as the general public. Nevertheless, despite this shortcoming, this pilot study did provide valuable preliminary data for planning of a larger-scale public survey. Secondly, although our findings were consistent with a similar study among Asian North Americans in previous studies, it is unclear to what extent our conclusions could be extended to the general public in other geographical locations, where cultural backgrounds, educational levels and language ability vary.

Nevertheless, our study confirmed the importance of public health education. It has provided us with a better understanding of the level of awareness and misperceptions among those who were sufficiently motivated to participate in our seminar, which would help identify strategies to improve the public knowledge and awareness. We believe

our study provides important findings for public health officials, as well as general practitioners, to improve their patient education programmes particularly for individuals who have been motivated to learn more about liver diseases, to ensure that they understand the various aspects of HBV infection, and to advocate vaccination against hepatitis B.

In conclusion, many misperceptions exist among the general public who participated in a public seminar on liver diseases in Singapore, especially in the area of HBV transmission. Those with better education are more likely to know HBV better. Further public education should be planned to clear the misperceptions identified, and be targeted at the less educated.

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