

# Hepatitis B ESL Education for Asian Immigrants

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**Abstract** Asian communities in North America include large numbers of immigrants with limited English proficiency. Hepatitis B virus (HBV) infection is endemic in most Asian countries and, therefore, Asian immigrant groups have high rates of chronic HBV infection. We conducted a group-randomized trial to evaluate the effectiveness of a hepatitis B English as a second language (ESL) educational curriculum for Asian immigrants. Eighty ESL classes were randomized to experimental (hepatitis B education) or control (physical activity education) status. Students who reported they had not received a HBV test (at baseline) completed a follow-up survey 6 months after randomization. The follow-up survey assessed recent HBV testing and HBV-related knowledge. Provider reports were used to verify self-reported HBV tests. The study group included 218 students who reported they had not been tested for HBV. Follow-up surveys were completed by 180 (83%) of these students. Provider records verified HBV testing for 6% of the experimental group students and 0% of the control group students ( $P = 0.02$ ). Experimental group students were significantly ( $P < 0.05$ ) more likely than control group students to know that immigrants have high HBV infection rates, HBV can be spread during sexual

intercourse and by sharing razors, and HBV infection can cause liver cancer. Our ESL curriculum had a meaningful impact on HBV-related knowledge and a limited impact on HBV testing levels. Future research should evaluate the effectiveness of ESL curricula for other immigrant groups and other health topics, as well as other intervention approaches to increasing levels of HBV testing in Asian immigrant communities.

**Keywords** Asians · Hepatitis B · Education · Immigrants

## Introduction

North America has recently experienced one of the largest immigration waves in history [1]. Over one in four (26%) of foreign-born Americans and over two in five (41%) of foreign-born Canadians are from Asia, and the majority of Asians who live in North America are immigrants [2, 3]. Consequently, Asian communities in Canada and the United States (US) include large numbers of people with limited English proficiency [4, 5]. For example, 48% of Chinese Americans do not speak English very well or at all [4]. Individuals who lack English proficiency are unable to participate in health education programs or understand media campaigns for the general population [6].

Hepatitis B virus (HBV) infection is endemic in most Asian countries and over 80% of liver cancers that occur in Asia are attributable to HBV [7–9]. Hepatitis B transmission in Asian countries usually occurs vertically from mother to child at birth. However, horizontal transmission can also occur through sexual intercourse or close household contact (e.g., by sharing razors) with a carrier [8]. Hepatitis B serologic testing allows the identification of chronically infected individuals who may benefit from

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treatment and should take precautions to avoid infecting others, as well as susceptible individuals who should be vaccinated [9]. Therefore, the Centers for Disease Control and Prevention recommends routine hepatitis B testing for immigrants from all countries in Asia [10].

Several recent literature reviews showed that levels of hepatitis B knowledge and awareness are low in Asian immigrant communities [11, 12]. Many Asians in North America do not know that individuals of Asian descent are more likely to be infected with hepatitis B than other groups [11, 13]. Additionally, Asian Americans and Asian Canadians are often uninformed about the common routes of hepatitis B virus transmission (e.g., during childbirth) and the potentially serious consequences of chronic hepatitis B infection (e.g., liver cancer) [12, 14–16]. Finally, hepatitis B testing rates have consistently been shown to be relatively low in Chinese American, Chinese Canadian, Vietnamese American, and Cambodian American populations [15–19].

Many immigrants with limited English proficiency participate in English as a second language (ESL) education [20, 21]. Consequently, a recent report on health literacy recommended cooperative efforts between health and education systems to develop and evaluate curricula that serve the needs of both health education and English language instruction [21]. However, very few publications have addressed the effectiveness of ESL curricula in improving health knowledge or outcomes [22]. We collaborated with community organizations that participate in the British Columbia (BC) English Language Services for Adults (ELSA) program to evaluate a hepatitis B educational ESL curriculum for Asian immigrants whose native language was Cantonese, Farsi, Korean, Mandarin, or Punjabi [23].

## Methods

### Research Setting

Our research was conducted in the BC lower mainland that is home to almost one million immigrants. Over three-quarters (78%) of recent immigrants to this area are of Asian descent [24]. Six BC community organizations that provide ELSA education participated in the study. The BC ELSA program offers level one (low beginner) through level five (high intermediate) ESL classes. Each student progresses through the ELSA levels as his/her English proficiency improves [23]. Our hepatitis B ESL curriculum was delivered to ELSA level three (low intermediate) classes. We elected to target low intermediate students because representatives from our collaborating community

organizations advised us that this was the most appropriate level for a HBV curriculum.

### Study Overview

We conducted a group-randomized controlled trial. Specifically, ELSA level three classes were randomized to experimental or control status during 2006 and 2007. A blocked randomization scheme was used whereby classes from each of the six participating community organizations formed a stratum and were randomized within the stratum. Students who had never received serologic testing for HBV were identified from a self-administered baseline survey. Each student who attended a project class and indicated he/she had never been tested for HBV was asked to complete an interviewer-administered follow-up survey 6 months after attending his/her project class. If a student indicated he/she had been tested for HBV (at follow-up) the project requested HBV testing records from his/her health care provider.

The experimental group classes received a 3-h ESL curriculum addressing HBV and the control group classes received a 3-h ESL curriculum addressing physical activity. Certified ESL teachers with experience in teaching ELSA level three classes were hired and trained (in either the HBV or physical activity curriculum). Different teachers delivered education to the experimental and control group classes. Study materials (such as consent forms and questionnaires) were translated into Chinese, Farsi, Korean, and Punjabi using standard methods (forward-translation, back-translation, and reconciliation). The BC Cancer Agency Institutional Review Board approved all our study procedures.

### Hepatitis B ESL Curriculum

Our hepatitis B ESL curriculum development was guided by the Health Behavior Framework and has previously been described in detail [25, 26]. The curriculum aimed to both improve HBV-related knowledge and motivate students to be tested for HBV. It included information about the importance of HBV testing for immigrants of Asian descent as well as the high rates of HBV infection in Asian Canadian communities, the ways that HBV can be transmitted from person to person, and the potential consequences of HBV infection. It incorporated standard ESL teaching methods and included multiple commonly used types of ESL lesson exercises [23, 27]. For example, students were shown a short (English language) video clip that depicted an Asian immigrant visiting a doctor to discuss HBV and request testing.

## Baseline Procedures

Project staff collaborated with the regular teacher and project teacher for each class to schedule recruitment and associated project classes. Project classes were generally scheduled within 1 week of recruitment classes. At each recruitment class, the regular teacher explained that the study would see if health education in English classes can improve immigrants' health; a guest speaker would be coming to the class to provide instruction about a health topic; and only students who spoke Cantonese, Farsi, Korean, Mandarin, and Punjabi were being invited to be part of the study (but all students could attend the health education class). Project staff then distributed recruitment flyers in the study languages (that provided detailed information about the project) and answered questions.

Students who agreed to participate in the study provided written consent and completed a brief baseline survey (in their native language). The questionnaire asked students to read the following statement: *Hepatitis is an inflammation of the liver caused by a viral infection. It sometimes makes the skin and eyes go yellow. People with hepatitis sometimes lose their appetite and experience nausea as well as vomiting.* They were then asked to indicate whether they had ever had a blood test to see if they had been exposed to hepatitis B. The survey instrument also included items to assess physical activity levels, as well as demographic items such as age and years since immigration. Finally, students provided their name, address, phone number, and email address (if applicable), as well as contact information for two people who would know how to reach them, if they moved.

## Follow-up Procedures

Study participants were asked to complete a follow-up survey 6 months after their project class (if they indicated that they had never received HBV testing at baseline). Each of these students received a letter reminding him/her that he/she had agreed to participate in the study. About 2 weeks later, an interviewer contacted the student and arranged an in-person interview. Up to 11 telephone contacts were attempted (including at least 3 day time, three evening, and 3 weekend attempts). If participants were not contactable by telephone and an email address was available, up to three email contacts were attempted. Follow-up survey participants were offered \$20 as a token of appreciation for their time. Each student completed the follow-up survey in his/her native language.

The follow-up survey instrument included questions about both hepatitis B and physical activity. Students were read the same statement about hepatitis B that was included on the baseline survey before being asked if they had ever

had a blood test to see if they had been exposed to hepatitis B. Those who indicated that they had been tested for HBV were asked when they had their HBV test (how many months ago). Follow-up survey participants were also asked whether they thought immigrants are more likely to be infected with hepatitis B than people who were born in Canada; hepatitis B can be spread during childbirth, during sexual intercourse, and by sharing razors; and hepatitis B infection can cause liver cancer.

Follow-up survey respondents who reported they had received HBV testing in the 6 month interval since their project class were asked to provide information about the date of testing, as well as the location of the clinic or doctor's office where testing was performed. Each of these participants was also asked to sign a medical release form giving project staff permission to request medical record verification of his/her self-reported HBV test. A copy of the HBV test result was then requested (from the relevant clinic or doctor's office) using a form that provided the participant's name, age, BC Medical Services Plan number, and self-reported date of testing. The project contacted each health care facility up to three times (twice by mail and once by telephone).

## Data Analysis

Our evaluation of intervention effectiveness was based on responses to the HBV testing and knowledge items that were included on the follow-up questionnaire, as well as HBV testing provider reports. A summary knowledge score was computed from each participant's responses to the five hepatitis B knowledge items (possible scores 0–5). We used chi-square tests, Fisher's exact tests, and unpaired t-tests for descriptive statistical analyses. Because the study randomization was by group rather than by individual, Generalized Estimating Equations (GEE) were also used for the evaluation. Our multivariable GEE analyses adjusted for the following variables: ESL organization, class time (day versus evening), country of origin (China, India, Iran, or other Asian country), years since immigration (<2 versus  $\geq 2$ ), gender, age in years (< 40 versus  $\geq 40$ ), years of education (<16 versus  $\geq 16$ ), and marital status (currently married versus not currently married).

## Results

### Study Sample

Eighty ELSA classes were randomized to the hepatitis B curriculum (40 classes) or physical activity curriculum (40 classes). These classes included 794 students who were eligible for the study (native language was Cantonese,

**Table 1** Summary of study accrual

Variable	Hepatitis B classes <i>N</i> (%)	Physical activity classes <i>N</i> (%)	Both class groups <i>N</i> (%)
<b>Baseline survey</b>			
Students who consented to study participation and completed baseline survey	358	401	759
Students who completed baseline survey and had no history of HBV testing	95 (27)	123 (31)	218 (29)
<b>Follow-up survey</b>			
Students who had no history of HBV testing (at baseline) and completed a follow-up survey	80 (84)	100 (81)	180 (83)

Farsi, Korean, Mandarin or Punjabi) and 759 (96%) of these students agreed to participate in the project. Table 1 summarizes our study accrual. At baseline, 218 (29%) of the 759 students who consented to study participation (and completed a baseline survey) indicated they had never been tested for HBV. We attempted to collect follow-up data from these students. Follow-up surveys were completed by 180 (83%) of the 218 students who had no history of hepatitis B testing. (The other 38 students refused to complete a follow-up survey, could not be contacted after multiple attempts or had disconnected phones and/or email addresses). Therefore, our analysis included 180 students.

### Study Group Characteristics

The characteristics of our participants with follow-up data are provided in Table 2. Our study group included 57 men and 123 women. Ninety-two of the students were from China, 30 were from India, 23 were from Iran, and 35 were from another country in Asia (Afghanistan, Cambodia, Hong Kong, Korea, Taiwan or Vietnam). There were no significant differences between the experimental and control groups with respect to country of origin, years since immigration, gender, age group, educational level, or marital status.

### Hepatitis B Knowledge Variables

Table 3 provides the proportions of experimental and control group students who answered the hepatitis B knowledge questions correctly, as well as p-values for our chi-square comparisons between the two groups. The odds ratios (OR) and 95% confidence intervals (CI) from GEE addressing the five knowledge items are also given in Table 3. Our experimental group students had higher levels

**Table 2** Study group characteristics

Characteristic	Experimental group students <i>N</i> = 80 <i>n</i> (%)	Control group students <i>N</i> = 100 <i>n</i> (%)	All students* <i>N</i> = 180 <i>n</i> (%)
<b>Country of origin</b>			
China	39 (49)	53 (53)	92 (51)
India	14 (18)	16 (16)	30 (17)
Iran	10 (13)	13 (13)	23 (13)
Other <sup>a</sup>	17 (21)	18 (18)	35 (19)
<b>Years since immigration</b>			
<2	34 (43)	47 (47)	81 (45)
≥2	46 (57)	53 (53)	99 (55)
<b>Gender</b>			
Male	27 (34)	30 (30)	57 (32)
Female	53 (66)	70 (70)	123 (68)
<b>Age-group (in years)</b>			
<40	34 (44)	48 (48)	82 (46)
≥40	44 (56)	52 (52)	96 (54)
<b>Years of education</b>			
<16	50 (62)	67 (67)	117 (65)
≥16	30 (38)	33 (33)	63 (35)
<b>Marital status</b>			
Currently married	69 (86)	85 (85)	154 (86)
Not currently married	11 (14)	15 (15)	26 (14)

<sup>a</sup> Afghanistan–12, Cambodia–1, Hong Kong–3, Korea–7, Taiwan–11, Vietnam–1

\* No significant differences between experimental and control groups

of knowledge than our control group students for all of the knowledge variables. Differences between students randomized to the experimental and control arms were statistically significant ( $P < 0.05$ ) for all the knowledge variables except HBV can be spread during childbirth.

### Hepatitis B Knowledge Score

The mean knowledge scores (in unadjusted analyses) were 3.68 (standard deviation–1.12) among all experimental group students and 2.87 (standard deviation–1.38) among all control group students ( $P < 0.001$ ). Mean knowledge scores were higher among experimental group students from China, India, Iran, and other Asian countries than their control group counterparts, and the differences between the two groups were statistically significant ( $P < 0.05$ ) for students from China as well as other Asian countries (Table 4). The difference in mean knowledge scores between students who attended hepatitis B classes and students who attended physical activity classes remained highly significant ( $P < 0.001$ ) after adjustment for other variables.

**Table 3** Hepatitis B knowledge

Knowledge variable	Experimental group <i>N</i> = 80 <i>n</i> (%)	Control group <i>N</i> = 100 <i>n</i> (%)	<i>p</i> -value	Adjusted OR (95% CI) <sup>a</sup>
Immigrants are more likely to be infected with HBV	32 (40)	25 (25)	0.03	2.12 (1.12–4.03)
HBV can be spread during childbirth	64 (80)	70 (70)	0.13	2.10 (0.96–4.62)
HBV can be spread during sexual intercourse	60 (75)	58 (58)	0.02	2.58 (1.29–5.15)
HBV can be spread by sharing razors	72 (90)	66 (66)	<0.001	5.42 (1.91–15.39)
HBV infection can cause liver cancer	66 (83)	68 (68)	0.03	2.08 (1.08–4.02)

<sup>a</sup> Adjusted for ESL organization, class time, country of origin, years since immigration, gender, age group, years of education, and marital status

**Table 4** Hepatitis B knowledge scores by country of origin

Country of origin	Experimental group <i>N</i> = 80 Mean (SD)	Control group <i>N</i> = 100 Mean (SD)	<i>p</i> -value
China	3.56 (1.14)	2.94 (1.25)	0.02
India	4.14 (1.03)	3.69 (1.08)	0.25
Iran	3.20 (1.32)	2.15 (1.68)	0.12
Other <sup>a</sup>	3.82 (0.95)	2.44 (1.46)	0.002

<sup>a</sup> Afghanistan, Cambodia, Hong Kong, Korea, Taiwan or Vietnam

### Hepatitis B Testing

Nine (11%) of the 80 experimental group students and 6 (6%) of the 100 control group students reported they had received HBV testing in the 6 months following their project class ( $P = 0.28$ ). Provider records verified HBV testing within 6 months of project classes for 5 (6%) of the students who were randomized to hepatitis B classes and 0 (0%) of the students who were randomized to physical activity classes ( $P = 0.02$ ). (One of the experimental group students and one of the control group students who self-reported hepatitis B testing declined to sign a medical records release form. Health care facilities indicated they had no record of recent HBV testing for three of the experimental group students and five of the control group students who self-reported HBV testing.)

### Discussion

Our findings indicate that an ESL curriculum for Asian immigrants can significantly improve HBV-related knowledge among individuals who have not been tested for hepatitis B. For example, 90% of the experimental group students knew that it is possible for someone to get HBV by sharing razors with an infected person, compared to 66% of the control group students ( $P < 0.001$ ). We also

found a statistically significant difference between the proportions of experimental group and control group participants who completed hepatitis B serologic testing (using medical records data). However, we were only able to document HBV testing among 6% of the students who attended a hepatitis B class.

Elder and colleagues evaluated a nutrition educational program for Hispanic ESL students in San Diego. Nutritional change materials were incorporated into the English language curriculum. Participants were exposed to either nutrition education or stress management classes. Self-report surveys were administered to collect students' nutrition-related knowledge and fat avoidance behaviors. The study also measured participants' blood pressure and cholesterol levels. Data were collected at baseline, 3 and 6 months. Results indicated long-term intervention effects on both nutrition knowledge and fat avoidance, but only short-term effects on cholesterol levels and systolic blood pressure [28].

We previously conducted a randomized controlled trial to evaluate the effectiveness of a hepatitis B lay health worker intervention for Chinese Americans and Chinese Canadians. Individuals who had never been tested for HBV were identified from community-based surveys in Seattle and Vancouver, and were randomly assigned to receive a hepatitis B lay health worker intervention or a direct mailing of physical activity educational materials. Follow-up surveys were completed 6 months after randomization, and self-reported HBV tests were verified by medical record reviews. Provider records verified HBV testing following randomization for 6% of the experimental group participants and 2% of the control group participants ( $P = 0.04$ ). A higher proportion of individuals in the experimental arm than individuals in the control arm knew that HBV can be spread by razors ( $P < 0.001$ ) and during sexual intercourse ( $P = 0.07$ ) [29].

The study strengths include our group-randomized study design, a high participation rate (96% of the eligible students agreed to participate in our study), a relatively low



loss to follow-up (less than 20%), and our inclusion of Asian immigrants from multiple countries. However, the study also has several limitations. Our participants had a relatively high educational level and the findings may not be applicable to Asian immigrant populations with lower educational levels. Representatives from our collaborating community organizations did not think it would be feasible to administer a long baseline survey within the context of ELSA classes and, therefore, we did not collect baseline HBV knowledge data. While unlikely because of the randomization, there is a small possibility that the experimental group had higher levels of knowledge about HBV at baseline.

## Conclusion

Our hepatitis B ESL curriculum had a very limited impact on HBV testing completion. However, the study findings indicate that hepatitis B education delivered within the context of ESL classes can positively impact HBV-related knowledge. Community organizations that provide ESL education to Asian immigrants could easily incorporate hepatitis B education into their programs (and would need few additional resources to do so). Future research projects should evaluate ESL curricula that address other health topics, as well as the effectiveness of health education ESL curricula for other immigrant populations. Researchers should also evaluate other intervention approaches to increasing levels of serologic testing for hepatitis B in Asian American and Asian Canadian communities.

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