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Knowledge of Viral Hepatitis Among Puerto Rican Adults: Implications for Prevention

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Abstract

Although primary prevention of HAV and HBV can be achieved through vaccination, the burden of HCV can only be reduced through behavioral interventions to reduce its risk factors. This study evaluated knowledge regarding transmission, clinical manifestations and prevention of viral hepatitis in Puerto Rico. We assessed the level of knowledge about HAV (six questions), HBV (12 questions) and HCV (eight questions) among non-institutionalized Puerto Rican adults aged 21–64 years. Demographic characteristics and self-reported knowledge of these infections were determined through a face-to-face interview. A mean knowledge score was computed by summing correct responses to each scale. Mean knowledge scores according to demographics were compared using ANOVA or the Kruskal–Wallis test. Mean knowledge scores for HAV, HBV and HCV infections were 2.6 ± 1.5, 6.1 ± 2.4, and 3.6 ± 1.1, respectively. For HAV and HBV infections, the mean knowledge score significantly ($P < 0.05$) increased with age, level of counseling received and number of sources of information. However, for HCV infection the mean knowledge score significantly increased with decreasing age, increased educational level and increased annual family income. Contrary to HBV, a higher HAV and HCV knowledge score was observed among individuals with history of vaccination for HAV and HBV, seropositive status for HAV and HCV, and history of drug use. A sizeable proportion of adults in this study demonstrated an inadequate level of knowledge, especially about transmission routes. Health education must be focused on transmission and prevention methods, including the availability of a vaccine for HAV and HBV, especially among those with chronic liver disease.

Keywords

Knowledge; Viral hepatitis; Puerto Rico; Prevention

Introduction

Viral hepatitis is caused by infection with any of six distinct viruses identified, of which, hepatitis A virus (HAV), hepatitis B virus (HBV) and hepatitis C virus (HCV) are the three most commonly found in the United States (US). These viruses are responsible for major public health problems globally [1]. In 2007, the estimated number of new infections in the US was 25,000 for HAV, 3,000 for HBV, and 17,000 for HCV [2]. During 1995–2007, the incidence rate of HAV in the US declined 92% to the lowest ever recorded (1.0 per 100,000 population). Similarly, the incidence of HBV declined 82% (1.5 per 100,000 population) from 1990 to 2007. Following a peak in 1992, incidence of HCV experienced an initial decline; however, HCV rates have plateaued since 2003 at approximately 0.3 per 100,000 population.

These statistics do not reflect the real burden of viral hepatitis caused by chronic infection with HBV and HCV. Both viruses are a leading cause of chronic liver disease and hepatocellular carcinoma, the incidence of which has been increasing in the US population since mid-1980s [3, 4]. Over the past years, comprehensive strategies have been developed and implemented in order to decrease or eliminate the transmission of HAV and HBV in the US, primarily through vaccination campaigns [5]. After the availability of these vaccines, incidence rates of HAV and HBV infection in the US have declined, although not at the same proportion in all population sub-groups. Greater declines in the incidence of infection occurred in the states that included recommendations of the issuance of routine childhood vaccination as recommended by the Advisory Committee on Immunization Practices than for the remainder of the country [5]. As a result, age-specific incidence rates declined more rapidly among children than among adults [6].

Although primary prevention of HAV and HBV infection can be achieved through vaccination, no vaccine exists against HCV. Thus, the burden of HCV can only be reduced through behavioral interventions to reduce risk factors for infection. A comprehensive health survey conducted in the US revealed that a substantial proportion of adults are either uncertain or inaccurately informed about HCV infection, and that racial differences in knowledge exist [7]. In addition, data from studies conducted in New York [8] and Puerto Rico [9] indicate that the majority of infected individuals are unaware of their infection, although they serve as a source of transmission to others and are at risk of developing significant liver morbidity. To reduce the number of new HBV and HCV infections and the morbidity and mortality associated to chronic viral hepatitis, a comprehensive strategy is needed [10, 11]. One component of this strategy includes enhanced efforts to provide appropriate education regarding risk factors for viral transmission and the need for testing and medical evaluation among the general public. Thus, it is important to measure the public's familiarity with these infections, specifically in a region where the prevalence of HCV antibodies is high [9], information that will be essential for developing educational campaigns to improve their awareness. No prior data on viral hepatitis awareness in the general population of Puerto Rico has been published. Thus, we evaluated the knowledge regarding transmission, clinical manifestations and prevention of viral hepatitis in the adult population of Puerto Rico.

Methods

The study population consisted of the non-institutionalized population of Puerto Rico aged 21–64 years who participated in a population-based household survey aimed at estimating the seroprevalence of hepatitis C and other viral infections (hepatitis A, hepatitis B, HIV and HSV-2) in Puerto Rico. The sampling design and data collection procedures of this study have been described in detail elsewhere [12, 13]. In brief, all the municipalities of Puerto Rico were stratified on the basis of population density and AIDS incidence rates attributed to injection drug use. Four strata were derived corresponding to municipalities with above and below median rates of population density and AIDS incidence rates. A cluster sampling design for household surveys using the census tracts of Puerto Rico was employed, and one individual aged 21–64 years from each selected household was randomly selected to participate in the study. Participants were asked to undergo a personal interview, an audio computer-assisted self-interview (ACASI) implemented using QDS (Nova Research Co., Washington D.C.), and collection of blood and urine specimens. All study procedures were reviewed and approved by the Institutional Review Board of the University of Puerto Rico Medical Sciences Campus. Field work was conducted between June 2005 and February 2008.

Face-to-face interviews elicited information on sociodemographics, tattooing and body piercing practices, history of other sexually transmitted infections (STI) including gonorrhea, syphilis, genital warts, and Chlamydia infection, state of knowledge about viral hepatitis transmission routes, clinical manifestations and prevention, and history of HAV and HBV immunizations. The ACASI system ascertained cigarette and alcohol use, lifetime and recent drug use practices, sex-related risk behaviors, and history of incarceration.

Three scales were adapted to measure knowledge of HAV, HBV and HCV infections using backward translation design methods [7, 14]. Both questionnaires were translated into Spanish and back-translated to English. Comparison of the original instrument with the back-translated instrument was carried out, and discrepancies between the two versions were addressed to ensure lexical equivalence, ease of understanding and missing items. We assessed the level of knowledge about HAV (six questions), HBV (12 questions) and HCV (eight questions) in the specific areas of routes of transmission, prevention methods and clinical sequelae.

Respondents were also queried about reasons for seeking HAV and HBV vaccination, sources of knowledge and self-perception of risk. Response options were as follows: “Agree”, “Disagree”, and “Do not know”. Self reported Hepatitis A protection was defined as having obtained two doses of the vaccine, whereas HBV protection was defined as having obtained at least three doses of the vaccine.

Statistical Analysis

Kuder-Richardson Formula 20 (KR-20) was used as a measure of internal consistency reliability for each scale [15]. Internal consistency of each scale was moderate, as reflected by KR-20 coefficients ranging from 0.40 for HCV to 0.60 for HBV (data not shown). Each correct answer of the scale was scored as 1 point. An incorrect or “do not know” answer was given a score of 0. A mean knowledge scores was computed by summing correct responses to each scale; possible total scores ranged from 0 to 6 points for HAV, 0 to 12 points for HBV, and 0 to 8 points for HCV, with higher scores reflecting more knowledge. Adequate knowledge was defined as a score of at least 70% of correct responses. Mean knowledge scores (mean ± SD) were compared according to selected characteristics using ANOVA or the Kruskal–Wallis test [16]. All statistical analyses were performed using the Stata statistical package (Version 10.0, College Station, TX, USA).

Results

Of the selected household residents, 1,654 (77.9%) consented to participate in the study. During the field work, both funding and scope of the parent study was reduced. As a result, the face to face interview was shortened. Therefore, HAV and HBV knowledge was evaluated in a sub-sample of 710 adults, whereas HCV knowledge was evaluated in the total sample. The distribution of age, sex and health care coverage in the subsample was similar to the distribution observed in the total study sample (age: 41.6 ± 12.1 years vs. 41.1 ± 12.3 years; female sex: 57.2% vs. 56.4%; no health care coverage: 10.9% vs. 10.5%).

Hepatitis A Knowledge

Only 9.3% of the study subsample had an adequate knowledge of hepatitis A (data not shown). The proportion of correct responses ranged from 13.8 to 86.3% (Table 1). More than half (57.8%) of the participants knew that HAV can be acquired by ingestion of contaminated water, however, only 21.9% of the respondents were aware that it can be acquired through the consumption of food contaminated by infected food handlers. Only 13.8% of the respondents acknowledged that the possibility of acquiring HAV through

sexual intercourse is low, while only 30.4% acknowledged that the majority of people infected with HAV completely recover without sequelae. However, 86.4% of them recognized the importance of good sanitation and personal hygiene, with special emphasis on careful hand washing and sanitary disposal of feces. Regarding vaccine awareness, one-half (50.7%) of the participants knew that hepatitis A is vaccine preventable. Only 1.6% of adults in the total study sample self-reported to have received two doses of the vaccine, primarily due to occupational indications (data not shown).

Hepatitis B Knowledge

Only 14.8% of participants had an adequate knowledge of hepatitis B (data not shown). The proportion of correct responses ranged from 17.3 to 78.7% (Table 2). The majority of the study sub-sample (78.7%) knew that HBV infection can be spread by having sexual intercourse with an infected person, although only 17.3% knew that asymptomatic individuals can transmit the disease to others, and less than one-third (27.2%) agreed that HBV is more easily spread than HIV. In addition, more than half of the participants reported that HBV infection can cause liver cancer (55.5%), and, in some cases, can be fatal (68.0%). The percentage of participants that knew that chronic infection can be lifelong and incurable was lower (38.0 and 35.2%, respectively). Other misconceptions about HBV transmission were also observed. More than half (52.5%) of the participants were unaware of the availability of the HBV vaccine. Only 11.5% of adults in the total study sample reported receiving three doses of the HBV vaccine, primarily due to school prerequisites (31.1%) (data not shown).

Hepatitis C Knowledge

A lower percentage (5.0%) of the study participants in the total sample had an adequate knowledge of hepatitis C (data not shown). The proportion of correct responses ranged from 1.8 to 99.1% (Table 3). Misconceptions regarding routine recommendations for HCV testing were observed. Although the majority (99.1%) of participants knew that someone who injects illegal drugs should be tested, 92.6% felt that persons who received a blood transfusion in 1999 should undergo testing, and 87.5% mentioned that coworkers of HCV infected individuals should undergo testing. More than four out of five (81.4%) participants had the misconception that hepatitis C is a vaccine preventable disease, and only a minority (1.8%) knew that infection with HCV can cause liver cirrhosis.

Knowledge Variations Across Population Subgroups

Mean knowledge scores were 2.6 ± 1.5 for HAV (range 0–6), 6.1 ± 2.4 for HBV (range 0–12), and 3.6 ± 1.1 for HCV (range 0–8) (Table 4). Mean knowledge scores of hepatitis A did not differ ($P > 0.05$) by sex, education, annual family income, marital status, health care coverage, general health status, history of other STI, HIV serostatus, history of blood transfusions prior to 1992, lifetime number of sexual partners or age at first sexual intercourse (Table 4). However, mean knowledge scores of HAV significantly increased with age, level of counseling received, number of information sources regarding HAV, history of HAV vaccination, HAV serostatus and tattoing and body piercing practices. Those with a history of illegal drug use (IDU) had a marginally higher mean knowledge score than those without such history ($P = 0.05$).

Similarly, mean knowledge scores of HBV did not differ ($P > 0.05$) by sex, education, annual family income, marital status, health care coverage, history of HBV vaccination, general health status, history of other STI, HIV serostatus, history of blood transfusions prior 1992, history of IDU, tattooing or body piercing practices, lifetime number of sexual partners or age at first sexual intercourse. However, mean knowledge scores of hepatitis B

significantly increased with age, level of counseling received, and number of information sources about HBV. Also, HBV seropositive individuals had a marginally higher mean knowledge score than those who were seronegative ($P = 0.05$).

For HCV, mean knowledge scores were significantly ($P < 0.05$) higher for younger adults, those with a higher educational level, higher annual family income, private health care coverage, more counseling received, multiple information sources regarding HCV, history of either HAV or HBV vaccination, HCV seropositive, those who reported good general health status, and those with a history of illegal drug use. However, HCV knowledge did not differ statistically ($P > 0.05$) according to sex, marital status, history of other STI, HIV serostatus, history of blood transfusions prior 1992, tattooing or body piercing practices, lifetime number of sexual partners or age at first sexual intercourse.

Discussion

This is the first epidemiological study to asses knowledge of viral hepatitis among adults in Puerto Rico. Our study confirms findings from others that a sizeable proportion of adults have an inadequate level of knowledge, especially about routes of transmission [7, 14, 17–22].

The most common misperceptions regarding knowledge about HAV infection were observed in routes of transmission. A rather lower percentage of participants acknowledged that HAV can be acquired through the consumption of food contaminated by infected food handlers and through sexual intercourse. When compared with the study conducted by Bardenheir and colleagues [23], a lower percentage of participants in Puerto Rico (82.1% vs. 50.7%, respectively) was aware of the availability of the HAV vaccine. Other misperceptions regarding the clinical manifestations included that less than one-third of the respondents acknowledged that the majority of people infected with HAV completely recover without sequelae. Studies about HAV knowledge have been conducted among travelers [24] and parents of children attending kindergarten in California [23]. However, studies in the general population in other countries are scant.

Regarding knowledge of HBV infection, several mis-perceptions were also noted in the category of transmission modes. However, the level of knowledge for HBV transmission observed in this study appears to be slightly higher than those reported elsewhere. For example, 45.9% of the participants knew that HBV cannot be spread by eating food prepared by an infected person. This percentage is higher than the percentage observed (23.5–36%) among other populations in the US [14, 21, 22]. Similarly, the percentage of participants in this study who were aware that HBV can be spread by sharing personal utensils like a toothbrush with an infected person (74.4%) is higher (45–69.3%) than other studies [14, 25, 26]. More than three-quarters of our participants agreed that HBV can be spread by having sexual intercourse with an infected person, a figure higher than those obtained in other population subgroups (39.9–69.0%) [14, 19, 21, 22]. However, mis-perceptions still were found to exist. For example, less than one-third of the participants knew that HBV is more easily spread than HIV, a finding consistent with other studies [14, 19, 21]. In the category of clinical sequelae, more than half of the participants reported that HBV infection can cause liver cancer (55.5%) and, in some cases, can be fatal (68.0%), but the percentage of participants that knew that infection can be lifelong and incurable was lower (38.0 and 35.2%, respectively). Compared to Chinese and Vietnamese populations in the US and Canada, these proportions appear to be low [14, 17, 19, 20, 22, 26].

Several misperceptions regarding HCV transmission and prevention were also observed, including the availability of a vaccine, transmission of HCV through casual contact, and

need for testing recent blood transfusion recipients. When these misperceptions were compared with results from a mail survey that employed quota sampling to create a nationally representative panel of US adults [27], the percentage of adults who were aware of the unavailability of a vaccine to prevent HCV was similar to that observed among IDUs residing in San Juan, PR (17.0%) [28] and Blacks in the US (19.5%), but lower than both Whites (27.2%) and Hispanics (46.6%) [7]. However, the percentage of Puerto Ricans who agreed that liver disease patients should avoid alcohol (97.6%) and those who currently inject illegal drugs should be tested (99.1%); these figures are higher than those reported for Whites (71.4 and 91.2%, respectively), Blacks (70.5 and 86.2%, respectively) and Hispanics (69.2 and 89.2%, respectively) in the US [7] and IDU's residing in San Juan, PR (71.2 and 84.4%, respectively) [28]. A minority of adults was aware that HCV can cause liver cirrhosis, a percentage significantly lower than those obtained for Whites (54.7%), Blacks (49.2%) and Hispanics (50.6%) in the US [7], and IDU's residing in San Juan, PR (64.2%) [28].

Mean knowledge scores for all infections varied significantly across age and level of prior counseling received. For all infections, mean knowledge scores were consistently higher among individuals who reported a high level of counseling and multiple sources of information. Participants aged 50 years or older had mean knowledge score for HAV and HBV significantly higher ($P < 0.05$) than those younger than 50 years. This finding is consistent with community studies conducted in Canada [29] that have reported that HBV knowledge is significantly associated with increasing age, education level and use of media for health education. In contrast, younger participants (21–49 years) had a mean knowledge score for HCV significantly higher than older participants in our study. This finding differs from those of Gardella and colleagues who reported a higher knowledge among females and older individuals [30]. However, van de Mortel and colleagues reported no differences in HCV knowledge across age and sex categories [31]. Meanwhile, mean knowledge scores for all infections also varied significantly across high risk subgroups. Contrary to HBV, higher HAV and HCV knowledge scores were observed among individuals who had been vaccinated for HAV and HBV, were seropositive for HAV and HCV, and reported drug use practices, findings consistent with other studies [28, 32]. Previous enrollment in drug treatment programs and integration of hepatitis C counseling into HIV existing prevention services might partially explain these findings [8, 33]. Also, a higher HAV knowledge score was observed among individuals who reported tattooing and body piercing practices. On the contrary, Gardella et al. observed a higher HCV knowledge among those with a history of tattooing and body piercing [30].

The percentage of adults in this study who self-reported HAV and HBV vaccination coverage was low, a finding consistent with health surveys in the US. For example, the 2007 National Immunization Survey-Adult data has recently reported that among adults aged 18–49 years, only 12.1% had received two or more doses of hepatitis A vaccine, being coverage significantly lower for Hispanics (7.1%) [34]. The National Health Interview Survey showed that HBV vaccination coverage among high-risk adults in the US has increased from 30% in 2000 to 45% in 2004, however, it is lower than coverage among children (92%) and adolescents (86%) [35]. Due to the potential for increased severity of acute hepatitis superimposed on existing liver disease, HAV and HBV vaccines are recommended for those with chronic liver disease and other groups at increased risk including men who have sex with men, injection drug users, HIV infected individuals, incarcerated persons, and high-risk heterosexuals [5, 36]. Therefore, public health programs and primary care providers should inform adults receiving preventive clinical services of the potential benefits of HAV and HBV vaccination for their health, and adopt strategies appropriate for the practice setting to ensure that all adults at risk for HAV and HBV infection are offered the vaccine.

Despite the lack of a vaccine to prevent HCV infection, there are public health strategies that can be implemented to start addressing the challenges of HCV infection in Puerto Rico. These include raising awareness and educating target populations about HCV transmission and prevention, increasing clinician awareness of hepatitis C management, increasing availability of diagnosis and treatment facilities, increasing access to effective drug treatment services, and developing appropriate control measures to help reduce continued transmission in correctional settings. These recommendations are consistent with the framework provided by the Centers for Disease Control and Prevention and the National Institutes of Health Consensus Development Conferences on the Management of Hepatitis C [37–39].

Our study has several strengths including a probabilistic multistage population-based sampling method, which enhances generalizability of the findings in Puerto Rico, and an overall high response rate. However, knowledge items for HAV and HBV had to be discontinued, and thus, the representativeness of the findings for these two scales is limited. Moreover, the three scales had a moderate internal consistency, thus further research might improve these scales' internal consistency through item addition [15].

Despite these limitations, this study identified a substantial lack of knowledge of viral hepatitis in a large segment of the population, supporting the urgent need of developing public health strategies to prevent and control these infections among high-risk populations and the general public in Puerto Rico. These should include the development of a comprehensive education initiative to increase knowledge and awareness regarding viral hepatitis transmission modes, prevention methods, and the need for testing and prompt medical evaluation. While knowledge and education are important parts of effective message and program design, other factors that affect health decisions should be considered including people's perceptions of risks, perceptions of their ability to adopt recommended behaviors, physical and social environmental factors, and the perceived costs and benefits [40]. Moreover, health care providers, health educators, and other community-based organizations must play an active role in educating target populations, expanding access to HAV and HBV vacci-nation, and improved screening and counseling for high-risk populations. Effective implementation of educational strategies and counseling to modify risk behaviors and routine vaccination recommendations could contribute to further decreasing viral hepatitis rates in this population.

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Table 1

Correct responses to hepatitis A knowledge scale (n = 710)

Knowledge item	Percent
Item 1. Hepatitis A virus can be spread by the intake of food prepared by an infected person (*Agree*)	21.8
Item 2. Hepatitis A virus can be acquired by drinking contaminated water with hepatitis A virus (*Agree*)	57.8
Item 3. There is a vaccine for hepatitis A (*Agree*)	50.7
Item 4. The possibility to acquiring Hepatitis A virus through sexual relations is high (*Disagree*)	13.8
Item 5. The majority of people infected with hepatitis A virus do not recover by themselves (*Disagree*)	30.3
Item 6. To protect yourself and to protect others from hepatitis A virus, it is important the hand washing after you go to the bathroom and before you prepare or eat your food (*Agree*)	86.3

Table 2

Correct responses to hepatitis B knowledge scale (n = 710)

Knowledge item	Percent
Item 1. If someone is infected with hepatitis B but looks and feel healthy, do you think that person can spread hepatitis B? (*Agree*)	17.3
Item 2. Do you think that hepatitis B can be spread by eating food prepared by an infected person? (*Disagree*)	45.9
Item 3. Do you think that hepatitis B can be spread by sharing a toothbrush with an infected person? (*Agree*)	74.4
Item 4. Do you think that hepatitis B can be spread by eating food that has been pre-chewed by an infected person? (*Agree*)	75.4
Item 5. Do you think hepatitis B can be spread by being coughed on by an infected person? (*Disagree*)	19.9
Item 6. Do you think hepatitis B can be spread by having sexual intercourse with an infected person? (*Agree*)	78.7
Item 7. Do you think hepatitis B can be spread by holding hands with an infected person? (*Disagree*)	75.8
Item 8. Do you think hepatitis B is more easily spread than HIV? (*Agree*)	27.2
Item 9. Do you think people with hepatitis B can be infected for life? (*Agree*)	38.0
Item 10. Do you think hepatitis B can cause liver cancer? (*Agree*)	55.5
Item 11. Do you think someone can die from hepatitis B? (*Disagree*)	68.0
Item 12. Do you think hepatitis B disease can be cured? (*Disagree*)	35.2

Table 3

Correct responses to hepatitis C knowledge scale (n = 1,654)

Knowledge item	Percent
Item 1. Can be infected by shaking hands with an infected person (*Disagree*)	78.7
Item 2. There is a vaccine for hepatitis C (*Disagree*)	18.6
Item 3. Someone with hepatitis C can feel fine (*Agree*)	39.9
Item 4. Hepatitis C can cause the liver to stop working (*Agree*)	1.8
Item 5. Someone with liver disease should avoid alcohol (*Agree*)	97.6
Item 6. A coworker of someone with hepatitis C should be tested (*Disagree*)	12.5
Item 7. Someone receiving a blood transfusion in 1999 should be tested (*Disagree*)	7.4
Item 8. Someone who currently injects illegal drugs should be tested (*Agree*)	99.1

Table 4

Mean knowledge scores for viral hepatitis according to selected characteristics

Characteristics	Hepatitis A (n = 710)		Hepatitis B (n = 710)		Hepatitis C (n = 1,654)	
	Mean ± SD	*P* value	Mean ± SD	*P* value	Mean ± SD	*P* value
Overall	2.6 ± 1.5	–	6.1 ± 2.4	–	3.6 ± 1.1	–
Age group in years						
21–29	2.3 ± 1.4	0.0019 *	5.6 ± 2.4	0.01 *	3.6 ± 1.1	<0.001 *
30–49	2.6 ± 1.4		6.2 ± 2.3		3.7 ± 1.0	
50–64	2.9 ± 1.6		6.3 ± 2.5		3.3 ± 1.0	
Sex						
Female	2.6 ± 1.4	>0.05 **	6.0 ± 2.4	>0.05 *	3.6 ± 1.1	>0.05 *
Male	2.7 ± 1.5		6.2 ± 2.4		3.5 ± 1.1	
Education in years						
≤12	2.7 ± 1.4	>0.05 *	6.1 ± 2.3	>0.05 *	3.2 ± 1.0	<0.0001 **
>12	2.5 ± 1.5		6.1 ± 2.4		3.9 ± 1.1	
Annual family income						
< $20,000	2.6 ± 1.5	>0.05 *	6.1 ± 2.4	>0.05 *	3.4 ± 1.0	<0.0001 **
≥ $20,000	2.6 ± 1.5		6.2 ± 2.4		3.9 ± 1.1	
Marital status						
Single	2.5 ± 1.5	>0.05 *	5.9 ± 2.6	>0.05 *	3.6 ± 1.1	>0.05 *
Married/cohabitating	2.6 ± 1.5		6.1 ± 2.4		3.6 ± 1.1	
Divorced/separated/widowed	2.7 ± 1.4		6.4 ± 2.2		3.5 ± 1.1	
Health care coverage						
None	2.7 ± 1.4	>0.05 *	6.1 ± 2.7	>0.05 *	3.5 ± 1.0	<0.0001 *
Public insurance	2.6 ± 1.4		6.1 ± 2.4		3.4 ± 1.0	
Private	2.6 ± 1.5		6.2 ± 2.3		3.7 ± 1.1	
Level of counseling received						
A lot/enough/some	3.2 ± 1.2	<0.0001 **	6.8 ± 1.9	<0.0001 **	3.7 ± 1.1	<0.0001 *
None	2.3 ± 1.5		5.5 ± 2.6		3.4 ± 1.1	

Characteristics	Hepatitis A (n = 710)		Hepatitis B (n = 710)		Hepatitis C (n = 1,654)	
	Mean ± SD	*P* value	Mean ± SD	*P* value	Mean ± SD	*P* value
Sources of information						
None	2.1 ± 1.5	<0.0001 **	5.1 ± 2.8	<0.0001 **	3.1 ± 1.0	<0.0001 *
One source	2.9 ± 1.2		5.9 ± 2.1		3.5 ± 1.0	
Two or more sources	3.0 ± 1.3		6.7 ± 2.1		3.7 ± 1.1	
History of HAV or HBV vaccination						
Yes	3.5 ± 1.3	<0.0001 **	6.3 ± 2.1	>0.05 **	3.8 ± 1.1	<0.0001 **
No	2.6 ± 1.5		6.2 ± 2.4		3.5 ± 1.0	
Viral hepatitis serostatus †						
Positive	2.9 ± 1.5	<0.0001 *	7.2 ± 1.9	0.05 *	4.0 ± 1.1	0.01 *
Negative	2.4 ± 1.4		6.1 ± 2.4		3.5 ± 1.1	
General health status						
Good	2.6 ± 1.4	>0.05 *	6.1 ± 2.4	>0.05 *	3.6 ± 1.1	<0.0001 **
Not good	2.7 ± 1.5		6.1 ± 2.5		3.4 ± 1.0	
History of other STI						
Positive	2.5 ± 1.7	>0.05 *	5.2 ± 2.4	0.06 *	3.6 ± 1.1	>0.05 *
Negative	2.6 ± 1.4		6.1 ± 2.4		3.6 ± 1.1	
HIV serostatus						
Positive	1.6 ± 1.7	>0.05 *	4.6 ± 3.0	>0.05 *	3.5 ± 1.0	>0.05 *
Negative	2.6 ± 1.5		6.1 ± 2.4		3.6 ± 1.1	
Blood transfusions prior to 1992 ‡						
Yes	3.0 ± 1.3	>0.05 *	6.6 ± 2.0	>0.05 *	3.4 ± 1.1	>0.05 *
No	2.6 ± 1.5		6.1 ± 2.4		3.6 ± 1.1	
Illegal drug use						
Ever	2.7 ± 1.4	0.05	6.2 ± 2.5	>0.05 *	3.6 ± 1.0	0.008 *
Never	2.5 ± 1.5		6.1 ± 2.4		3.5 ± 1.1	
Tattooing practices						
Ever	2.3 ± 1.4	0.03 *	6.4 ± 2.5	>0.05 *	3.6 ± 1.0	>0.05 *

J Community Health. Author manuscript; available in PMC 2012 October 04.

Characteristics	Hepatitis A (n = 710)		Hepatitis B (n = 710)		Hepatitis C (n = 1,654)	
	Mean ± SD	*P* value	Mean ± SD	*P* value	Mean ± SD	*P* value
Never	2.7 ± 1.4		6.1 ± 2.4		3.6 ± 1.1	
History of ear or other body piercing						
Ever	2.3 ± 1.5	<0.002*	5.9 ± 2.4	>0.05*	3.5 ± 1.0	>0.05*
Never	2.7 ± 1.4		6.2 ± 2.4		3.6 ± 1.1	
Lifetime number of sexual partners						
0–1	2.6 ± 1.4	>0.05*	6.0 ± 2.3	>0.05*	3.5 ± 1.1	>0.05*
2–9	2.7 ± 1.4		6.2 ± 2.4		3.6 ± 1.1	
≥10	2.5 ± 1.6		6.1 ± 2.5		3.6 ± 1.1	
Age at first sexual intercourse in years						
≤11	2.9 ± 1.6	>0.05*	6.3 ± 2.4	>0.05*	3.6 ± 1.1	>0.05*
12–17	2.6 ± 1.5		6.1 ± 2.4		3.5 ± 1.0	
≥18	2.6 ± 1.4		6.1 ± 2.4		3.6 ± 1.1	

** P* values from ANOVA test

*** P* values from Kruskal–Wallis test.

† Two participants were excluded for the analysis of HAV because missing values in the HAV test and four participants were excluded for the analysis of HCV because missing values in the HCV test

‡ History of blood transfusions prior to 1992 was categorized as self-reported transfusion prior to 1992 versus transfusion after 1992 or no transfusion