



Hepatitis B virus infection among street youths in Montreal

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Abstract

Background: Street youths are at high risk for many health problems, including sexually transmitted diseases and bloodborne infections. The authors conducted a cross-sectional anonymous study from December 1995 to September 1996 involving street youths in Montreal to estimate the prevalence of risk behaviours for hepatitis B virus (HBV) infection and of markers of past and present HBV infection.

Methods: Participants were 437 youths aged 14 to 25 meeting specific criteria for itinerancy who were recruited in collaboration with the 20 major street youth agencies in Montreal. Sociodemographic and lifetime risk factor data were obtained during a structured interview, and a blood sample was taken to test for HBV markers (hepatitis B surface antigen and antibodies to the hepatitis B core antigen). Univariate analyses and multivariate logistic regressions were conducted.

Results: The mean age of the subjects was 19.5 years; 69.3% (303/437) were males. Many subjects had high-risk behaviours: 45.8% (200/437) had injected drugs, 24.5% (107/436) had engaged in prostitution, and 8.7% (38/437) reported having a sexual partner with a history of unspecified hepatitis. The prevalence rate for one or both HBV markers was 9.2% (40/434) (95% confidence interval [CI] 6.7%–12.3%). Multivariate logistic regression analysis showed that being over 18 years of age (adjusted odds ratio [OR] 4.5, 95% CI 1.8–11.7), having injected drugs (adjusted OR 3.5, 95% CI 1.5–8.3) and having had a sexual partner who had unspecified hepatitis (adjusted OR 3.2, 95% CI 1.3–7.5) were all associated with HBV infection.

Interpretation: Street youths are at high risk for HBV infection. Early and complete HBV vaccination among this vulnerable population is urgently needed.

Hepatitis B virus (HBV) is a major cause of chronic liver disease and primary hepatocellular carcinoma in North America.¹⁻³ Among adolescents and young adults it is transmitted mainly through unprotected sexual intercourse. The sharing of injection material among drug users is another major risk factor.⁴ Tattooing and body piercing may also play a role, but the magnitude of this risk is not well known.

There is little literature available on the prevalence of HBV infection in the general Canadian population. In a 1995 survey of 1200 school children aged 8–10 years in Quebec, none was found to be positive for either hepatitis B surface antigen (HBsAg) or antibodies to the hepatitis B core antigen (anti-HBc).⁵ However, the risk of HBV infection increases during adolescence and early adulthood because of initiation of sexual activity and drug use. In a recent seroprevalence study in northern Ontario involving people 14–30 years of age, HBsAg seroprevalence rates were estimated to be between 0.24% and 0.47% and anti-HBs seroprevalence rates between 0.40% and 0.78%.⁶ Among young adults presenting to an urban STD clinic in Ontario, 2.7% were found to be HBsAg positive.⁷

Evidence

Études

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Few studies have been published on the prevalence of HBV infection among street people. In a New York study 12% of men living in a shelter were found to be positive for HBsAg and 43% had HBV antibodies.⁸ Among 87 street youths in Toronto (mean age 16 years), 8 were found to be anti-HBs positive.⁹ In a more recent New York study, 21% of homeless adolescents recruited in an urban drop-in centre had evidence of prior HBV infection.¹⁰

A 1995 HIV prevalence study involving street youths in Montreal showed that they were at high risk for blood-borne infections.¹¹ The rate of lifetime injection drug use was 36%; 58% of these participants had shared needles at least once. In all, 28% had engaged in prostitution (37% of girls, 21% of boys), and 58% had had sexual partners with high-risk behaviours for STDs including hepatitis and HIV infection.

These results prompted us to conduct a cross-sectional study involving Montreal street youths to estimate the prevalence of risk behaviours for HBV infection and of markers for past and present HBV infection (anti-HBc and HBsAg).

Methods

The study was conducted from December 1995 to September 1996. Subjects were recruited from among those participating in the Montreal Street Youth Cohort (MSYC) study,¹² which began in January 1995 and followed youth over time for changes in sexual and drug use behaviours and HIV infection. The cohort study was approved by the Human Subjects Committee of the Department of Epidemiology and Biostatistics at McGill University. Subjects were eligible if they were between 14 and 25 years of age, spoke French or English, intended to stay in Montreal during the following year and were "street active" (had either been without a place to sleep more than once or had regularly used the services of Montreal street youth agencies during the previous year). Subjects other than those participating in the MSYC study were also recruited by cohort interviewers during their regular visits to the 20 collaborating community agencies if the youths met the eligibility criteria. To ensure representativeness of the Montreal street youth population, recruitment visits were scheduled regularly in each agency according to the volume of their clientele.

The research nurse explained the study to each person, giving assurances that participation was voluntary and anonymous. Once a consent form was signed, an interview was conducted that included a 15-minute face-to-face questionnaire on sociodemographic characteristics and lifetime risk factors for HBV infection. The nurse then obtained a blood sample to test for HBV serology markers. An anonymous code was generated to link the questionnaire and blood test results. After the interview participants were given a stipend of \$10 as compensation for their time. The nurse was available to answer any questions on hepatitis and STDs and to provide information on free hepatitis B vaccination clinics.

Seroprevalence was determined using immunoenzymatic reagents. Blood samples from the first 301 subjects were tested using the Abbott IMX HbsAg and IMX core test kits (Abbott Diagnostics, Mississauga, Ont.); samples from the remaining 136 par-

ticipants were tested using the Cobas Core anti-HBc EIA and the Cobas Core HbsAg II EIA reagents (Roche Diagnostic Systems, Mississauga, Ont.). According to the manufacturers, both test kits have a specificity greater than 99.7%. Samples found to be positive for HBsAg and negative for anti-HBc were submitted to a neutralization confirmatory test.

Participants were also tested for hepatitis C; because the public health implications and the risk factors associated with hepatitis C are somewhat different, the results concerning hepatitis C in this population will be presented in a future paper.

Means, medians and crude rates were estimated. Seropositive and seronegative subjects were compared using Pearson's χ^2 test, Student's *t*-test and Fisher's exact test. Statistically significant variables ($p < 0.05$) were entered into a regression model. Non-significant variables were kept in the model when they affected the odds ratios for the other variables.

Results

A total of 437 street youths participated in the study, 372 of whom were recruited from among the MSYC study participants. The cohort and non-cohort subgroups were similar with respect to sociodemographic variables and risk behaviours such as prostitution, injection drug use and homosexual relations. The mean age was 19.5 years, and 69.3% (303/437) were males. Most (94.3%) were born in Canada, and most had Canadian-born parents (85.3% had a Canadian-born father and 91.2% a Canadian-born mother).

In terms of medical history, 4.1% (18/436) of the subjects reported a history of HBV infection. At least one dose of hepatitis B vaccine had been given to 38.5% (168/436); only 11.8% (51/434) of the participants had received 3 doses. Twenty-one (4.8%) reported that they had received blood or blood products for medical reasons. A small proportion (1.1%) said that they had injected steroids.

Risk behaviours

Over half (56.5% [247/437]) of the participants said that they had one or more tattoos (range 1–30). Of these, 162 (65.6%) had at least one tattoo done by a nonprofessional. As for body piercing, 40.3% (176/437) had a body part other than ears pierced; of these, 101 (57.4%) had at least one piercing done by a nonprofessional.

Most of the street youths were sexually active: 99.3% (434/437) reported heterosexual relations, and 18.3% (80/437) said they had had at least one homosexual partner in their lifetime. Proportionately more girls than boys reported homosexual activities (24.6% v. 15.5%). More than half (55.7%) of the participants reporting heterosexual relations and 21.3% of those reporting homosexual relations had had more than 10 partners in their lifetime. One quarter of the participants (24.5% [107/436]; 40.3% of the girls and 17.5% of the boys) reported having ever had sex in exchange for such items as money, gifts, drugs or a place to sleep.



Consistent condom use with heterosexual partners was low: only 2.3% (3/132) of the girls and 14.7% (44/300) of the boys reported always using condoms for vaginal penetration. Overall, 26.9% (36/134) of the girls and 18.3% (55/300) of the boys reported having ever had anal sex; of these subjects, 25.6% (23/90) said that they consistently used condoms for anal sex.

Of the 47 boys who reported having had homosexual partners during their lifetime, 14 (29.8%) had had insertive anal penetration and 16 (34.0%) had had receptive anal penetration. Condom use was reported by 12 of the boys who had had insertive penetration and 7 of those who had had receptive penetration.

Many of the participants, especially girls, reported having ever had sexual partners at high risk for STDs and bloodborne infections: for 51.0% (222/435; 63.4% of girls, 45.5% of boys) the partner had injected drugs, for 8.7% (38/437; 14.2% of girls, 6.3% of boys) it was someone with a history of unspecified hepatitis, and for 5.5% (24/435; 9.0% of girls, 4.0% of boys) the partner was HIV positive.

In all, 45.8% (200/437) of the participants reported having ever injected drugs (47.8% of girls, 44.9% of boys). Age

at first injection ranged from 10 to 24 years (mean 16.8 years overall, 16.1 for girls, 17.1 for boys). During the month before the interview, 10.6% of the 200 injected daily, 16.6% injected several times a week, 22.1% injected sporadically, and 50.8% abstained.

Just over half (51.8% [103/199]) of the youths who reported having injected drugs said they had borrowed a used needle at least once. Other injection materials were borrowed as follows: cotton (38.2%), spoon (56.8%) and water or other substances to clean needles and syringes (43.2%).

HBV serological status

Of the 434 participants who completed the laboratory tests,¹ 40 were found to be positive for one or both HBV markers, for a rate of 9.2% (95% confidence interval [CI] 6.7%–12.3%); 1.6% were HBsAg positive.

Table 1 presents the factors associated with HBV infection from the univariate analysis. Having more than 10 sexual partners in their lifetime, having been engaged in prostitution, having had homosexual partners and having had anal sex with heterosexual partners were not associated with HBV infection.

The results of the logistic multivariate regression analysis are shown in Table 2. Being over 18 years of age, having injected drugs and having had a sexual partner with a history of unspecified hepatitis were all independently associated with HBV infection. Having had at least one tattoo and having had body piercing were not found to be significant factors; nevertheless, they contributed as adjustment variables, and their odds ratios suggest that they may be associated with HBV infection.

Interpretation

The adolescents and young adults recruited for our study represent a group that needed to use free community services offering housing, food and social support on several occasions during the year preceding the interview, or had to seek shelter outside their immediate family. In 1993 the Montreal Regional Committee on Homeless Persons estimated that there were about 4000 youths be-

Table 1: Factors associated with hepatitis B virus (HBV) infection among street youths in Montreal (n = 434)

Lifetime risk factor	% (and no.) of street youths with HBV infection	p value
Injection drug use		
Yes	16.2 (32/197)	< 0.001
No	3.4 (8/237)	
≥ 1 tattoo		
Yes	13.5 (33/245)	< 0.001
No	3.7 (7/189)	
Body piercing (excluding ears)		
Yes	13.2 (23/174)	< 0.05
No	6.5 (17/260)	
Sexual partner(s) with history of unspecified hepatitis		
Yes	34.2 (13/38)	< 0.001
No	6.8 (27/396)	
Age, yr		
> 18	13.2 (34/258)	< 0.001
≤ 18	3.4 (6/176)	
Sexual partner(s) injecting drugs		
Yes	12.8 (28/219)	< 0.05
No	5.6 (12/213)	
Female sexual partner(s) engaged in prostitution		
Yes	15.4 (18/117)	< 0.05
No	7.0 (22/315)	
Male sexual partner(s) engaged in prostitution		
Yes	24.3 (9/37)	< 0.001
No	7.8 (31/395)	
HIV-positive sexual partners		
Yes	29.2 (7/24)	< 0.001
No	8.1 (33/408)	

Table 2: Factors associated with HBV infection in multivariate logistic regression analysis

Factor	Crude odds ratio	Adjusted odds ratio* (and 95% CI)
Older age (> 18 yr)	4.3	4.5 (1.8–11.7)
Injection drug use	5.6	3.5 (1.5–8.3)
Sexual partner(s) with history of unspecified hepatitis	7.1	3.2 (1.3–7.5)
≥ 1 tattoo	4.1	1.6 (0.6–4.2)
Body piercing (excluding ears)	2.2	1.6 (0.8–3.6)

Note: CI = confidence interval.

*Odds ratios were adjusted for other variables in the model.



tween 12 and 30 years of age who met this definition in the streets of Montreal.¹³

Although our sample seemed to be representative of the street youth population in Montreal (recruitment was done in the 20 major organizations working with street youths, and the selection criteria were developed in collaboration with street workers in these organizations), we may have missed street youths who do not frequent such organizations. We do not know how this might have biased our estimates of HBV infection prevalence, but presumably this bias is not important because, according to staff at street youth agencies, most street youths use their services. Another limitation was that most of the study subjects were recruited from among participants of a cohort study. Because cohort participants may be more compliant, less disorganized and thus less vulnerable to acquiring HBV infection than other street youths, our study may have underestimated the true rate of hepatitis B in the larger street youth population. On the other hand, because the cohort study began less than a year before our study started, there may not have been a significant "cohort effect." Finally, because the participants were given \$10, those living in more precarious situations and experiencing greater poverty may have been oversampled, which could have led to an overestimated infection rate.

Our study documents the importance of HBV infection in the street youth population: 9.2% of the subjects in our study had markers of infection. Sexual and drug use risk behaviours of street youths should be evaluated by health professionals caring for them so that harm reduction counselling can be offered. Hepatitis B vaccination clearly needs to be promoted as a preventive intervention; only 12% of the subjects in our study had completed the 3-dose vaccination schedule despite the availability of free vaccine.

The prevalence rate of HBV markers in our study population was 12 to 23 times higher than that observed in Ontario in the general population aged 14 to 30 years⁶ but similar to that reported in a Toronto street youth study.⁹ The Toronto study is the only other published one in Canada on hepatitis B in a street youth population. Since the eligibility criteria in that study included apprehended minors, comparability with our sample is difficult to assess. Sexual transmission in the context of prostitution appeared to be the main risk factor associated with infection in the Toronto study. However, the small sample may have obscured the role of other risk factors.

In our study the multivariate analysis indicated that older age (over 18), injection drug use and sex with partners with a history of unspecified hepatitis were significantly associated with HBV infection. Tattooing and body piercing also appeared to be associated with HBV infection, although not significantly.

The association between older age and HBV infection, also reported for HIV infection,¹⁴ may represent a cumulative effect of risk behaviours or an interaction between risk behaviours and risk networks. Street youths, especially mi-

nors, usually interact with people of their own age who have a lower prevalence rate of infection. This lower risk social network may protect them somewhat from acquiring these infections.

Injection drug use was reported by 46% of the subjects in our study. This rate is the highest reported among street youths in Canada.^{15,16} Injection drug use was a major risk factor for HBV infection: the rate of infection among those who reported ever having injected drugs was 3.5 times higher than the rate among those who had not reported such behaviour.

Sexual transmission was another important risk factor for HBV infection, especially in specific high-risk situations. In our sample, those who had had a sexual partner with a history of hepatitis were 3.2 times more likely than others to have HBV infection; however, infection was not associated with the number of sexual partners, prostitution, homosexual activity or anal sex.

Tattooing and body piercing (possibly when done by a nonprofessional) may also have contributed to the risk of HBV infection, but this hypothesis needs to be verified in further studies because the adjusted odds ratios were not statistically significant.

In Quebec a voluntary hepatitis B vaccination program has been provided to grade 4 students since 1994. This program has been well accepted and provides complete vaccination for the majority of students. However, there are certain neighbourhoods where vaccination coverage is less than optimal. These youths, as well as the current cohort of adolescents aged 14 and over, who did not benefit from the primary school vaccination program, are still at risk for hepatitis B. Physicians will need to continue to verify vaccination status and offer vaccination to adolescents when they come in for other medical consultations. Innovative programs will be needed to educate street youths about the prevention of bloodborne infections and to provide them with comprehensive health care that will include HBV vaccination. Sexual risk behaviours and injection drug use put these youths at high risk for hepatitis B and many other preventable diseases. Youth-friendly, accessible medical and social services, including substance abuse treatment programs, are urgently needed for this population.

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