Risk factors for hepatitis C virus infection among street youths

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Research

Recherche

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Abstract

Background: The relative contributions to risk of hepatitis C virus (HCV) infection resulting from unsafe sexual behaviours and exposures to blood (e.g., tattooing, body piercing and injection drug use) among youths at risk are not well known. We interviewed street youths about risk factors for HCV infection and documented their HCV antibody status.

Methods: From December 1995 to September 1996 we recruited 437 youths aged 14 to 25 years who met specific criteria for itinerancy. Data on sociodemographic characteristics and lifetime risk factors were obtained during a structured interview, and a venous blood sample was taken for HCV antibody testing.

Results: Many of the subjects reported behaviours that put them at risk for bloodborne diseases: 45.8% had injected drugs, 56.5% had at least 1 tattoo, and 78.3% had body piercing. The overall prevalence of HCV infection was 12.6% (95% confidence interval [CI] 9.7%–15.9%). In a multivariate logistic regression analysis, injecting drugs (adjusted odds ratio [OR] 28.4 [95% CI 6.6–121.4]), being over 18 years of age (adjusted OR 3.3 [95% CI 1.6–7.0]) and using crack cocaine (adjusted OR 2.3 [95% CI 1.0–5.3]) were independent risk factors for HCV infection. Having more than 1 tattoo (adjusted OR 1.8 [95% CI 0.95–3.6]) was marginally associated with HCV infection, and body piercing was not.

Interpretation: Drug injection was the factor most strongly associated with HCV infection among street youths. Given that injection drug users are the driving force of the HCV infection epidemic in Canada, increased intervention efforts to prevent initiation of drug injection are urgently needed to curb the epidemic.

The predominant role of blood transfusion and injection drug use in the transmission of the hepatitis C virus (HCV) has consistently been reported worldwide.[1] In Canada drug injection is currently the most important transmission route.[2] The rate of sexual transmission is estimated to be low,[3–7] and intrafamilial transmission is uncommon.[8] Transmission of HCV through other situations involving unapparent or minor exposure to blood, such as in tattooing,[9–16] body piercing[13] and the sharing of noninjectable drug preparation equipment,[3,5] has been reported. However, the relative contribution of these modes of transmission is still unknown.

Only a few studies have looked at transmission patterns and risk factors for hepatitis C in Canada, and most relied on surveillance data.[2] Only 1 HCV study has been published on Canada's street youths, a population of 45 000 to 150 000 subjects.[17] This study, conducted in Ottawa in 1993, showed a prevalence of HCV infection of 4% among 100 street youths aged less than 21 years.[18]

Two other studies have been published on HCV among street youths. One study, conducted in Oregon in 1994–1997, showed a prevalence of 5.0% among 536 subjects aged 14 to 20 years.[19] Martins and colleagues[20] performed a study in Goiania, Brazil, in 1990–1993 and found prevalence rates of 1% and 3% respectively in 2 subgroups of street youths (391 home-based and 100 street-based) aged 9 to 20 years.

In 1995 we began a cross-sectional study to estimate the prevalence of hepatitis B and C among Montreal street youths and to determine risk factors associated with these infections. In this paper we present the results for HCV infection; the results for hepatitis B virus (HBV) were published previously.[21]

Methods

The study was conducted from December 1995 to September 1996. The methods were previously described in detail.[21] In brief, "street-active" participants aged 14 to 25 years were recruited through the ongoing Montreal Street Youth Cohort Study.[22] Youths were considered street-active if they had been without a place to sleep more than once or had regularly used the services of Montreal street youth agencies during the previous year. The cohort study was approved by the Human Subjects (Ethics) Committee, Department of Epidemiology and Biostatistics, McGill University, Montreal.

All subjects completed a 15-minute face-to-face questionnaire on sociodemographic characteristics and lifetime risk factors for HBV and HCV infections, followed by venipuncture for HBV and HCV antibody testing. Testing for antibodies to HCV was performed on fresh blood at the Centre hospitalier de l'Université de Montréal — Hôpital Saint-Luc. The Abbott HCV EIA (Abbott Diagnostics, Mississauga, Ont.), a second-generation immunoenzymatic bead test, was used for the first 329 subjects. This test was then replaced by the Roche Cobas anti-HCV EIA (Roche Diagnostic Systems, Mississauga) for administrative reasons, and it was used for the remaining 108 subjects. According to the manufacturers' data, the 2 tests were comparable, with reported sensitivity values of 98.6% and 99.6% respectively in chronic hepatitis and specificity values of 99.5% and 99.8% respectively. Throughout the study, positive samples were confirmed with a third-generation recombinant immunoblot assay (RIBA HCV 3.0 SIA; Chiron Diagnostics, Markham, Ont.).

We calculated means and crude rates with 95% exact binomial confidence intervals (CIs). Rates were compared with the use of Pearson's χ^2 or Fisher's exact test. We conducted a multivariate logistic regression analysis to identify factors associated with HCV infection. Variables associated with HCV infection in univariate analyses ($p < 0.10$) were entered into the model by means of backward stepwise selection. We tested potential confounders before selecting the final model, that is, we entered nonsignificant variables into the selected multivariate model and determined their effect on the odds ratios of the independent variables.

Results

The sociodemographic characteristics and lifetime risk behaviours of the 437 study subjects were previously reported.[21] Overall, 303 subjects (69.3%) were male, the mean age was 19.5 years, 247 subjects (56.5%) had at least 1 tattoo, and 342 subjects (78.3%) had ear or other body piercing. A total of 200 (45.8%) reported injection drug use, and 232 (53.1%) reported crack cocaine use. Twenty-one subjects (4.8%) reported having received blood or blood products for medical reasons (19 in Canada, 1 in the United States and 1 in England), and 34 (7.8%) had received medical injections or vaccination in 19 different countries other than Canada.

Table 1: Variables associated, in univariate analyses, with hepatitis C virus (HCV) infection among street youths aged 14 to 25 years

Variable	No. of subjects: Total *n = 437**	No. of subjects: HCV positive *n = 55*	HCV infection rate, %	*p* value†
Age, yr				
> 18	261	44	16.9	
≤ 18	176	11	6.2	0.001
Tattooing				
By nonprofessional	162	34	21.0	
By professional	85	11	12.9	
Not tattooed	190	10	5.3	< 0.001
No. of tattoos				
> 1	149	35	23.5	
1	98	10	10.2	
0	190	10	5.3	< 0.001
Body piercing, no. of perforations (including ears)				
> 5	110	21	19.1	
1–5	232	25	10.8	
0	94	9	9.6	0.058
Injection drug use				
Yes	200	53	26.5	
No	237	2	0.8	< 0.001
Crack cocaine use				
Yes	232	46	19.8	
No	205	9	4.4	< 0.001
Engaged in prostitution				
Yes	107	24	22.4	
No	329	31	9.4	< 0.001
> 10 heterosexual partners				
Yes	241	42	17.4	
No	192	12	6.2	< 0.001
Homosexual partner(s)				
Yes	80	17	21.2	
No	357	38	10.6	0.010
Anal sex (receptive or insertive)				
Yes	101	18	17.8	
No	336	37	11.0	0.070
Sexual partner(s) with history of injection drug use				
Yes	222	42	18.9	
No	213	13	6.1	< 0.001
Sexual partner(s) with history of unspecified hepatitis				
Yes	38	14	36.8	
No	399	41	10.3	< 0.001
HIV-infected sexual partner(s)				
Yes	24	7	29.2	
No	411	48	11.7	0.012
≥ 1 reported STD				
Yes	134	26	19.4	
No	303	29	9.6	0.004

*Total number of subjects may not add up to 437 for some variables owing to missing data.
†Pearson's χ^2 or Fisher's exact test (as appropriate, based on expected cell size).

Of the 437 blood samples tested, 55 were positive for HCV antibodies, for a prevalence rate of 12.6% (95% CI 9.7%–15.9%). The HCV infection rate did not vary with sex (females 10.4%, males 13.5% [$p = 0.37$]).

The variables significantly associated with HCV infection in univariate analyses are presented in Table 1. Sex, birth in Canada, transfusion of blood or blood products, medical injections or vaccination outside Canada, ear or other body piercing, injection of steroids, having lived with someone (other than a sexual partner) with a history of unspecified hepatitis, having used someone else's toothbrush or razor, and having had ulcers or genital wounds were not associated with HCV infection. The results of the multivariate logistic regression analysis are shown in Table 2. Injection drug use, higher age (over 18 years v. 18 or less) and crack cocaine use were independently associated with HCV infection.

Two of the 55 HCV-positive subjects, both older than 18 years, had never injected drugs. Of the 2, 1 reported having used crack cocaine, having had sexual activities with a person with a history of unspecified hepatitis and with a person with a history of drug injection, and having had more than 10 heterosexual partners. The other subject reported having used crack cocaine.

Interpretation

Compared with the estimated prevalence of HCV infection in the Canadian general population (0.8%),[2] the prevalence was higher (12.6%) in the Montreal street youth population. This rate was also much higher than that reported for other street youth populations (4% in Ottawa,[18] 1% and 3% in Goiania, Brazil,[20] and 5% in Oregon[19]). The higher prevalence of drug injection use among the Montreal participants (46%, as compared with 17% in Ottawa[18] and 37% in Oregon[19]) or their higher age may explain this observation.

In the multivariate analysis, drug injection was the factor most strongly associated with HCV infection. Other factors were higher age and crack cocaine use. Having more than 1 tattoo was marginally associated with HCV infection.

The association between age and HCV infection may reflect the cumulative effect of risk behaviours (duration and frequency of injection) or an interaction between risk behaviours and risk networks, as noted in studies of HIV infection.[23] Younger street youths, especially minors, usually interact with people of their own age, with a low prevalence of infection, which may protect them somewhat from acquiring hepatitis C.

An association between crack cocaine use and HCV infection has previously been reported.[5] A similar association between crack cocaine use and HIV infection was observed by Faruque and associates,[24] who linked the increased prevalence of HIV infection with the presence of oral sores among crack cocaine users.

Finally, tattooing, but not body piercing, was associated with HCV infection. The association was borderline significant and was present only for more than 1 tattoo. Nevertheless, tattooing was retained in the model because of its p value, close to statistical significance, and its biological plausibility. An association between tattooing and HCV infection has previously been reported in Canada and elsewhere.[9–16] One study demonstrated an increased risk when tattooing was performed by a nonprofessional.[15] Although we detected such an association in the univariate analysis, it was not retained in the multivariate model.

Among the 55 HCV-infected youths identified in our

Table 2: Variables associated with HCV infection in multivariate logistic regression analyses*

Variable	No. of HCV-positive subjects/total no. of subjects	Crude OR (and 95% CI)	Adjusted OR (and 95% CI)†
Injection drug use			
Yes	53/200	42.3 (10.2–176.3)	28.4 (6.6–121.4)
No	2/237		
Age, yr			
> 18	44/261	3.0 (1.5–6.1)	3.3 (1.6–7.0)
≤ 18	11/176		
Crack cocaine use			
Yes	46/232	5.4 (2.6–11.3)	2.3 (1.0–5.3)
No	9/205		
Tattooing			
> 1 tattoo	35/149	4.1 (2.3–7.4)	1.8 (0.9–3.6)
≤ 1 tattoo	20/288		

Note: OR = odds ratio, CI = confidence interval.
*No other variables significantly modified the ORs of the variables in the retained model.
†Each OR was adjusted for the other 3 variables in the model.

study, only 15 (27.3%) reported being HCV-positive in their questionnaire. This low proportion of subjects aware of their infection status suggests that surveillance data, based on reported infections, may not be accurate for this population.

In this HBV[21] and HCV study, 3 risk factors were associated with both infections: higher age, injection drug use and tattooing. Sexual activity and body piercing played a role only in HBV transmission, and crack cocaine use was associated only with HCV transmission.

The generalizability of our results to other street youths is unknown. Participants were recruited through all major community organizations. Because of this sampling strategy, we may have missed street youths not frequenting such organizations. However, a recent census of the Montreal street population showed that about 90% frequent community organizations.[25]

Another limitation to our study is that most of the subjects were participating in a cohort study. Since the cohort study started only 1 year before we began the current study, no significant "cohort effect" is expected. However, because cohort participants may be more compliant and less disorganized and, thus, less vulnerable to acquiring HCV infection than other street youths, we may have underestimated the true rate of HCV infection. On the other hand, 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.

We found that during the study period, drug injection was highly prevalent among Montreal street youths and represented the main risk factor for HCV infection. To curb the HCV infection epidemic in Canada, increased intervention efforts are needed to prevent initiation into drug injection among vulnerable youths. In addition, access to low-threshold programs (e.g., needle exchange programs), substance abuse treatments, and HCV antibody testing and counselling should be facilitated for vulnerable youths.

Competing interests: None declared.

Contributors: Drs. Roy and Haley were responsible for the conception and design of the study, data analysis, interpretation of results and writing of the manuscript. Ms. Leclerc was responsible for data analysis, interpretation of results and writing of the manuscript. Dr. Boivin was responsible for data analysis, interpretation of results and revision of the manuscript. Ms. Cédras was responsible for data analysis and writing of the manuscript. Dr. Vincelette was responsible for interpretation of results and revision of the manuscript.

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