DOI: 10.1590/S0034-89102007000900009

Rev Saúde Pública 2007;41(Supl. 2)

Valquiria O. C. Brito[I]

Deolinda Parra[II]

Regina Facchini[III]

Cassia Maria Buchalla[IV]

HIV infection, hepatitis B and C and syphilis in homeless people, in the city of São Paulo, Brazil

ABSTRACT

OBJECTIVE: To estimate the prevalence of HIV infections, as well as hepatitis B and C and syphilis viruses in homeless people.

METHODS: Cross-sectional study with educational intervention, conducted in the city of São Paulo, between 2002 and 2003. A convenience sample of homeless people who used night shelters was selected, according to the following criteria: aged 18 or older and not showing psychiatric disturbances. During interviews, sociodemographic and behavioral data were gathered and HIV, hepatitis B and C and syphilis laboratorial tests and post-test counseling were carried out.

RESULTS: A total of 330 shelter users participated, with an average age of 40.2 years, 80.9% of them male, having lived on the streets for one year in average. Prevalences of 1.8% for HIV, 8.5% for hepatitis C virus, 30.6% for previous hepatitis B infection, 3.3% for chronic or acute infection by hepatitis B virus, and 5.7% for syphilis. The consistent use of condoms was referred to by 21.3% of interviewees and the use of injecting drugs by 3% of them. Positivity was 10% for HIV and 50% for hepatitis C virus among injectable drug users, versus 1.5% for HIV and 7.3% for hepatitis C among the others, showing an association between the virus and the use of injecting drugs. Previous imprisonment was referred to by 7.9% of women and 26.6% of men, with a prevalence of 2.6% for HIV and 17.1% for hepatitis C virus.

CONCLUSIONS: The high prevalences of HIV and hepatitis B and C viruses require prevention programs based on vaccination against hepatitis B, early diagnosis of these infections and placement of homeless people into health services.

KEY WORDS: HIV infections, epidemiology. Hepatitis B, epidemiology. Hepatitis C, epidemiology. Syphilis, epidemiology. Homeless persons. Seroepidemiologic studies. Cross-sectional studies.

INTRODUCTION

The homeless population is one of the most vulnerable regarding HIV transmission as it includes high-risk groups constituted by former convicts, crack and cocaine users, sex workers, minority groups and people with mental disturbances.[13,14, 20]

Behavior related to both sexual practice and shared use of injecting drugs may cause the homeless population to be predisposed to hepatitis B infection.[3] The risk of this population to contract hepatitis C also increases when compared to the general population. Blood transfusions, tattoos, use of injecting drugs and sexual intercourse with multiple partners have been correlated with hepatitis C virus infection among homeless adolescents.[3,15]

[I] Coordenadoria de Vigilância em Saúde. Prefeitura do Município de São Paulo. São Paulo, SP, Brasil

[II] Centro de Testagem e Aconselhamento "Henrique de Souza Filho" – Henfil. Prefeitura do Município de São Paulo. São Paulo, SP, Brasil

[III] Programa de Doutorado em Ciências Sociais. Instituto de Filosofia e Ciências Humanas. Universidade Estadual de Campinas. Campinas, SP, Brasil

[IV] Departamento de Epidemiologia. Faculdade de Saúde Pública. Universidade de São Paulo. São Paulo, SP, Brasil

Correspondence:
Cássia Maria Buchalla
Departamento de Epidemiologia - Faculdade de Saúde Pública -USP
Av. Dr. Arnaldo 715
01246-904 São Paulo, SP, Brasil
E-mail: cmbuchal@usp.br

Received: 8/8/2006
Reviewed: 5/23/2007
Approved: 6/3/2007

In Brazil, there are few studies that deal with the health of this population and, in general, they refer to specific groups such as the adolescents,[9] minor offenders,[24] or female prisoners.[8] Lopes et al[8] found prevalences of 14.5% for HIV infection and 5.7% for syphilis in a female prison in the city of São Paulo. They concluded that poverty and low level of education were important risk factors for sexually transmitted diseases, including HIV/AIDS.

The definition of "homeless population" includes people who have no adequate, fixed residence in the night period. Using or living in shelters, institutions and private or public locations not designated or used as regular accommodation to sleep is also considered homeless condition.[20] There is no estimate concerning the size, distribution or makeup of this population. It is a heterogeneous population that migrates, rendering the exact count of people living in the streets difficult.[23]

In São Paulo, this population has increased in the last years. According to the *Secretaria da Assistência Social* (Social Assistance Department), 3,392 people were registered in 1991; 4,549 in 1994; 5,334 in 1996; 6,453 in 1998; 8,706 in 2000 and 10,394 in 2003. In 2000, 3,693 shelter users were registered by the census, against 6,186 in 2003, which represents a 70% increase.*

The populations in a condition of poverty show multiple, complex factors that promote the transmission of sexually transmitted infections.[13] Nonetheless, there are few epidemiological data related to these infections and hepatitis among the homeless.

The objective of the present study was to estimate the prevalence of infections by the HIV, hepatitis B virus (HBV), hepatitis C virus (HCV) and syphilis, and to identify factors associated with the transmission of these infections among the homeless.

METHODS

This is a cross-sectional study with a convenience sample of the homeless population that uses shelters at night, in downtown São Paulo.

A total of five shelters were selected. The criteria for selection were the following: close distance from the central area of the city, interest and consent of the shelter managers, partnership with the municipal government, and reference from the technicians of the *Secretaria de Assistência Social* (Social Assistance Department).

To select the studied population, shelter users were previously informed about the objectives of the study by means of posters that covered: the process of educational intervention, individual interview and blood collection for laboratorial tests.

The sensitization and educational intervention were conducted by means of a group workshop on issues such as safe sex, prevention of sexually transmitted infections/AIDS and harm reduction by drug abuse. The workshop participants were invited to take part in the study, according to the following inclusion criteria: to be aged 18 or older and not presenting psychiatric disturbances. Those who accepted to participate were interviewed individually and given explanations about the objectives of the study, methodology, risks, lack of implications in case of participation or refusal, guarantee of confidentiality of results and autonomy to drop out at any moment, without personal implications.

From November 11th 2002 to May 20th 2003, educational interventions and individual interviews with the admitted shelter users who agreed on participating in the study were conducted.

The interviews were based on a pre-codified, structured questionnaire with the following data: age, gender, self-referred color, marital status, length of time living on the streets, sexual practice and partners, use of condoms, drug abuse, sharing of personal devices, such as hygiene objects and razors, information on sexually transmitted diseases, and previous clinical picture indicative of such diseases.

Blood samples were collected after interviews by venipuncture through the Vacutainer system. Blood was collected into two dry tubes and sent to analysis in two reference laboratories in the city of São Paulo.

The anti-HIV antibody test was carried out by enzyme-linked immunosorbent assay – ELISA. As recommended by the Brazilian Ministry of Health, tests from two different brands were done to confirm the negative results. Discrepant results were repeated and the positive or undetermined ones were submitted to the Indirect Immunofluorescence Assay (IFA) or the Western Blot (Cambridge Biotech) confirmatory tests for the diagnosis of HIV-1 infection.

The diagnosis of syphilis was conducted by the Venereal Disease Research Laboratories test (VDRL), which means a stabled antigenic suspension to conduct the modified Unheated Serum Reagin test (USR) for syphilis detection. The *Treponema pallidum* Particle Agglutination test (Serodia TP.PA) was also used when the samples were reactive.

The serology for hepatitis B was carried out by means of the ELISA immunoenzymatic test, following the algorithm: determination of HB antigen and total anti-HBc antibody titles. If both were negative, the result would be considered negative. If the HBsAg was negative and the total anti-HBc was positive, the anti-HB antibody detection test was done, whose positive result pointed out previous hepatitis B infection immunity.

* Censo de moradores de rua da cidade de São Paulo. [Accessed on 8/17/2007] Available at: http://pvalls.ibmecsp.edu.br/seminariosIbmec/MoradoresdeRua.pdf

The method used for total anti-HBc was the immunoenzymatic ELISA- Hepanostika anti-HBc Uni-Form test from Biomérieux, based on the principle of single-phase competitive inhibition.

The serological tests for hepatitis C were conducted by the use of two techniques: the EIA-Hepanostika qualitative immunoenzymatic test and the Monolisa Anti-HCV Plus indirect immunoenzymatic technique.

The results of laboratorial tests were delivered in the shelters to the participants ten to 20 days after material collection, or were available at the *Centro de Testagem e Aconselhamento Henfil* (Henfil Testing and Counseling Center) for the absentees.

The post-test counseling consisted of: individual attendance, clarification of eventual questions, promotion of preventive behavior, reduction in harm, and necessary referrals.

The referrals followed the criteria below:

- Users having complaints about sexually transmitted diseases and/or positive result for HIV, hepatitis B, hepatitis C and/or syphilis were referred to municipal STD/AIDS units for treatment and outpatient follow-up;
- Susceptible users with negative serology for hepatitis B were sent to be vaccinated in municipal STD/AIDS units.

All the participants were admitted as users at the *Centro de Testagem e Aconselhamento Henfil* (Henfil Testing and Counseling Center) of the Municipal Health Secretariat, where they received orientation and free samples such as male and female condoms and harm reduction kits for injecting drug use.

For statistical analysis of data the EpiInfo program was used, the univaried analysis to find out the associations between high-risk situations and the prevalences of the infections studied. When appropriated, Fisher's exact test was used.

The research protocol was approved by the research ethics committee of the Municipal Health Secretariat of the city of São Paulo). All the participants in this study signed a free informed consent form.

RESULTS

A total of 330 homeless people who use shelters in the central area of the city were interviewed, corresponding to 29.7% of all the vacancies offered at the five participating shelters.

Table 1 shows the sociodemographic characterization of the interviewees. The population studied was composed by 267 men (80.9%). The average age of participants was 40.2 years (minimum 18 and maximum 72). The average age among the interviewed women (36.7 years) was lower than men's.

Fifty percent of the sample participants were white and 63% single. Regarding level of education, around 70% mentioned having a maximum of four years of formal education and illiteracy was referred to by 3.6% (7.9% among women and 2.6% among men). The majority of participants (66.6%) were originally from other states, 28.8% from the Northeast region, 22.7% from the Southeast region and 10% from the South region. The average length of time spent on the streets was one year and 7.9% of the women and 26.6% of the men had been to prison.

The sexual behavior of the population studied and the existence of steady relationship, understood as one which is stable and has lasted more than three months, were analyzed, considering the time before the homeless condition and the moment of interview. Table 2 shows the data on the sexual life of the interviewees. In the homeless condition, 46% of the women and 19.5% of the men reported having a steady relationship. Sexual intercourse for money was referred to by 56 people (17%), 15 of which were women and 41 men. Furthermore, 43 of them (76.7%) were younger than 40 years. Sexual intercourse to get drugs was referred to by ten participants, four of which were women and six men, whereas the exchange of sex for food was referred to by 13 shelter users (3.9%), five of which were women (7.9%) and eight men (2.9%).

The number of occasional sexual partners after beginning to live on the streets varied from zero to 200 among men (mean=9.5 and median=2); and from zero to 20 among women (mean=1.95 and median=1). Around 26% remained sexually abstinent since they began to live on the streets.

The use of condoms in all sexual relations was reported by 21.2% of participants, 8.1% of which were women and 24.3% men. The reasons that were pointed out more frequently to justify the use were relations with strangers and avoidance of diseases and children. Nonetheless, around 32.5% never use condoms, 41.9% of which are women and 30.3% men. Forty-six percent of participants referred to an inconsistent use of condoms.

Regarding the abuse of substances, 70% of the interviewees referred to previous or current use of alcohol (higher among men) and 60.3% of tobacco. Use of marijuana by 27% of them, inhaled cocaine by 17.5% and crack by 12.4% were also mentioned, the use of injecting drugs being referred to by 10 men.

Knowledge of symptoms and/or STD names was referred to by 87% of interviewees, 91.4% of which were men and 71.4% women. Previous STD was mentioned

Table 1. Distribution of sociodemographic characteristics according to gender, among shelter users in the central area of the city of São Paulo, 2003.

Sociodemographic characteristics	Woman		Man		Total (N = 330)	
	N	%	N	%	N	%
Age group						
18-19	3	4.8	6	2.2	9	2.7
20-29	17	27	45	16.9	62	18.8
30-39	20	31.7	74	27.7	94	28.5
40-49	13	20.6	87	32.6	100	30.3
50-59	7	11.1	36	13.5	43	13
60 and over	3	4.8	19	7.1	22	6.7
Marital status						
Single	35	55.6	173	64.8	208	63
Married/de facto relationship	9	14.3	27	10.1	36	10.9
Separated/Divorced	15	23.8	61	22.8	76	23
Widow/widower	4	6.3	6	2.2	10	3
Skin color						
White	26	41.3	142	53.2	168	50.9
Brown	26	41.3	84	31.5	110	33.3
Black	11	19.1	41	15.4	52	15.8
Schooling						
Illiterate	5	7.9	7	2.6	12	3.6
Knows how to read and write	6	9.5	18	6.7	24	7.3
1st to 4th grade	24	38.1	85	31.8	109	33
5th to 8th grade	20	31.7	105	39.3	125	37.9
High-school (not completed)	3	4.8	18	6.7	21	6.4
High-school (completed)	4	6.3	27	10.1	31	9.4
University (incomplete)	1	1.6	3	1.1	4	1.2
University (completed)	0	0	4	1.5	4	1.2
Length of time on the streets						
Up to 1 month	12	19.1	41	15.4	53	16.1
1 to 3 months	16	25.3	32	11.9	48	14.5
3 to 6 months	9	14.3	32	11.9	41	12.4
6 months to 1 year	9	14.3	49	18.3	58	17.6
1 to 2 years	6	9.5	35	13.1	41	12.4
2 to 5 years	7	11.1	39	14.6	46	13.9
> 5 years	4	6.3	39	14.6	43	13
Origin						
North region of Brazil					6	1.8
Northeast region					95	28.8
Center-east region					8	2.4
South region					33	10
Southeast region (from states of MG, RJ, and ES)					75	22.7
São Paulo - Capital					65	19.6
São Paulo - Countryside					45	16.8
Other countries					3	0.9

Table 2. Distribution of sexual behavior* according to gender, at the time of interview (current) and in the period prior to homeless condition, among shelter users. City of São Paulo, 2003.

Sexual behavior	Man				Woman			
	Previous period		Current period		Previous period		Current period	
	N	%	N	%	N	%	N	%
Heterosexual behavior*	220	84.0	182	68.2	56	93.0	46	73.0
Homosexual behavior*	4	1.5	1	0.4	3	4.8	1	1.6
Bisexual behavior*	27	10.3	20	7.5	0	0.0	0	0.0
Sexual abstinence	1	0.4	64	24.0	3	4.8	16	25.4
Steady relationship	192	71.9	52	19.5	46	73.0	29	46.0

* exclusive sexual behavior

Table 3. Distribution of prevalences of HIV infection and anti-HCV, HbsAG, total anti-HBc, VDRL/TPPA markers among shelter users. City of São Paulo, 2003.

Marker	Man		Woman		Total	
	N	%	N	%	N	%
Anti-HIV	4	1.5	2	3.2	6	1.8
Anti-HCV	26	9.7	2	3.2	28	8.5
HBsAG	10	3.7	1	1.6	11	3.3
Total anti-HBc	82	30.7	19	30.2	101	30.6
VDRL/TPPA	14	5.2	5	7.9	19	5.7

VDRL: Veneral Disease Research Laboratories test
TPPA: *Treponema pallidum* serodia test

by 51% of interviewees, 53.6% of which were men and 41.3% women. A total of 95.9% of all the 169 participants, who referred to previous STD, underwent treatment, 73.5% of these with a doctor and 19.8% at drugstores. The most frequent diseases were gonorrhea (52.1%), warts (8.9%), syphilis and discharge (both referred to by 8.3% of the population). Among shelter users with previous STD, the positivity rate for anti-HIV was 3.0%, whereas among the others it was 0.6%, not a significant difference (p=0.11).

The tests done showed a prevalence of 1.8% for HIV infections. The age group distribution showed 9.1% among those who are older than 60 years, followed by the 30-39 year group with 3.2%, and the 50-59 year group with 2.3%.

The VDRL test was positive in 5.7% of cases, one single case had a 1/256 title and five others, 1/4. The others presented a probable serological scar.

Regarding hepatitis C, the prevalence was 8.5%, totaling 14% in the 50-59 year group, and followed by the 40-49 year and the 30-39 year groups, with 10% and 9.6% respectively.

Regarding HBV infection, the general prevalence was 3.3%, totaling 5.3% in the 30-39 year group. The prevalence of previous HBV infection was 30.6%, with a prevalence of 45.5% in the above 60 year group, followed by the 50-59 year group, with 41.9%. The lowest rate observed (11%) was among the participants in the 18-19 year group. (Table 3)

The consistent use of condoms was referred to by 21.2% of users and, in this group, the prevalence of HIV infections was zero; HBsAg was 1.4%; total anti-HBc, 21,4%; and syphilis, 1,4%.

In the female group that affirmed exchanging sex for money, the HIV prevalence was 13.3%, whereas in the other groups this rate was zero. Among those that informed having a bisexual or injecting drug user as a partner, the HIV prevalence was 40% and 25% respectively.

The frequency of previous hepatitis B virus infection in male shelter users was 30.9% among those who referred to heterosexual relations, 37% among those who referred to bisexual behavior, and 50% among homosexuals.

The HIV/HCV coinfection was observed in two cases, representing 0.6% of the studied sample. The HIV/hepatitis B and HIV/syphilis coinfections were not observed in the sample. The HCV/HBV coinfection, as well as the HCV/syphilis coinfection, took place in one case each, whereas the syphilis/hepatitis B coinfection occurred in two cases.

Table 4. Distribution of frequencies of sexual relationships, habits and background information according to prevalence of Anti-HIV, Anti-HCV, HBsAg and VDRL among shelter users. City of São Paulo, 2003.

Variable	Anti–HIV		Anti HCV		HBsAG		VDRL		Total
Sexual relationship*									
Partner has multiple partners	6	2.1	27	9.4	10	3.5	18	6.3	286
Partner uses injecting drugs	3	3.4	11	12.6	2	2.2	5	5.7	87
Bisexual male partner	3	5.5	5	9.3	3	5.5	6	11.1	54
Partner is a prisoner	2	1.9	13	12.8	3	2.9	10	9.9	101
Partner is a sex worker	3	1.4	23	10.5	7	3.1	14	6.3	219
Partner is HIV positive	1	6.6	3	20	0	0	1	6.6	15
Habits/background information									
Transfusion of blood/other blood products	1	3	1	3	2	6	3	9	33
Tattoos	0	0	8	13.3	4	6.6	6	10	60
Sharing of personal hygiene objects**	1	1.1	12	13.5	3	3.3	8	8.9	89
Previous imprisonment	2	2.6	13	17.1	3	3.9	8	10.5	76

* possibility of more than one answer
** question applied to 210 shelter users

The use of injecting drugs was referred to by 3% of the population and, in this group, HIV and HCV positivities were 10% and 50% respectively, whereas among the others it was 1.5% for HIV and 7.3% for HCV.

Tattoos were referred to by 60 users (18%), none of them with positive serology for HIV, 13.3% with positive HCV and 6.7% with positive HBsAg.

Among the 210 interviewees that answered the question about sharing personal hygiene objects such as toothbrushes and razors, 89 answered affirmatively. In this group, the HCV prevalence was 13.5%.

Previous imprisonment was referred to by 23% (76) of users, among which the HIV prevalence was 2.7%, 17.1% for HCV and 4.1% for HBsAg.

The HCV positivity was 9.7% among men. In this group, an association among injecting drug sharing (OR=3.73; CI 95%: 1.35; 10.18); injecting drug use (OR= 11.14; CI 95%: 2.53; 49.43) and previous imprisonment (OR=2.62; CI 95%: 1.06; 6.42) was observed. Among women, the HCV positivity rate was 3.2%, totaling 5.3% among women having former convicts as partners (p = 0.53) and 20% among women who have been to prison (p = 0.15); however, a significant statistical association was not observed.

Among men, an association between previous hepatitis B and sexual relationship with a former convict (male of female) was observed (OR=2.16; CI 95%: 1.11; 4.17), as well as with HIV carriers (OR=4.83; CI 95%: 1.25; 20.06). The positivity rates were 43.9% and 66.7% respectively.

DISCUSSION

The present study estimated the prevalence of four infections and the risk factors associated with them among shelter users from the central area of the city of São Paulo.

The cross-sectional outline is included among the limitations of this study, as it does not enable to identify the causality of infections. On the other hand, a sample constituted by volunteers prevents the results from being generalized to the rest of the homeless population. Regarding data analysis, the small number of infection cases studied constitutes a limitation as well.

Brazilian studies on this issue usually refer to the younger population[9] or to institutionalized groups.[24]

In American studies, the homeless population is considered high-risk concerning parenteral infections due to a large number of injecting drug users. The estimated HIV prevalence in the United States is 0.3% in the general population[10] and 3.3% in the homeless population.[1] However, this rate varies between zero and 62%, depending on the target population, geographic area and recruitment location. [13] The homeless condition is also an important risk factor for HIV infection. Among injecting drug users living on the streets, the prevalence of this infection was 33.7%, compared to 20.5% among injecting drug users who do not live on the streets of Chicago.[22]

In spite of the common means of parenteral transmission of hepatitis C and HIV, it was observed in the present study that the rate of HIV infection was lower than 2%, whereas for HCV it was 8.5%. This difference was also observed in a study conducted in New Mexico, among injecting heroin users recruited on the streets, whose positivity rates for HIV, HCV and HBV were 0.5%, 82.2% e 61.1%, respectively.[17] The lowest prevalence of HIV infection obtained in the present study could be due to refusal by part of the users who

were aware of their carrier condition to participate in the study. During the educational activities that preceded the interview and material collection for testing, two shelter users disclosed being HIV seropositive, affirmed being under medical supervision and chose not to participate in the study. Although lower than what was observed in other studies, the prevalence of HIV infection of 1.8% represents almost three times the estimate of HIV prevalence in the Brazilian population, 0.6%.[21] In a study conducted in San Francisco, the HIV seroprevalence registered in the homeless population was five times higher than the one in the general population.[14]

All the women who were HIV positive and in a homeless condition related exchanging sex for money. An American study showed prevalence of 22.4% for HIV, 53.4% for HBV and 29.7% HCV among female sex workers. The factors related to these rates were unsafe sexual practice, homeless condition and drug abuse, among other things.[7]

Concerning syphilis, the data found in the present study are comparable to those indicated in the city of Rio de Janeiro, with a prevalence of 5.3% among pregnant women.* Nonetheless, it must be taken into consideration the fact that, in the present study, the treponemic test was carried out only in the VDRL positive cases, underestimating the number of cases referring to serological scars.

Information from the Ministry of Health points out highly varied syphilis rates, 0.5% among army draftees, in 1997, 16.3% among the population of men who have sexual intercourse with other men, and from 7% to 43% among prisoners.**

An inquiry made in the city of São Paulo showed active infection seroprevalence by hepatitis B virus of 1% and anti-HCV prevalence from 1% to 4%.[5]

In studies on homeless population, the observed HCV seroprevalence was: 12.6% among homeless adolescents in Montreal, 22% among adults in Los Angeles, and 26.5% among adults in Oxford.[11,15,18]

In Brazil, Martins et al[9] observed a 3% rate for HCV among homeless adolescents in the central region of Brazil, and Zanetta et al[24] observed a prevalence of 5.9% among boys and 4.6% among girls in institutions for minors living on the streets or for minor offenders in São Paulo, Brazil.

The association among HCV infection, injecting drug use and sharing of personal hygiene objects corroborates studies that point to injecting drug use as being the highest risk factor for HCV infection.[2,3,19] Even though only 3% of the studied population referred to the use of injecting drugs in the present study, the HIV and HCV positivities among users were high. In the homeless population who did not use injecting drugs, these figures were 1.5% for HIV and 7.3% for HCV, thus confirming the association between HCV and injecting drug use.

An apparent association between previous imprisonment and hepatitis C was found while verifying that 46.4% of the 28 shelter users infected with HCV referred to previous imprisonment. High infection rates among former convicts were observed: 2.6% for HIV, 17.1% for HCV, 38.2% for HBV in previous infection, 3.9% for HBV and 10.5% for syphilis. However, these rates are lower than those observed in Italy, in a study conducted with prison population, where a positivity of 38% for HCV, 52.7% for anti-HBc, 6.7% for HBsAg and 7.5% for anti-HIV were observed.[2]

The prevalence of HBsAg among adolescents living on the streets of Montreal[16] varied between 1% and 6%, and among shelter users it was 12%; whereas previous hepatitis B was 21% among those who regularly go to community restaurants, and 43% among shelter users in New York city.[22] In spite of the free immunization against hepatitis B, the vaccine coverage rate is low, as observed in a study conducted in Montreal,[16] where 12% of the 437 homeless adolescents completed the three doses of the vaccine program.

The HIV/hepatitis B and C coinfection rate was comparable to that from another Brazilian study among HIV seropositives, where the HCV prevalence was 53.8%; total anti-HBc, 44%; and HBsAg, 5.3%.[12]

Hepatitis C prevalence among tattooed people was almost double that found among non-tattooed ones. Although not significant, this association confirms findings from other studies.[2,6,19]

Alcoholism was reported as a risk factor for the development of HCV infection in an American study with patients hospitalized for non-hepatic causes.[4] In the present study, around 70% of shelter users referred to current or previous use of alcohol and an association between hepatitis C and alcoholism was observed. The high HCV prevalence in the studied group, if applicable to the entire homeless population in the city of São Paulo, reveals a public health problem. This infection requires from six to 12 months of treatment and regu-

* Boletim Epidemiológico Aids - Ministério da Saúde. Programa Nacional de DST/Aids. Brasília. (DF) 2000; ano XIII(1) dezembro 1999 a junho 2000.

** Ministério da Saúde. Prevalências de DST em populações específicas. Projetos Desenvolvidos pela Coordenação Nacional de DST/Aids em parceria com estados, municípios e outras instituições. Brasília; 2006 [Accessed on 8/17/2007]. Available at: http://www.aids.gov.br/data/Pages/LUMISBCD47A0DPTBRIE.htm

lar follow-up during this period, which is problematic for the homeless. The treatment of chronic hepatitis C requires cooling medication and the use of syringes and needles, which makes it difficult to treat these individuals. These patients must have medical follow-up for assessment of complications and possible side effects such as depression and anemia.

HCV positivity among homeless men was associated with prior history of injecting drug use and sharing of syringes and needles, sexual relationships with injecting drug users, and former convict condition. The data presented reveal the need to establish detection programs for HIV and viral hepatitis infections among shelter users, as well as enabling these people to have easier access to healthcare services. Vaccination against hepatitis B must be implemented as a way to reduce infection in this vulnerable group.

Among women, sexual relationships with bisexual men or injecting drug users were a predictive factor for HIV infection. This group is also more vulnerable to sexually transmitted diseases, a fact evidenced by the higher level of unawareness of these diseases and unsafe sexual practices. Specific HIV preventive actions for homeless women and prevention of cervical cancer must be focused on by means of orientation and gynecological consultations, aiming at early detection and treatment of these infections.

Finally, it is essential that educational interventions be established, aiming at the reduction of high risk behavior to prevent HIV, sexually transmitted diseases and hepatitis, by means of harm-reducing programs, exchange of syringes and equipment for injecting drug use, and supply of free samples such as male and female condoms and harm-reducing kits.

REFERENCES

1. Allen DM, Lehman JS, Green TA, Lindegren ML, Onorato IM, Forrester W. HIV infection among homeless adults and runaway youth, United States, 1989-1992. Field Services Branch. *AIDS*. 1994;8(11):1593-8.

2. Babudieri S, Longo B, Sarmati L, Starnini G, Dori L, Suligoi B, et al. Correlates of HIV, HBV, and HCV infections in a prison inmate population: results from a multicentre study in Italy. *J Med Virol*. 2005;76(3):311-7.

3. Beech BM, Myers L, Beech DJ, Kernick NS. Human immunodeficiency syndrome and hepatitis B and C infections among homeless adolescents. *Semin Pediatr Infect Dis*. 2003;14(1):12-9.

4. Cheung, RC; Hanson,AK, Maganti, K, Keefe EB, Matsui, SM. Viral Hepatitis and other Infectious Diseases in a Homeless Population. *J Clin Gastroenterol*. 2002;34(4):476-480.

5. Focaccia R, da Conceição OJ, Sette H Jr, Sabino E, Bassit L, Nitrini DR, et al. Estimated prevalence of viral hepatitis in general population of the municipality of São Paulo, measured by a serologic survey of a stratified, randomized and residence-based population. *Braz J Infect Dis*. 1998 Dec;2(6)269-284.

6. Haley RW, Fischer RP. Commercial tattooing as a potentially important source of hepatitis C infection. Clinical epidemiology of 626 consecutive patients unaware of their hepatitis C serologic status. *Medicine (Baltimore)*. 2001;80(2):134-51.

7. Inciardi JA, Surratt HL, Kurtz SP. HIV, HBV, and HCV infections among drug-involved, inner-city, Street Sex Workers in Miami, Florida. *AIDS Behav*. 2006;10(2):139-47.

8. Lopes F, Latorre MRDO, Pignatari ACC, Buchalla CM. Prevalência de HIV, papilomavírus humano e sífilis na Penitenciária Feminina da Capital, São Paulo, 1997-1998. *Cad Saude Publica*. 2001;17(6):1473-80.

9. Martins RM, Porto SO, Vanderborght BOM, Rouzere CD, Queiroz DAO, Cardoso DDP, et al. Short report: Prevalence of hepatitis C viral antibody among Brazilian children, adolescents, and street youths. *Am J Trop Med Hyg*. 1995;53(6):654-5.

10. McQuillan GM, Khare M, Karon JM, Schable CA, Vlahov D. Update on the seroepidemiology of human immunodeficiency virus in the United States, household population: NHANES III, 1988-1994. *J Acquir Immune Defic Syndr Hum Retrovirol*. 1997;14(4):355-60.

11. Nyamathi AM, Dixon EL, Robbins W, Smith C, Wiley D, Leake B, et al. Risk factors for hepatitis C virus Infection Among Homeless adults. *J Gen Intern Med*. 2002;17(2):134-43.

12. Pavan MHP, Aoki FH, Monteiro DT, Gonçalves NSL, Escanhoela CAF, Gonçalves Jr FL. Viral hepatitis in patients infected with human Immunodeficiency virus. *Braz J Infect Dis*. 2003;7(4):253-61.

13. Raoult D, Foucault C, Brouqui P. Infections in the homeless. *Lancet Infect Dis*. 2001;1(2):77-84.

14. Robertson MJ, Clark RA, Charlebois ED, Tulsky J, Long HL, Bangsberg DR, et al. HIV seroprevalence among homeless and marginally housed adults in San Francisco. *Am J Public Health*. 2004;94(7):1207-17.

15. Roy E, Haley N, Leclerc P, Boivin JF, Cédras L, Vincelette J. Risk factors for hepatitis C virus infection among street youths. *CMAJ*. 2001;165(5):557-60.

16. Roy E, Haley N, Lemire N, Boivin JF, Leclerc P, Vincelette J. Hepatitis B virus infection among street youths in Montreal. C*MAJ*. 1999;161(6):689-93.

17. Samuel MC, Doherty PM, Bulterys M, Jenison SA. Association between heroin use, needle sharing and tattoos received in prison with hepatitis B and C positivity among street-recruited injecting drug users in New Mexico, USA. *Epidemiol Infect*. 2001;127(3):475-84.

18. Sherriff LC, Mayon-White RT. - A survey of hepatitis C prevalence amongst the homeless community of Oxford. *J Public Health Med*. 24(4):358-61, 2003.

19. Stein JA, Nyamathi A. Correlates of Hepatitis C virus infection in homeless men: a latent variable approach. *Drug Alcohol Depend*. 2004;75(1):89-95.

20. Stratigos AJ, Katsambas AD. Medical and cutaneous disorders associated with homelessness. *Skinmed*. 2003;2(3):168-74.

21. Szwarcwald CL, Carvalho MF. Estimativa do Número de Indivíduos de 15 a 49 anos infectados pelo HIV, Brasil, 2000. *Bol Epidemiol Aids* [periódico na internet]. 2001 [Acesso em: 4/4/2006];14(1). Disponível em: http://www.aids.gov.br/final/biblioteca/bol_htm/artigo1.htm

22. Torres RA, Mani S, Altholz J, Brickner PW. Human Immunodeficiency virus infection among homeless men in a New York City shelter. Association with *Mycobacterium tuberculosis* infection. *Arch Intern Med*. 1990;150(10):2030-6.

23. Vieira MAC, Bezerra EMR, Rosa CMM. População de rua: quem é, como vive, como é vista. 3. ed. São Paulo: Hucitec; 2004.

24. Zanetta DMT, Strazza L, Azevedo RS, Carvalho HB, Massad E, Menezes RX, et al. HIV infection and related risk behaviours in a disadvantaged youth institution of Sao Paulo, Brazil. *Int J STD AIDS*. 1999;10(2):98-104.