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## Brief Report

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# Prevalence of HBV, HCV, HIV, and Syphilis among Homeless Subjects Older than Fifteen Years in Tehran

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Homeless people are usually prone to be infected with multiple infectious diseases such as human immunodeficiency virus, hepatitis B virus, and hepatitis C virus, as well as syphilis. In this cross-sectional study, using a questionnaire and enzyme-linked immunosorbant assay, we evaluated the seroprevalence of hepatitis B and C viruses, human immunodeficiency virus, and syphilis, as well as their risk factors in 202 homeless men. A total of 70 (34.7%), 87 (42.8%), and 13 (6.4%) subjects were infected with hepatitis B, hepatitis C and human immunodeficiency viruses, respectively. Ten (0.5%) had a simultaneous infection with hepatitis B and C viruses and human immunodeficiency virus.

Only one participant was seropositive for rapid plasma reagin. History of smoking and opium addiction was present in 144 (71.6%) and 109 (54.2%) subjects, respectively. Although all human immunodeficiency virus-positive subjects were hepatitis C virus positive, 10 (76.9%) had a history of intravenous drug abuse. Risk factors including intravenous drug abuse ( $P<0.005$ ) and imprisonment ( $P<0.05$ ) were significantly associated with all the three infections.

We found no significant association between high-risk sexual behavior and these infections. Although syphilis seems not to be an important risk factor among homeless adults, all hepatitis B, hepatitis C, and human immunodeficiency virus infections have quite noticeable frequencies among Iranian subjects. History of intravenous drug abuse should be taken into account in screening of homeless people.

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## Introduction

Homeless people are at increased risk for acquisition of hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) infections as well as syphilis.<sup>1</sup> Drug consumption, sexual promiscuity, extreme poverty, and low educational level place homeless people at high risk of sexually-transmissible diseases (STDs).<sup>2-4</sup>

STDs have been surveyed among homeless

Muslims in India.<sup>3</sup> In that report, researchers focused on the effect of circumcision on the prevention of STDs between homeless Muslim (circumcised) and Hindu (uncircumcised) men.<sup>3</sup> Because of several differences between south-eastern Asia and countries existing in southwestern region regarding social and cultural views as well as the incidences of STDs, we conducted this study to determine the frequency of infection with HBV, HCV, HIV, and syphilis among homeless subjects living in Iran. In a previous report, the authors determined the prevalence of HBV, HCV, and HIV infections, as well as syphilis among street children residing in southern Tehran.<sup>4</sup>

## Materials and Methods

This cross-sectional study was conducted in Tehran. Our subjects were 202 homeless men who had been found daily by investigators of

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Islamshahr Welfare Care Institution, in downtown Tehran from April 21, 2007 through July 21, 2007. To select studied population and take census, the municipal authorities who were the main managers of the institution were informed about the project to reach an agreement on mutual participation. Using a one-page questionnaire, each subject was initially interviewed and then evaluated by a general practitioner. At the next step, a blood sample of at least 5 mL was collected from each case and sent to a reference laboratory at the day of sampling. The blood samples were checked for total bilirubin, direct bilirubin, aspartate aminotransferase (AST), alanine aminotransferase (ALT), rapid plasma reagin (RPR), HBs Ag, HBs Ab, HBc Ab, HCV Ab, and HIV Ab. For serologic studies, we used an enzyme-linked immunosorbent assay (ELISA) (DIAKEY serologic kits, South Korea) which does not react competitively. For anti-HCV, recombinant antigens including N S3, N S4, N S5, and antihuman IgG with horseradish peroxidase (HRPO) were used as the solid phase and conjugated factor in this method. Regarding HIV infection, the anti-HIV 1/2 antibody tests were carried out. The antigens of gp36, gp41, and gp24 were utilized in this method. For serologic assay of hepatitis B, HBs Ag, anti-HBc, and anti-HBs antibodies were evaluated. The method of ELISA test could detect two separate epitopes of HBs Ag by means of two highly specific monoclonal antibodies, as the solid phase and conjugated factor. HBc Ab and HBs Ab were tested by anti-HBc Ab ELISA test and anti-HBs Ab ELISA test, respectively.

Using Mann-Whitney U and Student's *t*-test for quantitative variables as well as Chi-square and Fisher's exact tests for categorical variables, we analyzed the data. *P* value  $\leq 0.05$  was considered statistically significant.

## Results

A total of 202 homeless men were investigated. Although 52 participants were rough sleepers, the remaining 150 (74.3%) subjects had a temporary shelter or slept in human congregate shelters at night and lived on the streets during the day. The mean $\pm$ SD age of the participants was 45 $\pm$ 17.7 years. The mean length of homelessness was 501.8 (range: 10 – 3700) days.

Table 1 shows the demographic, clinical, and laboratory data in detail. History of smoking was present in 144 (71.3%) subjects. Half of these

subjects had a history of smoking more than 13 pack/year and almost 15% had a history of more than 30 pack/year. Tattooing was observed in 69 (34.5%) subjects. Of these, 12 (17.4%) experienced tattooing in prison. A total of 109 (54.2%) subjects had a history of substance abuse. Of these, evidence for injection of the drug was found in 34 (31.3%) persons. The most frequent drug was opium (63 out of 109, 57.8%).

The mean $\pm$ SD age at the first experience of drug abuse was 30 $\pm$ 12 years. Fifty-eight out of 202 (29%) persons were in prison for a while. Eleven individuals had a history of needle sharing, although almost all of them had information on the risks. Only one had a positive history of tuberculosis. No one had palmar erythema, encephalopathy, and caput medusae. Laboratory studies revealed that RPR reaction for syphilis was positive in only one participant. Seventy (34.3%) subjects were positive for HCV Ab. HIV Ab was positive in 6.4% of the participants. HBs Ag, HBc Ab, and HBs Ab were found positive in eight (3.55%), 86 (42.6%), and 41 (20.3%) men, respectively. Seven of the eight HBs Ag-positive patients were HBs Ab positive too.

The mean $\pm$ SD total and direct bilirubin in the studied subjects was 1.04 $\pm$ 0.7 (range: 0.3–8.2) and 0.27 $\pm$ 0.38 (range: 0.1–5.3) mg/dL, respectively. The mean $\pm$ SD AST and ALT in the studied subjects was 32.2 $\pm$ 32.7 (range: 4–276) and 31.7 $\pm$ 36.3 (range: 5–272) IU/L, respectively.

### HCV Ab-related results

The HCV Ab-positive men had a significantly (*P*<0.005) lower mean $\pm$ SD age (42.7 $\pm$ 13.8 years) than HCV Ab-negative persons (46.3 $\pm$ 19 years). No correlation existed between HCV Ab positivity and age of the participants. The prevalence of HCV did not change significantly with the type of temporary shelters used by the participants. The positive history of jaundice, dark urine, smoking, and tattooing had a statistically significant correlation with the HCV Ab prevalence (*P*<0.005). The prevalence of icterus among HCV Ab-positive subjects was 21.7%.

Of 11 subjects with tattoos during imprisonment, 10 (91%) were positive for HCV Ab (*P*<0.005). On the other hand, 29 (42%) of 69 individuals with out-prison tattooing were positive for HCV Ab. Forty-three HCV Ab-positive subjects were opium users while 18 (26%) had a history of injectable drug abuse (IDU).

There were significant differences between HCV

**Table 1.** Risk factors, clinical features, and laboratory findings in detail.

Variable/Serologic findings	No. (%) of individuals	HBV		HCV Ab <sup>+</sup>	HIV <sup>+</sup>
		HBs Ag <sup>+</sup>	HBc Ab <sup>+</sup>		
<b>Risk factors</b>					
Blood transfusion	42 (20.8%)	—	—	14	2
Smoking (*) (***)	144 (71.3%)	8	68	66	129
Tattooing (***)	69 (34.2%)	3	35	39	11
Family history of hepatitis (***)	3 (1.55%)	0	2	1	1
Drug abuse (*) (***)	109 (54%)	8	54	59	11
Imprisonment (*) (***)	58 (28.7%)	5	34	39	6
Sharing needles (***)	11 (5.4%)	1	7	9	4
Urethral discharge (*) (**) (***)	5 (2.5%)	1	3	5	3
STD (*) (**) (***)	4 (2%)	1	3	4	3
Close contact with icteric cases (*)	14 (6.9%)	1	9	7	1
<b>Signs and symptoms</b>					
Dark urination	18 (8.9%)	2	11	14	3
Icterus	18 (8.9%)	0	11	14	3
Cervical lymphadenopathy	52 (25%)	5	35	10	2
Auxiliary lymphadenopathy	32 (11%)	—	—	2	0
Inguinal lymphadenopathy (***)	42 (21%)	—	—	12	4
Thyromegaly	2 (1%)	0	1	1	0
Icterus (***)	15 (7.4%)	1	10	15	3
Hepatomegaly	8 (4%)	0	6	8	1
Splenomegaly (**)	3 (1.5%)	0	1	3	2
Ascites	1 (0.5%)	0	1	1	1
Abdominal tenderness (***)	45 (22.3%)	2	24	26	6
RUQ tenderness (*)	13 (6.4%)	2	9	12	2
Petechia	1 (0.5%)	0	0	0	0
Lower extremities edema	14 (6.9%)	1	6	—	—
Palmar erythema	—	0	0	—	—
Encephalitis	—	0	0	—	—
Caput medusa?	—	0	0	—	—
Residential status	—	4	23	—	—
<b>Laboratory findings</b>					
Total bilirubin	—	1.7 (0.3–3.2)	0.99 (0.3–8.2)	1.02 (0.3–8.2)	1.4 (0.3–8.2)
Direct bilirubin	—	0.85 (0.12–5.3)	0.29 (0.1–5.3)	0.32 (0.1–5.3)	0.62 (0.1–5.3)
AST (*) (**)	—	79.5 (15–159)	36.3 (5–191)	45.9 (4–276)	57.1 (11–59)
ALT(*) (**)	—	95.1 (24–220)	34.4 (5–220)	46.6 (9–272)	54.3 (12–220)

\*A significant difference ( $P<0.05$ ) between subjects with or without history of / existing HBV infection; \*\*A significant difference ( $P<0.05$ ) between subjects with or without history of/existing HCV infection; \*\*\*A significant difference ( $P<0.05$ ) between subjects with or without history of/existing HIV infection.

Ab-positive and -negative cases concerning drug abuse, type of illicit drugs, and method of drug abuse, particularly in IDUs. Duration of addiction did not affect the prevalence of HCV Ab ( $P=0.6$ ). Approximately, 57% of those with a history of imprisonment had a significant serum level of HCV Ab, while 13.8% of the participants with no history of imprisonment were HCV Ab positive ( $P<0.006$ ). Approximately, 56.5% of those with a significant serum level of HCV Ab had a history of imprisonment, while 18 (13.8%) of cases with negative HCV Ab tests had such a history ( $P=0.05$ ).

#### HIV Ab positive-related findings

A total of 13 persons were HIV Ab seropositive. The mean±SD age of HIV Ab-positive and -negative cases was 35.5±10 and 45±18 years, respectively ( $P<0.05$ ). In spite of tattooing ( $P<0.005$ ), none of the “history of smoking” and “residential status” were predictors of serologic status of HIV Ab. Twelve (92%) cases had a positive history for drug abuse. There was a significant association between HIV and IDU ( $P<0.005$ ). There were significant associations between HIV Ab status and the presence of STD and urethral discharge ( $P<0.05$ ).

### HBV-related findings

We defined an HBV-positive case as a non-vaccinated person who had at least one detectable HBV-related marker in his blood sample. Accordingly, 87 out of 202 homeless men were HBV positive of whom eight and 86 persons were seropositive for HBs Ag and HBc Ab, respectively.

Age-specific distribution of HBV showed significant differences between subjects aged 15 – 24 years and those older than 24 years (16.7% vs. 47%;  $P < 0.022$ ). The mean  $\pm$  SD age of HBV-positive patients was  $48.5 \pm 16$  years. Drug abuse was found very frequently in HBV-positive patients, particularly in HBs Ag-positive subgroup ( $P < 0.008$ ). Concerning the effect of imprisonment on the prevalence of HBV, there was a significant difference between HBV-positive and -negative participants ( $P < 0.05$ ).

### Results considering co-infections

Sixty percent of the participants had co-infection with HCV and HBV. Dual infection with HBV and HIV was present in 76.9% of HIV-positive subjects. All HIV-positive cases were also positive for HCV Ab. A total of 10 out of 202 participants (5%) had triple infection with HIV, HBV, and HCV. A history of IDU had a strong association with HCV and HIV infections ( $P < 0.003$ ). We observed a statistically significant correlation between HBV infection and IDU ( $P < 0.02$ ).

## Discussion

Homeless people suffer from a wide range of health and social problems and have a high rate of mortality and morbidity. Numerous infectious and noninfectious diseases are detected among this group of people. Due to this fact, we examined the prevalence of HIV, HBV, and HCV infections, as well as syphilis and the risk factors among homeless men using clinical evaluations and laboratory tests in a cross-sectional study. The results of our study showed a noticeable prevalence for HCV Ab, HIV Ab, HBs Ag, and HBc Ab. In comparison with previous surveys,<sup>5-7</sup> we found a higher prevalence for HBV infection. This discrepancy could be explained by Iran's location as an intermediate region for hepatitis B. Concerning HIV and HCV infections, the difference in the prevalence was attributed to the distribution of various risk factors in different countries and also with performing disease-

controlling plans in special societies.<sup>7-10</sup> In our study, there were similarities between HCV and HIV infections regarding their risk factors. Smoking, tattooing (particularly in prison), drug abuse, IDU, heroin abuse, imprisonment, presence of urethral discharge, and STD were identified as common risk factors. A history of icterus and dark urine was more likelihood of HCV infection in homeless people. Furthermore, among IDUs, HIV infection was more frequent in young participants while HCV was more common in older than 25-year-old persons. Concerning HBV infection, drug abuse regardless of the type of drug, imprisonment, history of icterus, existence of right upper quadrant (RUQ) tenderness on physical examination, old age, and prolonged history of drug abuse were considered as factors mostly affecting the prevalence of HBV infection.

The findings of Brito et al.,<sup>5</sup> who conducted a study in Sao Paulo, Brazil, are compatible with the findings of the present study. Since the history of IDU is considered as an important risk factor for the development of HCV and HIV infections, a low prevalence of IDU in Sao Paulo may describe low frequencies of HIV and HCV infections there. On the other hand, syphilis which is strongly related to unprotected sexual relationships was more common in Sao Paulo than Tehran. This finding seems to be due to the differences in attitudes towards sexual behaviors through these two different countries.

In a study on prisoners in Maryland, USA,<sup>6</sup> the prevalence of IDU was 8 – 23% which is higher than the frequency in homeless people of Tehran. Weight and the role of risk factors in different situations, like prison and living in the street, are quite different, although history of imprisonment seems to exacerbate the frequency of blood-borne diseases as well as STDs. Unprotected sex is of great importance when one plans to evaluate the frequencies of HIV and hepatitis.<sup>9</sup> Although a history of urethral discharge and STD was asked from the subjects enrolled in the present study, presumably, because of cultural considerations, history of unprotected sex could not be clearly determined.

In conclusion, since there are common risk factors reported for HBV, HCV, and HIV infections in different studies, similar disease-controlling plans seem to be applicable in a worldwide range. The results of this study showed that smoking and in-prison tattooing correlate with the development of HIV, HCV, and to a lesser

extent, HBV infections. This finding may be of value in regard to the schemes of risk factors distribution among some special groups, like homeless people to provide more practical disease-controlling plans.

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