Original Articles

Prevalence of human immunodeficiency virus, hepatitis C virus, and hepatitis B virus infection among heroin injectors in the central region of Saudi Arabia

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ABSTRACT

الأهداف: تحديد مدى انتشار عدوى التهابات الكبد الفيروسية (ب) و (ج) وكذلك عدوى فيروس نقص المناعة بين المرضى المنومين من مدمني الهيروين بالمنطقة الوسطى، ودراسة العلاقة بين الإصابة بها ومتغيرات المرضى الديموغرافية.

الطريقة: أُجريت هذه الدراسة الاسترجاعية خلال الفترة من يناير 2006م إلى نوفمبر 2012م. ولقد تم جمع بيانات المتغيرات الديموغرافية، ونتائج تحاليل الإصابة بفيروسي الكبد الوبائي (ب) و (ج) وفيروس نقص المناعة من ملفات مرضى إدمان الهيروين الذين تم تنويمهم خلال فترة الدراسة بمجمع الأمل للصحة النفسية، الرياض، المملكة العربية السعودية. وقد تم حساب معدل انتشار العدوى وعلاقة ذلك بالمتغيرات الديموغرافية للمرضى.

النتائج: شملت الدراسة 357 مريضاً جميعهم سعوديون ذكور ومتوسط أعمارهم 40 عاماً (±8.6)، وقد كان عدد مرات تنويمهم بمستشفيات الإدمان 5.8 مرات (±5). وقد أظهرت نتائج التحاليل عدم إصابة 20.1% من المرضى بالعدوى، وإصابة 56.6% من المرضى بفيروس واحد، بينما أصيب 13.2% بفيروسين، وأصيب 1.1% من المرضى بثلاثة فيروسات. وبلغ معدل الإصابة بفيروسي الكبد الوبائي (ب) 7.7% ، و 77.8% بالنسبة لفيروس الكبد الوبائي (ج)، فيما كانت نسبة الإصابة بفيروس نقص المناعة 9.8% . وقد كان هناك علاقة ذات دلالة إحصائية بين الإصابة بفيروس الكبد الوبائي (ج) والإصابة بفيروس نقص المناعة. كما أظهرت الدراسة أن الإصابة بفيروس الكبد الوبائي (ج) تكثر لدى الفئة العمرية 29–20 عاماً، وبين غير الموظفين، وأولئك الذين كان مستوى تعليمهم لا يتعدى المرحلة الابتدائية، ومن حصلوا على تعليم فوق الثانوي وأقل من الجامعي. أما الإصابة بفيروس الكبد (ب) فيكثر لدى مرضى الفئة العمرية 39–30 عاماً، وأولئك الذين حصلوا على التعليم الثانوي.

الخاتمة: توضح الدراسة الانتشار الكبير للإصابة بفيروسي الكبد الوبائية (ب)، (ج) وفيروس نقص المناعة بين مدمني الهيروين السعوديين المنومين، ويماثل ذلك النسب الموجودة في الدول الغربية. ولذلك تكمن أهمية قصوى لتفعيل برامج مراقبة العدوى وبرامج تخفيف الضرر وبرامج التثقيف الصحي من أجل تقليل انتشار العدوى.

Objectives: To calculate the prevalence of hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) infections among inpatient heroin users, and to study the relationships between these infections and patient demographics.

Methods: In this retrospective study, heroin users' inpatient records from the Alamal Hospital, Riyadh, Saudi Arabia were reviewed for HIV, HBV, and HCV screening results, age, number of admissions, education, and marital and occupational status. The study took place between January 2006 and November 2012. The prevalences of HIV, HBV, and HCV and their associations to demographics were evaluated.

Results: A sample of 357 inpatients Saudi male heroin users (all injectors) aged 40 (±8.6) years with lifetime admissions averaged 5.8 (±5) times were studied. Screening results revealed that 20.1% of subjects were infection-free, 56.6% had a single infection, 13.2% were infected by 2 viruses, and 1.1% were infected by 3 viruses. Prevalence of HBV surface antigen was 7.7%, antibodies for HCV 77.8%, and HIV 9.8%. A significant association was found between positive HCV and positive HIV tests. Furthermore, HCV was more common among patients aged 20-29 years, those who were unemployed, and who had primary, secondary, or postsecondary education. Finally, HBV was associated in patients aged 30-39 years and those with secondary educations.

Conclusion: Contracting serious contagious viral infections is very common among Saudi heroin injectors at rates similar to those seen among injectors in Western countries. Infection control, education, and harm reduction programs are of paramount importance.

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Substance users are more vulnerable to human immunodeficiency virus (HIV) and viral hepatitis than the general population.[1-3] Specifically, those who inject drugs are at a higher risk for human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) infections.[1] Considering these viruses are blood borne infections, they are transmitted efficiently through sharing of contaminated needles and other injection paraphernalia.[4-7] In the United States, approximately 9-12% of new HIV cases[8,9] and 50% of new HCV cases[10] are associated with illicit injection of drugs. The prevalence of HCV among injecting drug users in the industrialized world is greater than 60%.[1-5] In Saudi Arabia, very few studies addressed HIV, HBV, and HCV infections in Saudi heroin users who inject drugs. Njoh and Zimm[11] described more than 2000 drug users admitted to an addiction treatment center in Jeddah between January 1995 and May 1996 and found a 0.1% prevalence of HIV. In 1996,[12] they found a prevalence of HCV seropositivity of 74.6%. In 1995, at the same treatment center, the HBV surface antigen was positive in 12.6% of 349 screened patients, 80% of whom injected drugs.[13] Another screening of 344 Saudi injecting drug users in the eastern region, reported a 38% HCV RNA detection rate, and a 12% HBV DNA detection rates.[14] No studies were performed to estimate the prevalence of these viral infections in the central region, and those performed in Jeddah (western Saudi Arabia) are old and may not correctly reflect the current status. In this study, we aim to estimate the prevalences of HBV, HCV, and HIV infections among heroin injectors in the Saudi central region and to explore any significant relationships related to patient demographics.

Methods. Data was collected from Alamal Complex for Mental Health in Riyadh, which is the only addiction treatment center in the central Saudi region and serves almost one-third of the Saudi population. Alamal Complex is a free governmental tertiary hospital for mental and addiction disorders, and all Saudi (regardless of their region) and residents of Gulf Cooperation Council (GCC) countries are eligible to use its services. Inclusion criteria were male gender, being a heroin inpatient addict, and admission between January 2006 and November 2012. Exclusion criteria were female (2 were admitted in this time frame) and non-Saudi patients. The latter was applied because the patients represented a minority of the sample; all were from GCC countries and usually arrived for treatment and then returned to their home countries. All patients admitted to inpatient services were screened for HIV antibody, HBV surface antigen, and HCV antibody through immunoassay methods. When screening results were positive, a further confirmatory test was performed at the Central Laboratory of the Ministry of Health using the western blot test for HIV, HbsAg neutralization test for HBV, and recombinant immunoblot assay (RIBA) for HCV.

Study design. In this retrospective study, heroin users' inpatient records were reviewed for HIV, HBV, and HCV screening results, age, number of admissions, education, and marital and occupational status. Prevalence of HIV, HBV, and HCV and the associations between demographic variables and positive test results were evaluated. Study methodology was ethically approved by the Institutional Review Board of the College of Medicine at Al-Imam Mohammad Ibn Saud Islamic University, Riyadh, Saudi Arabia.

Statistical analysis. Data were collected and stored in a Microsoft Excel 2007® spreadsheet then managed and analyzed using statistical analysis by the IBM SPSS Statistics for Windows version 20.0 (IBM Corp, Armonk, NY, USA). Descriptive analysis was performed presenting categorical variables as frequencies and percentages and continuous variables as mean (± SD). The chi-square test was used to detect potential associations between presence of virus and socio-demographic variables. The Fisher exact test was applied whenever indicated. The Pearson's correlation coefficient (ρ) was also used to detect potential correlations between variables. A 95% confidence interval was applied to *p*-values that met the 0.05 threshold, which was determined to be the maximum value allowed to indicate statistical significance.

Results. The sample of 378 participants were aged 40 (± 8.6) years (range, 13-71 years). All used heroin primarily by injection. Average previous admissions to addiction treatment centers was 5.8 (±5) times. Most (43.1%) were aged between 40 and 49 years. Analysis of

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demographic and socioeconomic characteristics showed that most (49.7%) of the recruited subjects were single and had either an intermediate (34.1%) or primary level of education (31.6%). Most were unemployed (68.5%) (**Table 1**). Screening results revealed that 20.1% had no viral infections, 56.6% had a single viral infection, 13.2% were infected by 2 viruses, and 1.1% were infected by 3 viruses. The prevalence of HCV antibody seropositivity was 77.8%, while for HIV, it was 9.8%, and for HBV surface antigen 7.7%. Moreover, there was a significant correlation between HCV and HIV positivity (R = 0.16, p=0.003) while there was an inverse correlation between HCV infection and number of admissions (R = -0.34, p<0.0001). There was an overall statistically significant association between the presence of HCV and age, level of education, and occupation (p<0.01 in all cases). More specifically, it was associated with age range (for those aged 20-29 years and also those aged 40-49 years, p<0.01) and education (for those with primary, secondary, and post-secondary educations, all p<0.01). It was also associated with those who were unemployed (p=0.001) while it was significantly protective (negatively associated) with those who were students: p<0.0001. The HBV was associated with age range (30-39 [p=0.017] and 40-49 years, [p=0.003]) and education (secondary school education, p=0.018) (**Figure 1**).

Discussion. These results show a high prevalence of HIV, HCV, and HBV among male Saudi heroin injectors. However, in Saudi Arabia, the prevalences of HIV and HCV infections are low. Compiled registered cases of HIV for one decade (2000-2009) comprised 2,956 cases[15] while HCV seropositive prevalence is approximately 0.4-1.1% among Saudi blood donors.[16-19] The prevalence of HBV surface antigen showed a marked decrease after introduction of vaccination from 1.5-2.6% among blood donors,[16-20] and it was shown to be as little as 0.22% in some community-based studies,[19,21] compared with 7% before including the HBV vaccine in regular vaccination schedule.[22] Approximately 90% of patients were <50 years of age, implying they are sexually active adults and able to spread their infections to sexual partners, and those who share injection paraphernalia with their partners. It is well known that most drug use behavior starts in adolescence, implying that most study patients began injecting drugs in the late 1990's or later, a period

Table 1 - Sample of Saudi heroin users distributed by demographic characteristics.

Characteristic	All study group N=378	HBV+ n=29	HCV+ n=294	HIV+ n=37
Age				
<20	1 (0.3)	0	0	0
20-29	48 (12.7)	4 (13.8)*	16 (5.4)‡	1 (2.7)
30-39	121 (32.0)*	3 (10.3)†	96 (32.7)	15 (40.5)
40-49	163 (43.1)	20 (69.0)	146 (49.7)‡	18 (48.6)
50-59	41 (10.8)	2 (6.9)	34 (11.6)	2 (5.4)
≥60	4 (1.1)	0	2 (0.7)	1 (2.7)
Marital status				
Single	188 (49.7)	20 (69.0)	135 (46.0)	18 (48.6)
Married	159 (42.2)	8 (27.6)	130 (44.2)	11 (29.7)
Divorced	30 (8.0)	1 (3.4)	28 (9.5)	8 (21.6)
Missing	1	0	1	0
Level of education				
Illiterate	3 (0.8)	0	2 (0.7)	1 (2.8)
Intermediate	130 (34.1)	9 (31.0)	108 (36.7)	9 (25.3)
Primary school	118 (31.6)	6 (20.7)	106 (36.1)‡	16 (43.2)
Secondary school	88 (23.5)	12 (41.4)*	53 (18.0)‡	8 (21.6)
Post-secondary school diploma	19 (5.1)	2 (6.9)	10 (3.4)†	2 (5.4)
University	16 (4.3)	0	11 (3.7)	0
Missing	4	0	4	1
Type of occupation				
Unemployed	259 (68.5)	22 (75.9)	213 (72.4)	29 (78.4)
Student	6 (1.6)	0 (0)	0 (0)‡	0 (0)
Government employee	79 (20.9)	7 (24.1)	56 (19.2)	7 (18.9)
Private sector employee	13 (3.4)	0 (0)	9 (3.1)	0 (0)
Retired	18 (4.8)	0 (0)	13 (4.5)	1 (2.7)
Missing	3	0	3	0

*p<0.05, †p<0.01, ‡p<0.001. HBV - hepatitis B virus, HCV - hepatitis C virus, HIV - human immunodeficiency virus

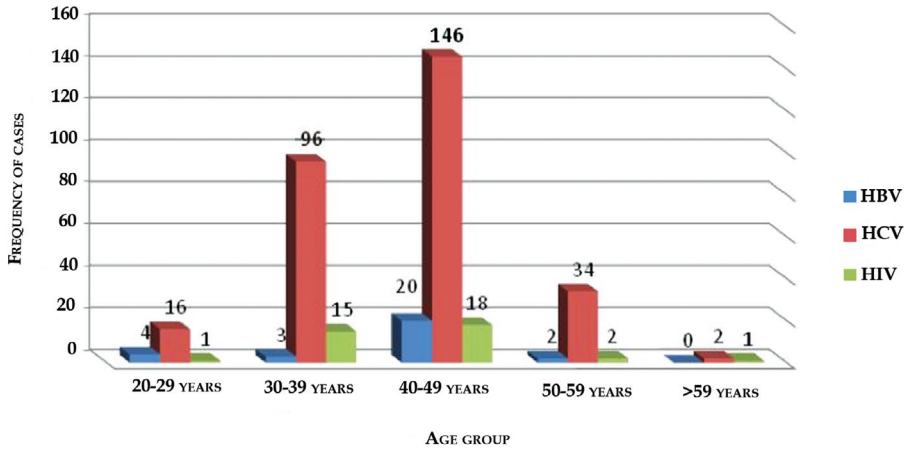

Figure 1 - Frequency of hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) infections among 378 Saudi heroin users by different age group.

when a well-established health service existed in Saudi Arabia. Unfortunately, the high infection rate reflects a shortcoming in the prevention of infection in such patients and in planning for good public heath prevention strategies through harm reduction and other preventive measures. The high infection rate is complicated by high rates of unemployment and low levels of education, which are common characteristics of addiction patients and present challenges in providing good intervention for them. The HBV vaccine was included in the usual Saudi vaccination schedule in 1989,[23] possibly explaining why HBV is more common among those aged 30 years or more and less common among younger patients.

In conclusion, the high prevalence of these major virulent infections among heroin injectors is a sign of a major public health problem. Other than complicating addiction illnesses of patients, they could play major roles in spreading these infections to other heroin users and non-users. Prevention of such transmission is of paramount importance. Unfortunately, there are no harm reduction or opioid substitution programs in Saudi Arabia. Furthermore, Saudi addiction treatment centers have strict protocols of screening all patients for these infections, yet infection control and intervention programs for those who test positive in these centers remain to be evaluated. Addiction treatment programs should include preventive educational activities to help patients learn about prevention of these infections. Staff and those who work with infected patients should have special training in protecting themselves and other patients. Although this study emphasizes the high prevalence of HIV, HCV, and HBV among injecting heroin users, it is well known that these infections are common among non-injecting heroin users as well. Special infection treatment clinics are suggested as alternatives to referring patients to tertiary general hospitals in the 3 major addiction treatment centers (Alamal Hospitals), so that this kind of intervention can be integrated with other addiction treatment programs. Heroin use habits should be studied in the community to build good harm-reduction strategies and prevention control programs, activities, and education in addiction treatment centers. This study population was restricted to inpatients, and this limits generalization of the findings to the community. Furthermore, it is not clear that these infections are primarily the results from heroin injection as it is not uncommon for patients of this type to be involved in other risky behaviors and to ignore protection measures.

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