

## **Prevalence of hepatitis B and anti-hepatitis C virus antibody among people who inject drugs in the Lebanese population**

Antoine Abou Rached,<sup>1,2</sup> Mary Nakhoul,<sup>1</sup> Carine Richa,<sup>1</sup> Afif Jreij,<sup>1</sup> Pierre Abi Hanna<sup>1</sup> and Walid Ammar<sup>2</sup>

<sup>1</sup>Faculty of Medical Science, Lebanese University, Hadath, Lebanon (Correspondence to Abou Rached Antoine: abourachedantoine@gmail.com). <sup>2</sup>Ministry of Public Health, Beirut, Lebanon.

### **Abstract**

**Background:** People who inject drugs are prone to a number of blood-borne viral infections. Hepatitis B virus (HBV) and hepatitis C virus (HCV) constitute an important public health concern in this high risk group.

**Aim:** We aimed to determine the prevalence of HBV and HCV antibody among people who inject drugs in Lebanon.

**Methods:** We conducted a prospective cross-sectional study between June 2015 and June 2016 on PWIDs recruited through Lebanese nongovernmental organizations in collaboration with the Lebanese Ministry of Public Health. The participants were tested for HBs antigen and HCV antibody using rapid test kits. The prevalence of each virus was then calculated. The correlation between both infections and other possible risk factors was also analysed.

**Results:** A total of 250 people were included in our study, of whom 98% were males. Mean age was 31.9 (standard deviation 8.7) years. The prevalence of HBsAg and anti-HCV among people who inject drugs was 1.2% and 15.6%, respectively. Older age, longer duration of drug use and lack of awareness were significantly correlated with a higher rate of HCV infection ( $P < 0.01$ ). The high rate of needle sharing among our PWIDs significantly affected the prevalence of anti-HCVAb.

**Conclusion:** People who inject drugs remain the subpopulation most affected with chronic HCV in Lebanon.

Keywords: HPV, HCV, people who inject drugs, Lebanon

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## Introduction

The World Health Organization (WHO) estimates that in 2015, 257 million persons, 3.5% of the world population, were living with chronic HBV infection. The African and Western Pacific regions accounted for 68% of those infected. Also, it is estimated that 71 million persons were living with HCV infection in 2015, i.e. 1% of the world population (1). In 2015, viral hepatitis was responsible for 1.34 million deaths. Mortality from viral hepatitis has increased by 22% since 2000 (1).

Transmission of HBV and HCV has been causally associated with injection drug use by people who inject drugs (PWIDs) due to sharing of needles and injection equipment contaminated with infected blood. Seroprevalence rates for HBV and HCV vary considerably among PWIDs depending on the geographic region and time period for the PWID populations tested.

Injection drug use, unsafe sex and unsterile tattoos are the main modes of transmission of HBV in patient not vaccinated. Injection drug use remains the main mode of transmission in industrialized countries, whereas unsterile tattoos and piercings in nonprofessional settings might play an increasing role in young populations (2).

Unsafe therapeutic injection practices and blood transfusions are also important routes of infection (3). Unsafe health care practices (including unsafe health care injections) and injection drug use remain the leading modes of transmission of HCV. Areas with high rates of infection are located in the Eastern Mediterranean Region and the European Region. In the Eastern Mediterranean Region, the most common cause of transmission of infection is unsafe health care injections (4,5). In the European Region, injection drug use accounts for a substantial proportion of infections (6).

According to the latest United Nations Office on Drugs and Crime report, around 16.5 million people (0.4% of the total world population) aged 15–64 years use heroin or opium (7).

Lebanon is ranked among the countries with a low endemicity profile for both viruses having a prevalence of 1.74% for HBV and 0.21% for HCV (8); HCV genotype 3 is the most prevalent genotype in the Lebanese PWID population followed by genotype 1 (9). The prevalence of these infections among PWID in Lebanon has previously been estimated at 2.5–5% for HBV and more than 50% for HCV, based on small scale reports (10).

The aim of this study was to determine the prevalence of both infections in PWIDs in the Lebanese population based on a screening strategy applied by a number of nongovernmental

organizations and to establish the correlation between both infections and other possible underlying factors within this high-risk group.

## **Methods**

### *Study design*

We carried out this cross sectional study between June 2015 and June 2016 on injection drug users recruited through the Middle East and North Africa Harm Reduction Association (MENAHRRA) in collaboration with many other nongovernmental organizations throughout Lebanon.

### *Study conduct and data collection*

As part of a strategy to control blood-borne viral infections such as HIV and viral hepatitis in high risk groups by the Lebanese Ministry of Public Health, screening for HCV antibodies and HBs antigen and HIV in the PWID population was carried out followed by a vaccination protocol against HBV in seronegative patients. This work was done in collaboration with nongovernmental organizations throughout Lebanon. These organizations were registered in Beirut and their geographic distribution covered Lebanese territory from north to south, Beqaa and Beirut. They included ESCALE, SIDC, SKOUN, AJEM, the nongovernmental organization platform of SAIDA, Oum el Nour, Jeunesse contre la drogue, Cenacle de la lumiere, Nusroto and Bonheur du ciel. The PWIDs presenting to these organizations were from different regions in Lebanon.

All the PWIDs patients presented to the aforementioned nongovernmental organizations were included in our study, after a clear explanation of the aims of the study, independently of their age, sex or duration of drug use. There were no exclusions.

All participants were able to read, 95% signed a consent form in Arabic. Their agreement was guided by the responsible person in the nongovernmental organization. At the time of the study, participants were not under the effects of drugs. They were tested for HBs Ag and HCV Ab using rapid test kits: RDT HEPATITIS B (SD Bioline HBsAg-01FK10W), HBsAg, RDT HEPATITIS C (SD Bioline HCV-02FK10), HCVAb, which are based on enzyme immune assay. None of the PWIDs included were prisoners but some had a previous history of incarceration that is not reported here.

Data collection included age, sex, nationality, presence of any other predisposing factor for viral hepatitis acquisition, other high risk behaviours such as sharing needles, men who have sex with men, sex working, living with someone infected with HBV and/or HCV, sex with a person infected with HBV/HCV, history of blood transfusion, the presence of piercings and tattoos. Further inquiry included the level of awareness and education, which were assessed by asking

participants if they had ever heard about HBV/HCV, viral transmission through contaminated blood and unsafe sexual practices or about the existence of HBV vaccination for prevention. They were also asked about any previous HBV vaccination.

All data were gathered by the responsible person in each nongovernmental organization and were registered in an *Excel* document.

### *Statistical analysis*

The prevalence of HBV and anti-HCV antibody among the PWIDs in the study was calculated. The correlation between the age of participants and test positivity was calculated. The impact of viral hepatitis risk factors on the prevalence of HBV and anti-HCV antibody was also analysed. The prevalence of needle-sharing between the PWIDs as well as the duration of drug injection were specifically addressed in addition to their association with serologic positivity of HBV and HCV. Similarly, we investigated the knowledge of participants about viral hepatitis and mode of transmission and how it could affect their life. The proportion of participants vaccinated for HBV was also calculated to inform a future viral prevention programme.

The statistical analysis on these associations was done using the Chi-squared ( $\chi^2$ ) test; *P*-value < 0.01 was considered the threshold for statistically significant correlation.

### **Results**

A total of 250 people were included in our study, representing 95% of the total number of PWIDs recruited during the period of the study by the different nongovernmental organizations.

Male sex was predominant, representing 98% of the studied population; only 5 women participated (2% of the population). The majority of PWIDs were adolescents and young adults, with 75% aged under 35 (mean = 31.9; standard deviation 8.7) years. There were 9 Palestinians and 1 Afghan participant; the remaining 240 were Lebanese

Only 3 participants were positive for HBs Ag, prevalence 1.2%. All of the HBV-positive PWIDs were male and Lebanese. Their mean age was 29.7 years. Although they appeared to be younger compared to other PWIDs seronegative for HBV (mean age = 31.91 years), the difference in age was not statically significant (*P* = 0.66).

We found 39 patients were positive for HCV antibody, prevalence 15.6%. One individual was co-infected with HBV. All were males, 3 were Palestinians and the remaining 36 were Lebanese. The mean age was 35.8 years. They were significantly older than the PWID population seronegative for HCV included in this study (*P* = 0.01).

The association between men who have sex with men, sex working, living with someone infected with HBV/HCV, sex with a person infected with HBV/HCV, history of blood transfusion, history of tattoos or piercings and the frequency of HBV and HCV in our PWIDs population showed that none of these risk factors significantly affected the prevalence of either infection (Table 1).

Among the study population, 83 participants reported sharing needles (33.2%). Two of the 3 HBV positive (66.7%) and 21 of the 39 HCV positive (53.8%) individuals had a history of sharing needles. We noted a significant association between needle sharing and the occurrence of HCV infection ( $P = 0.0029$ ), but for HBV it was not significant ( $P = 0.22$ ).

The mean duration of drug use was 125.0 weeks among our PWID population and 240.5 weeks among the HCV-positive participants, with a statistically significant association between longer duration of injection drug use and positive HCV serology ( $P = 0.001$ ).

Concerning awareness of viral hepatitis, 54 PWIDs (21.6%) had never heard about HBV/HCV and the risk of transmission through contaminated blood or needle stick or unsafe sexual practices. These groups have a significant risk for infection with HCV ( $P = 0.01$ ). Additionally, 164 PWIDs (65.6%) had never heard that HBV can be prevented by vaccination.

Only 45 PWIDs (18%) had received the HBV vaccine prior to our study. None of them tested positive for HBV.

## **Discussion**

Our study has provided an updated evaluation for HBV and HCV prevalence among PWIDs in Lebanon, i.e. 1.2% and 15.6%, respectively.

The prevalence of hepatitis B in this group of the population is lower than among the general population overall (1.74%) (8), but when compared to the same age group in the general population it is higher. Data on other high risk groups in Lebanon give a prevalence of 1.6% in haemodialysis patients (11), 0.99% in men who have sex with men (12), 0.28% in thalassaemic patients (13), 2.4% among prisoners secondary to unprotected sexual intercourse and tattooing as well as PWIDs (14), and 6.9% in HIV patients (15). A previous study on PWIDs in Lebanon found a prevalence of 0–5% for HBV infection (10).

This prevalence of HBV in the PWID population was lower than figures reported in the surrounding Middle Eastern countries (10). The prevalence of surface HBV antigen in a European review for PWIDs was available for 21 of the 34 countries; this ranged from 0% to 21.3% (16). In 10 countries it exceeded 10% (10). The HBs Ag prevalence in PWIDs was on average 9 times higher than in the general population (in 6 of the 8 countries that had both estimates available). In

Romania and Ireland, HBs Ag estimate among the general population was higher (5.6% vs 4.7%, 0.1% vs 0.0%, respectively) (16).

In our study, only 18% of PWIDs were actually vaccinated against HBV while 65% did not know that HBV can be prevented by vaccination. Knowing the importance of vaccination in HBV prevention, these findings reflect a significant lack of education and awareness programmes for PWIDs in our country as well as an inefficient strategy for reaching and vaccinating this group.

The prevalence of anti-HCV antibody in our PWIDs was significantly higher than among the general Lebanese population and among haemodialysis patients and prisoners, making injection drug users the population group most affected. Mahfoud et al. reported a higher anti-HCV antibody prevalence reaching 52.8% in 106 Lebanese PWIDs (17). These individuals appeared to be older than our participants (mean age 40 years); more than 75% of the infected subjects had tattoos and almost all of them had a history of imprisonment. These factors may explain the higher results. Another study found that 27.6% of 309 PWIDs in Lebanon were anti-HCV positive and this was associated with incarceration, sharing/reusing needles and a history of sexually transmitted disease in the previous year. Both of these studies were conducted using the respondent driven sampling method, which can reach hidden populations such as PWIDs but at the expense of a somehow lower data accuracy in comparison with population based-surveys.

Seroprevalence rates for HCV among most PWID populations worldwide have often been reported to be higher than 50% (18); PWIDs are at high risk of HCV infection and are the key affected community globally. Prevalence and incidence of HCV up to 95% and 45/100 person-years respectively have been reported in PWIDs (19–23).

In a European review, an estimate of HCV Ab prevalence in PWIDs was available for 29 of the 34 countries covered, and ranged from 5.3% to 90%, on average 47 times higher than in the general population (in 13 countries that had both estimates available) (16). In 26 countries, there was a 60–80% prevalence of antibodies for HCV (anti-HCV) in PWIDs, while in 12 countries it was > 80% (10).

Based on our results, Lebanon is among the areas with the lowest prevalence for HBV and HCV in PWIDs compared with the surrounding countries in the Middle East and North Africa, where the rate of HBV and HCV infection has reached extremely high levels, e.g. in Libya and Egypt (10). Although it may reflect the low baseline endemicity in the general Lebanese population, other factors may be related to such a low rate such as the current drug and harm reduction policies. Lebanon is one of the 5 Arab countries providing a needle and syringe exchange programme along with Egypt, Morocco, Palestine and Tunisia (24). On the other hand, what characterizes Lebanon from the majority of Arab countries is that the Lebanese court imposes dependence treatment besides sanction for incarcerated drug users, thus, reducing their future risk of viral

exposure (25). Furthermore, opioid substitution therapy (OST) was implemented in Lebanon in 2011 along with only 4 other Middle Eastern countries, Bahrain, Islamic Republic of Iran, Morocco and the United Arab Emirates. According to Lebanese Ministry of Public Health reports, the prevalence of HCV was reduced from 27% to 16% in 2014, although a clear causal correlation could not be confirmed between the reduction and OST implementation (24). Harm reduction strategies for PWIDs such as needle and syringe programmes and OST had limited impact on HCV prevention; a combination of interventions is often needed (26).

Studies of the effects of exposure to preventive interventions, including drug treatment (27), needle and syringe distribution (28), harm reduction and education programmes (29), and bleach disinfection (30), have failed to provide conclusive evidence of efficacy. While a recent Dutch study showed significant protective effects of comprehensive harm reduction (needle and syringe distribution and methadone treatment) on HIV and HCV incidence (31), a peer education intervention randomized controlled trial found reductions in risk behaviour but no difference in HCV incidence (18.4/100 person-years) between the intervention and control groups (32). These data suggest that further decreases in incidence are unlikely to be achieved without large scale and effective biomedical interventions, notably preventive vaccines (33).

In our study, sharing needles was significantly associated with a higher rate of infection. In a review and meta-analysis of the association between self-reported sharing of needles/syringes and hepatitis C virus prevalence and incidence among people who inject drugs, pooled prevalence and incidence of HCV was 59% and 11% among PWIDs who reported never and not recently sharing needles/syringes, respectively, with odds ratio 3.3 (95% CI: 2.4–4.6), comparing HCV infection among those who ever (or recently) shared needles/syringes relative to those who reported never (or not recently) sharing (34).

Programmes to provide PWIDs with access to sterile needles and syringes (NSPs) are generally considered to be among the most effective means of reducing HIV and HCV transmission among PWIDs (35).

A minimum of 20 to 30 syringes per PWID annually may be needed to affect HIV and/or HCV transmission in a population of PWIDs. Reaching high coverage levels (20–30 syringes per PWID per year and at least 50% of the PWIDs population) for NSP is very likely to be followed by reductions in HIV and/or HCV infection in the local population of PWIDs (36).

In this study, HCV positive PWIDs were found to be significantly older than the general PWID population. Similarly, we noted a strong correlation between the duration of their drug injection practices and anti-HCV positivity. Backmund et al. reported a correlation between older age, longer duration of drug use and positivity of HCV serology among drug users (37).

Further analysis of the study population has showed that a low index of awareness of HCV and mode of transmission was associated with a higher prevalence of infection. As limiting exposure to HCV is the only way of preventing viral transmission, it is of extreme importance to implement targeted educational programmes for all PWIDs in Lebanon and to inform them about the different modes of transmission as well as the possible methods of prevention.

Our study has some limitations. As the estimated drug user population in Lebanon is about 10 000–15 000 individuals (38), of whom 35% are PWIDs (39); our study population provides an estimation of HCV and HBV serology in this population group followed by the nongovernmental organizations and it could result in an underestimate of the exact prevalence of HCV and HBV in this population. Furthermore, illicit drug users are a hard to reach population as they tend to deny and hide their practices, which may be a basis for contempt in Lebanese society. Nor did we report on whether our PWIDs had a history of imprisonment, where viral spread may occur more frequently.

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**Table 1. Association between risk factors for viral hepatitis and the frequency of hepatitis B virus (HBV) and hepatitis C virus (HCV) in the intra-venous drug user (IVDU) population, Lebanon, 2015–2016 (*n* = 250)**

Risk factor	HCV			HBV		
	Frequency		Correlation with HCV in IVDU population	Frequency		Correlation with HBV in general population
	No.	%	<i>P</i> -value**	No.	%	<i>P</i> -value*
Men who have sex with men	0	0.0	– <sup>a</sup>	0	0.0	– <sup>a</sup>
Sex worker	2	5.1	0.579	0	0.0	0.738
Living with someone infected with HBV/HCV	0	0.0	0.333	0	0.0	0.804
Sex with a person infected with HBV/HCV	0	0.0	0.456	0	0.0	0.848
History of blood transfusion	4	10.2	0.13	0	0.0	0.710
History of sharing needles	21	53.8	0.0029	0	0.0	0.221
Never heard of HBV/HCV or its mode of transmission	9	23.0	0.01	3	100	0.20
Presence of piercing	4	10.2	0.110	0	0.0	0.370
Presence of tattoos	17	43.5	0.570	0	0.0	0.170

\*\*Significant at the 0.01 level (2-tailed).

<sup>a</sup>Cannot be computed (at least 1 of the variables is constant). There were no men who have sex with men among participants

**Table 2. Association between risk factors and HCV infection among people who inject drugs, Lebanon, 2015–2016 (*n* = 250)**

Risk factor	Odds ratio	95% confidence interval	
		Lower	Upper
Sex worker	1.575	0.315	7.881
History of blood transfusion	3.331	0.926	11.976
History of blood donation	0.894	0.250	3.191
History of sharing needles	2.803	1.398	5.6223
Presence of piercing	0.378	0.128	1.116
Presence of tattoos	1.265	0.634	2.526
Ever heard of hepatitis B virus	0.904	0.400	2.040
Ever heard that HBV can be transmitted through contaminated blood or unsafe sexual practices	0.904	0.400	2.040
Ever heard that HBV can be prevented by a vaccine	0.712	0.336	1.512