A survey of hepatitis B and C prevalence amongst the homeless community of Prague

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Background: Viral hepatitis B (VHB) and C (VHC) are a major health concern worldwide, with 170 million people chronically infected and at risk of liver cancer, cirrhosis or liver failure. Since no vaccination is available against VHC it is important to understand how to prevent future infection. The modes of transmission include intravenous drug use (IDU), blood products, tattooing and, to a lesser extent, sexual intercourse. Homelessness is a risk factor of VHB and VHC because of the environments and behaviours associated with homeless communities such as poor hygiene, nutrition and high levels of IDU. The aim of this project was to determine the prevalence of VHB and VHC and its risk factors amongst homeless community of Prague, Czech Republic.

Patients and methods: Ninety-eight individuals of the Prague homeless community were interviewed and tested for VHB and VHC infection markers. Results: The prevalence of both VHB and VHC was 26.5%. The major risk factors in this population were past and present IDU, young age and sharing the paraphernalia used by intravenous drug users (e.g. spoons, foils and filters). Conclusion: With the exception of age, all these risk factors could all be targeted in order to combat the major public health concern that VHB and VHC poses to the homeless community of Prague.

Keywords: hepatitis B, hepatitis C infection, homelessness, intravenous drug use

Background

Drug abuse and viral hepatitis B (VHB) and viral hepatitis B (VHC) in high-risk groups represent one of the most extensive health problems of the present world and the Czech Republic is no exception. Many epidemiological studies have investigated the prevalence of VHB and VHC infection amongst risk population groups, in which the prevalence of VHB and VHC infection is between 15% and 20%. In some, the incidence VHB or VHC infection in high-risk groups was found to be up to 90%. In the Czech Republic, no study focusing on high-risk population groups has been published to date. Therefore, the estimates of VHB and VHC infection so far have not been based on real data.

According to the study by Center for Disease Control (CDC) in the US in 1993 the prevalence of VHB infection in IDU was 15%. The estimate of the occurrence of VHB or VHC infection in high-risk groups in Eastern European countries were reported from Georgia, Bulgaria or Hungary. The World Health Organization (WHO) currently estimates that there are currently 170 million people chronically infected with VHC. Many people with VHC were infected by blood transfusions in the 1970s and 1980s. Since 1990, all blood products have been screened for VHB and VHC and this resulted in the reduction of post-transfusion hepatitis by >50% between 1990 and 1993. Since then, further improvements in testing have further reduced the risk but, in >40% of cases, it is not possible to identify the time or source of infection.

Individuals infected with VHB and VHC can remain asymptomatic for decades. However, >80% of infected people become chronic carriers, which results in a substantially increased risk of liver cirrhosis, liver cancer and liver failure, some 20–30 years later. At present, there is no vaccination for VHB, and treatment with interferon and ribavirin is <60% effective as well as being very expensive. Prevention is thus the most effective method of combating this epidemic, it is therefore important to target those individuals and populations that are at the highest risk of infection.

The homeless are such a high-risk population. The high prevalence of VHB and VHC amongst the homeless was demonstrated by a study in the US between 1992 and 1993. In another study of homeless veterans admitted to a domiciliary programme in California, 42% were found to have anti-VHC antibodies. Other studies on homeless populations in Canada and France found a lower prevalence of VHC than the California study, but this may have been because the surveys were in younger adults.

In this study, we investigated the extent to which VHB and VHC are a public health problem in the homeless community in Prague. Prague has the highest proportion of homeless individuals in Czech Republic, due to the large student population, the willingness of others to give money to the homeless people and the relatively good facilities that Prague provides to them. The study group comprised of adolescents and adults, clients of the community centre ('Chance Center'). From discussions with the managers of these centres, it was estimated that the homeless population of Prague was between 250 and 300 individuals. This provided us with a good opportunity because the subjects were accessible and there was an existing network throughout Prague that would allow an intervention to be applied more efficiently. There have been no previous publications on a survey of VHB and VHC prevalence in risk groups of adolescents and adults in Prague.
Materials and methods

Subjects

For the purpose of this study, the homeless community of Prague was defined as those individuals who use sheltered accommodation within Prague city, at the Chance Center (community centre for youth and adults). The study aimed to recruit between 80 and 100 volunteers, by posters, through the managers of the facility. The study was based at the Department of Paediatrics and Adolescent Medicine of the University Hospital Charles University, 3rd Medical Faculty in collaboration with the ‘Chance Center’ (community centre for youth and adult at risk). The study group comprised of adolescents and adults, who where clients of the community centre. The study was conducted according to Good Clinical Practise and the Declaration of Helsinki, in accordance with institutional research review board requirements approved by an Ethics committee of the 3rd Faculty of Medicine, Charles University. For ethical reasons, the study individuals would not be able to find out their own results from this study but those who were interested were directed to the Chance Center for further information. During the study period November to December 2005, 98 persons have been screened.

Measurements

The study subjects provided a blood sample and completed a structured questionnaire. The laboratory screening consisted of serum aminotransferases (ALT and AST), for hepatitis B surface antigen (HBsAg), HBsAg and antibody to HBsAg (anti-HBs), antibody to hepatitis B core antigen (anti-HBc), anti-HBe and PCR VHB–DNA testing for hepatitis B, PCR VHC–RNA and anti-VHC testing for hepatitis C.

VHC RNA was detected by means of RT–PCR nested (in-house method). After the isolation of viral RNA from serum sample (QIA amp Viral RNA Mini Kit, Qiagen) RT–PCR in nested configuration followed. The primers were selected from 5’NCR region of viral genome. The reaction was optimized as PCR in one tube. The product of the length of 259 bp was detected by electrophoresis on agarose gel after staining with ethidium bromide.19,20

For VHB DNA detection in the serum sample PCR nested with the sensitivity of 100–1000 geneq/ml with the primers from precore region of viral genome (in-housemethod) was used. The viral DNA isolation was performed by alkaline lysis, then PCR followed. The product of length of 259 bp was also detected by electrophoresis on the agarose gel after ethidium bromide staining.18

Personal information was collected using a questionnaire administered by an interviewer. The questionnaire asked about (i) injecting drug use, and if so, sharing needles and paraphernalia; (ii) sexual intercourse, number and sex of partners and whether or not condoms were used; (iii) alcohol consumption and sharing of drinking vessels; (iv) vaccination against hepatitis A and B; (v) family history of hepatitis; (vi) blood transfusion; (vii) tattoos, ear and body piercings.

Statistical analysis

The data on VHB and VHC status and characteristics of the homeless population were tabulated; the main predictive variables included age, sex, length of homelessness, number of tattoos, amount of alcohol use and intravenous drug use (IDU), as well as information relating to other known risk factors for VHB, VHC. IDU was classified into three categories: IDU in the present (within the last 6 months), IDU in the past (>6 months ago) and never. Sharing of paraphernalia was dichotomized into two categories: those who have had and those who have never shared. These data were analysed using SPSS version 10.0.

Results

Twenty-six people (26.5%) had VHB or VHC detected by laboratory test (24 men and 2 women; 5 × VHB, 21 × VHC, 2 × VHB and VHC). There was no difference between the sexes in the proportions of VHB or VHC positive because the ratio of males to females in this community was 9:1. The average age of this population was ~30 years.

With respect to IDU, 56 people (57%) admitted to being intravenous drug users on a daily basis either at present or in the past, with 34% admitting to injecting drugs daily at the time of the interviews. Of those injecting drugs, 41% said that they had shared needles whereas 6% had shared other paraphernalia (equipment used in the preparation of drugs for injection, e.g. spoons, filters and foil).

We identified three factors that showed a positive association with VHB, VHC (table 1). IDU in the past (>6 months ago), IDU in the present (within last 6 months) and sharing of paraphernalia. The effect of age was marginally significant and needle sharing was not significant.

The youngest person who was VHB or VHC positive was 16-years old, but the prevalence of positivity did not increase with age beyond the age of 21 years (table 2). Comparing the VHB, VHC positivity in those aged <21 (prevalence 1%) with those aged 21 and older (prevalence 30%), the difference is statistically significant (Fischer’s exact test, P = 0.034). However, the odds ratio for age, whether treated as a continuous variable or as binary variable less than/not less than 21 years in multivariate analysis, was not statistically significant.

Needle sharing did not appear to be significantly associated with VHB, VHC infection, with or without stratification according to sharing of other paraphernalia (table 3). VHB or VHC infection was not found to be associated with any of the other variables investigated (sexual activity, alcohol use, family or personal history of hepatitis, tattooing and body piercing, blood transfusion).

Table 1 Association suspected risk factors with VHB, VHC (odds ratios and 95% confidence intervals)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDU in the past (&gt;6 months) versus never</td>
<td>5.84 (2.56–13.3)</td>
</tr>
<tr>
<td>IDU in the present (&lt;6 months) versus never</td>
<td>3.74 (2.08–6.69)</td>
</tr>
<tr>
<td>Sharing of paraphernalia (Yes versus No)</td>
<td>4.37 (1.23–15.58)</td>
</tr>
<tr>
<td>Age (21+ versus 20 or less)</td>
<td>7.14 (0.89–56.80)</td>
</tr>
<tr>
<td>Needle sharing (Yes versus No)</td>
<td>1.24 (0.42–3.71)</td>
</tr>
</tbody>
</table>

Table 2 VHB, VHC status by age, sex and sexual intercourse

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Number of individuals</th>
<th>Sex: male/female</th>
<th>Homosex/ Heterosex</th>
<th>VHB and (or) VHC positive n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16–20</td>
<td>11</td>
<td>11/0 (100/0)</td>
<td>9/2 (81/19)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>21–30</td>
<td>36</td>
<td>31/5 (86/14)</td>
<td>31/5 (86/14)</td>
<td>12 (33)</td>
</tr>
<tr>
<td>31–40</td>
<td>34</td>
<td>34/2 (94/6)</td>
<td>29/5 (83/15)</td>
<td>9 (26)</td>
</tr>
<tr>
<td>41–50</td>
<td>13</td>
<td>10/3 (77/23)</td>
<td>7/6 (53/47)</td>
<td>3 (30)</td>
</tr>
<tr>
<td>over 50</td>
<td>4</td>
<td>4/0 (100/0)</td>
<td>2/2 (50/50)</td>
<td>1 (25)</td>
</tr>
</tbody>
</table>
general practitioner and half of these being registered at the with 9 out of 10 homeless people in Prague having access to a needle exchange programmes can be effective. Moreover, the homeless facilities in Prague to target the VHB and VHC problem. Ironically, the success of the needle exchange the later is plausible. Finally, as mentioned below, para- paraphernalia). Third, sharing needles may have been a significant result (although association was found for a non-intravenous drug user. This study, the first in the Czech Republic, found a relatively high prevalence of VHB and VHC infection amongst the homeless population and confirmed the importance of IDU as a strong risk factor for infection. The prevalence of VHB and VHC in this study is within the range reported from elsewhere, for example Cheung et al. estimated the prevalence of VHC amongst homeless veterans in California to be 41.7%. Roy et al. estimated a prevalence for VHB amongst street youths in Canada of 6.3% and VHC of 12.7%. Those studies were carried out amongst the homeless communities of countries with rates VHB and VHC in the general populations similar to that in the Czech Republic and so are useful for putting our results in context. An VHB, VHC prevalence of 26.5% lies in the middle of these two earlier studies results, suggesting that a quarter of the homeless population in Prague was infected with VHB, VHC, making this a serious public health concern.

In trying to combat this problem, it is important to examine the risk factors that contribute to this situation so that a framework can be established to reduce the infection rate. As expected, the main risk factors for VHB and VHC amongst the homeless community in Prague was IDU. The results from this study suggest that daily intravenous drug user is 14 times more likely to contract VHB and VHC than a non-intravenous drug user. Surprisingly, there seemed to be no association between VHB and VHC and needle sharing in this population. Several reasons may account for this lack of association. First, the positive impact of the needle—exchange scheme at the Chance Center has meant that fewer intravenous drug users were sharing needles. Second, this risk factor is limited to only the proportion of the participants who are intravenous drug users. This smaller sample size reduces the chance of a significant result (although association was found for paraphernalia). Third, sharing needles may have been unreported, while sharing paraphernalia may have been reported more reliably. Finally, as mentioned below, paraphernalia may be genuinely the main source of transmission in intravenous drug users in the homeless community of Prague.

With 67.2% of the intravenous drug users included in the study sharing paraphernalia, it seems that the later is plausible. If confirmed by further data, this knowledge could be used by the homeless facilities in Prague to target the VHB and VHC problem. Ironically, the success of the needle exchange programme has misled intravenous drug users that needle sharing is the only important risk factor.

On the other hand, however, it was encouraging that the needle exchange programmes can be effective. Moreover, with 9 out of 10 homeless people in Prague having access to a general practitioner and half of these being registered at the Chance Center, there is certainly an easy and effective method of transferring this important information to those individuals who will benefit from it.

The other risk factor identified by this project was age. In our sample, the prevalence of viral hepatitis was significantly higher in the group 21 to 30 years, which correlates with epidemiological data obtained from centres in the whole Czech Republic. The significance of this finding is uncertain, because the outcome of statistical tests depended on the method used and the age chosen to divide the groups. Nevertheless, we found that, by logistic regression, the risk of VHB and VHC to those over 21-years old was seven times that of those younger than this. Again, this is most likely to relate to the length of exposure; it is likely that IDU and injecting drugs or being in close and frequent contact with intravenous drug users increase with age.

A strength of this study was the method of recruitment. The initial impression was that recruitment might be problematic and we planned for a 12-week period for interviewing and sampling. In reality, it took only 6 weeks to interview and sample the 98 volunteers. Using homeless centres may be a useful tool for future studies among other homeless populations.

Some of the results of this study may be used in everyday practice. We are planning to continue our cooperation with the educational centre for high-risk groups (Chance Center) to test the clients of the centre for viral hepatitis. VHB infection negative subjects will be offered vaccination and VHC infection or VHC infection positive ones will be offered treatment, if indicated based on their clinical condition and if good compliance may be expected. We also plan to study in more detail the role of paraphernalia in the transmission of VHB and VHC.

### Conclusion

Viral hepatitis, especially chronic, is a serious disease not only from the medical but also social aspect. Life threatening late consequences of the disease is a problem that affects not only the health care but also social sphere. Incomplete education, frequent absence from work, premature retirement and expensive treatment, especially liver transplantation may be a special problem, because the affected individuals are usually unemployed without health insurance. Our results confirm the hypothesis that the prevalence of VHB and VHC infection in the homeless population is significantly higher than in general population; this corresponds with the higher incidence of these diseases in the recent years not only in the Czech Republic but also in neighbouring countries.

Preventive measures are crucial to prevent or at least reduce the consequences of viral hepatitis in risk groups. However, these measures are time consuming and financially

<table>
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<tr>
<th>Table 3</th>
<th>VHB, VHC status, sparing needles and other paraphernalia</th>
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<tbody>
<tr>
<td><strong>Shared other paraphernalia</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shared needles</td>
</tr>
<tr>
<td>VHB, VHC positive</td>
<td>11</td>
</tr>
<tr>
<td>VHB, VHC negative</td>
<td>10</td>
</tr>
<tr>
<td>Subtotals</td>
<td>21</td>
</tr>
<tr>
<td><strong>Had not shared other paraphernalia</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shared needles</td>
</tr>
<tr>
<td>VHB, VHC positive</td>
<td>0</td>
</tr>
<tr>
<td>VHB, VHC negative</td>
<td>2</td>
</tr>
<tr>
<td>Subtotals</td>
<td>2</td>
</tr>
</tbody>
</table>
extremely demanding. Institutions that take care of high-risk individuals focus more often on adults than adolescents or young adults. Undoubtedly the prevention of viral hepatitis and HIV infection is especially important in the young age groups, since it is at this age when prostitution and drug abuse usually start. It is therefore the responsibility of not only non-governmental institutions, but primarily of the government, to provide financial means to support education, employment and social participation of young people. This would help to prevent prostitution and IDU and consequently also reduce the burden of infection by VHB, VHC and HIV.

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Conflict of interest: None declared.

Key points

- This is the first study in the Czech Republic of the prevalence of VHB and VHC infection amongst adolescent and adult homeless persons.
- Almost three-fifths of the study sample were current or past intravenous drug users and a quarter were infected by VHB or VHC.
- Infection was associated with IDU, sharing paraphernalia and higher age. Needle sharing did not appear to affect the risk of infection, presumably because of effective needle exchange programme.
- IDU and particularly sharing paraphernalia may provide the focus for preventive measures to reduce the risk and consequences of viral hepatitis in this risk group.

References


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