

HIGH HEPATITIS B AND LOW HEPATITIS C PREVALENCE IN ROMA POPULATION IN EASTERN SLOVAKIA

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SUMMARY

Background: Viral hepatitis B and C prevalence in the Roma population of eastern Slovakia is largely unknown. This study aimed to explore the prevalence and associated risk factors of chronic viral hepatitis B and C among Roma living in segregated communities in eastern Slovakia.

Methods: Data from the cross-sectional HepaMeta study conducted in Slovakia in 2011 among Roma living in rural communities were used. Participants were tested for the presence of HBsAg, anti-HBc IgG and anti-HCV. The risk factors were assessed mainly via a structured questionnaire/interview.

Results: Altogether 452 Roma were screened, and 11 were excluded due to missing data. A total of 441 patients were included (mean age 34.7 ± 9.14 years; 35.2% men). 12.5% of participants were HBsAg positive, 40.4% anti-HBc IgG positive while negative for HBsAg and 47.2% of participants were negative for all serological markers of hepatitis B. Hepatitis C prevalence was very low (0.7%), while 2 out of 3 anti-HCV positive participants were coinfecting with hepatitis B. Risk factors for hepatitis B infection were male sex, higher age, tattoo, and previous imprisonment. No difference was found in intravenous drug use, blood transfusions and sexual behaviour.

Conclusion: More than half of the Roma residing in eastern Slovakia have been infected at one point in life with the hepatitis B virus, and 12.5% are HBsAg positive. Hepatitis C prevalence is very low, which is probably due to very low intravenous drug use.

Key words: hepatitis B prevalence, hepatitis C prevalence, Roma population, tattoo, imprisonment, sexual behaviour

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INTRODUCTION

Chronic viral hepatitis B and C are the most common causes of liver cirrhosis worldwide (1). More than 2 billion people acquire hepatitis B infection during their lifetime. Overall, 350–400 million people are infected with the hepatitis B virus, about 125 million of whom are Chinese (2). The prevalence of hepatitis C infection is about 3%, which represents more than 200 million people (3).

Possible routes of transmission of hepatitis B and C are either vertical, from mother to child during birth, or horizontal via contact with contaminated blood or sexual intercourse. Probably the most common route of infection with hepatitis B is sexual intercourse. Regular sexual intercourse with an infected partner,

promiscuity and homosexuality constitute particularly high risks. The risk for hepatitis B transmission among homosexuals rises with anal intercourse and the length of the period of sexual activity. About 75% of homosexual males were infected after 5 years of regular sexual intercourse (4). Transmission risk factors are similar for heterosexual men and women. Thirty-nine percent of all hepatitis B infections in the United States are transmitted via heterosexual intercourse and 24% via homosexual intercourse between men (5). The risk of hepatitis C transmission by sexual intercourse is relatively low compared with hepatitis B (6).

The hepatitis B and C virus is blood-borne, thus the following procedures are particularly dangerous: blood and blood-product transfusion; injury with a needle or contact with blood of infected or a presumably infected person; surgery and mini-invasive surgery; intravenous drug use; tattoo or piercing; haemodialysis; manicure and pedicure; use of the razor or toothbrush of an infected person (6, 7).

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Chronic hepatitis B and C can progress to liver cirrhosis and hepatocellular carcinoma. Hepatitis B carriers are at risk of hepatocellular carcinoma even without the development of liver cirrhosis (7). More than 1 million people die each year because of liver failure or hepatocellular carcinoma directly associated with hepatitis B (8).

The Roma population constitutes a specific minority which differs greatly from the majority population in terms of cultural stereotypes, lifestyle and socioeconomic status, probably due to their origin. Indeed, the origin of the Roma has been traced to North East India (9); therefore, the prevalence of hepatitis B would probably be higher than in the majority population.

The aim of this study was to explore the prevalence of hepatitis B and C among young Roma in Roma communities in eastern Slovakia and to analyse selected risk factors for hepatitis B and C infection.

MATERIALS AND METHODS

Data from the cross-sectional HepaMeta study conducted in Slovakia in 2011 were used. This project aimed to map the prevalence of viral hepatitis B/C and metabolic syndrome in the population living in eastern Slovakia including Roma settlements. In addition to the general methodology described in detail elsewhere (10), further paper-specific amendments to the methodology follow.

Only Roma participants (n=452) were included in this analysis. Participants were considered to have active HBV infection if they were HBsAg positive. Patients with anti-HBc IgG or antiHBs antibodies positivity were considered to have had encountered HBV in the past or were vaccinated.

Statistical Analysis

Results are presented as a median (interquartile range) for continuous variables with nonparametric distribution or mean±standard deviation for data with parametric distribution and as percentages for categorical variables unless stated other-

wise. Differences between the two groups of participants were tested using the Mann-Whitney U test. The chi-square test (with continuity correction if low expected counts) was utilised for categorical variables.

RESULTS

A total of 452 Roma were screened. Serology was not available for 11 participants, thus the final sample included 441 probands. Mean age of the study sample was 34.7±9.14 years, and males accounted for 35.2%.

Hepatitis B

HBsAg positivity was found in 55 (12.5%) participants (95% confidence interval 9.71–15.88). From the HBsAg negative patients, anti-HBc IgG positivity was found in 178 (40.4%) participants, while 208 (47.2%) participants were both HBsAg and anti-HBc IgG negative. For subsequent analysis, we divided the participants into three groups: HBsAg positive patients were considered to have active hepatitis B infection; HBsAg negative but anti-HBc IgG positive patients were considered to have resolved hepatitis B infection; and the third group consisted of patients negative for both HBsAg and anti-HBc IgG.

First we compared participants with active hepatitis B with participants negative for both HBsAg and anti-HBc IgG. Results are summarised in Table 1. We found that HBsAg-positive patients are older and have a greater proportion of males. Surprisingly, promiscuity, represented by the reported number of sexual partners, was not found to be significantly associated with hepatitis B. Therefore, we performed gender specific analysis of reported sexual partners (Fig. 1) and found out that men reported significantly more sexual partners than women. We also found that 20% of HBsAg-positive participants reported using a condom always or most of the time compared with 7.4% of HBsAg and anti-HBc IgG-negative participants. The whole-group analysis of relationship between condom use and number of sexual partners proved

Table 1. Comparison of imprisonment, drug use, blood transfusion, sexual behaviour, and tattoo procedure between HBsAg-positive and HBsAg, HBc IgG-negative participants

	N	HBsAg positive n (%)	HBsAg, HBc IgG negative n (%)	p
Gender (male)	263	28 (50.9)	64 (30.8)	0.005
Age (years)*	261	35.2 (12.2)	30.7 (6.1)	0.028
Imprisonment	259	7 (12.7)	13 (6.4)	ns
Drugs total	260	1 (1.9)	6 (2.9)	ns
Intravenous drugs	258	–	1 (0.5)	–
> 4 sexual partners	255	8 (14.5)	28 (14.0)	ns
Sex for money	256	2 (3.6)	5 (2.5)	ns
Used condom always or most of the time	257	11 (20.0)	15 (7.4)	0.006
Tattoo total	257	23 (44.2)	69 (33.7)	ns
Tattoo privately	250	20 (40.8)	65 (32.3)	ns
Tattoo parlour	172	3 (9.4)	4 (2.9)	ns
Blood transfusion	250	8 (14.8)	33 (13.8)	ns

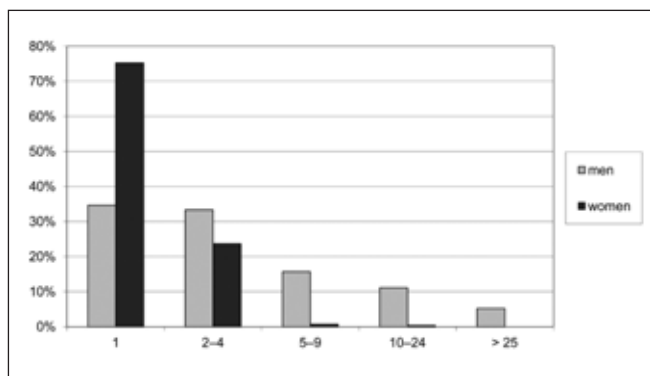


Fig. 1. Reported sexual partners by men and women; p for difference < 0.001 .

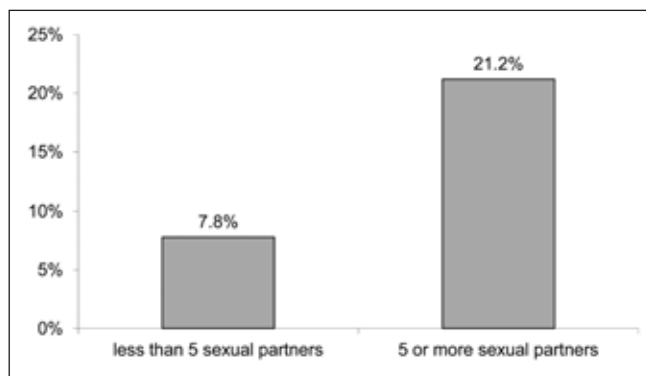


Fig. 2. Percentage of participants who reported using condom always/almost always by number of sexual partners; $p = 0.002$.

that participants with more frequent condom use had also more sexual partners than participants who used condom rarely (Fig. 2).

Next we compared HBsAg-positive participants to participants who were HBsAg-negative but anti-HBc IgG positive (Table 2). In this case, anti-HBc IgG but HBsAg-negative participants were older than the HBsAg-positive participants, but there were still more men among the HBsAg-positive, and they used a condom more frequently.

In the third case we compared participants with resolved hepatitis B with participants who had never encountered this virus (Table 3). As expected, we found that HBc IgG positive participants were older, were more frequently imprisoned and more frequently tattooed. There was no difference in gender distribution. We have also obtained information about vaccination from participants' medical records. Only 15 participants (3.3%) were vaccinated against hepatitis B in adulthood.

Hepatitis C

Anti-HCV positivity was found in only three participants (0.7%). Two anti-HCV positive participants were also HBsAg

positive. Due to the very low number of anti-HCV positive, no significant difference was observed in any parameter (Table 4).

DISCUSSION

Hepatitis B and C prevalence among the Roma of Central Europe has been very poorly explored. To this date we were able to find only one such paper in the MEDLINE database; it tried to map hepatitis B prevalence in the Hungarian Roma population. The authors tested 64 patients in the Dzsembuji region, 50 Roma and 14 people from the majority population. No patient had active hepatitis, 26% of Roma subjects and 28.6% of the majority subjects had come in contact with hepatitis B in the past (11).

In another study Greek authors tested 216 children (118 Roma) with a mean age of 9 years. Twenty-two percent of these Roma children had resolved hepatitis B infection and were anti-HBc positive, while 4% were HBsAg positive. No children from the majority group had HBsAg positivity (12).

We found out that the prevalence of active hepatitis B in the Roma population in segregated communities was 12.5%, which is

Table 2. Comparison of imprisonment, drug use, blood transfusion, sexual behaviour, and tattoo procedure between HBsAg-positive and HBsAg-negative, but HBcIgG-positive participants

	N	HBsAg positive n (%)	HBsAg negative HBc IgG positive n (%)	p
Gender (male)	233	28 (50.9)	63 (35.4)	0.039
Age (years)*	230	35.2 (12.2)	38.6 (12.3)	0.004
Imprisonment	230	7 (12.7)	24 (13.7)	ns
Drugs total	232	1 (1.9)	2 (1.1)	ns
Intravenous drugs	226	–	1 (0.6)	–
> 4 sexual partners	226	8 (14.5)	15 (8.8)	ns
Sex for money	227	2 (3.6)	6 (3.5)	ns
Used condom always or most of the time	227	11 (20.0)	15 (8.7)	0.022
Tattoo total	226	23 (44.2)	77 (44.3)	ns
Tattoo privately	228	20 (40.8)	75 (43.6)	ns
Tattoo parlour	131	3 (9.4)	2 (2)	ns
Blood transfusion	221	8 (14.8)	27 (16.2)	ns

*Median (interquartile range)

Significance tested by chi-square (with continuity correction if low expected counts) or Mann-Whitney U test where appropriate

ns non-significant difference ($p > 0.05$)

Table 3. Comparison of imprisonment, drug use, blood transfusion, sexual behaviour, and tattoo procedure between HBc IgG-positive and HBc IgG-negative participants (only HBsAg negative)

	N	HBc IgG positive n (%)	HBc IgG negative n (%)	p
Gender (male)	386	63 (35.4)	64 (30.8)	ns
Age (years)*	381	38.6 (12.3)	30.7 (16.1)	<0.001
Imprisonment	379	24 (13.7)	13 (6.4)	0.016
Drugs total	384	2 (1.1)	6 (2.9)	ns
Intravenous drugs	378	1 (0.6)	1 (0.5)	ns
>4 sexual partners	371	15 (8.8)	28 (14)	ns
Sex for money	373	6 (3.5)	5 (2.5)	ns
Used condom always or most of the time	374	15 (8.7)	15 (7.4)	ns
Tattoo total	379	77 (44.3)	69 (33.7)	0.035
Tattoo privately	373	75 (43.6)	65 (32.3)	0.025
Tattoo parlour	239	2 (2.0)	4 (2.9)	ns
Blood transfusion	363	27 (16.2)	33 (16.8)	ns

*Median (interquartile range)

Significance tested by chi-square (with continuity correction if low expected counts) or Mann-Whitney U test where appropriate

ns non-significant difference (p>0.05)

Table 4. Comparison of imprisonment, drug use, blood transfusion, sexual behaviour, and tattoo procedure between anti-HCV-positive and negative participants

	N	Anti-HCV positive n (%)	Anti-HCV negative n (%)
Gender (males)	441	2 (66.7)	153 (34.9)
Age (years)*	436	23.5 (N/A)	35.5 (15.29)
Imprisonment	434	-	44 (10.2)
Drugs total	438	-	9 (2.1)
Intravenous drugs	431	-	2 (0.5)
> 4 sexual partners	426	1 (33.3)	50 (11.8)
Sex for money	428	-	13 (3.1)
Used condom always or most of the time	429	1 (33.3)	40 (9.4)
Tattoo total	431	1 (33.3)	167 (39.0)
Tattoo privately	422	1 (33.3)	159 (37.9)
Tattoo parlour	271	1 (50.0)	8 (3.0)
Blood transfusion	417	1 (33.3)	67 (16.2)

*Median (interquartile range)

much higher than the average prevalence in the Slovak Republic (1.7%) (13). Altogether almost 53% had come into contact with hepatitis B virus in the past or present (12.5% HBsAg positive, and 40.4% HBsAg negative, but HBcIgG positive). General hepatitis B prevalence in the United States is around 0.3%, but it is much higher in communities of people from South East Asia (Chinese 10%, Vietnamese 14%, Laotians 14%) (14). High hepatitis B prevalence could persist in relatively closed communities because of inadequate anti-epidemiological procedures. Therefore, these communities could be a source of infection for the unvaccinated majority population.

Roma do not constitute a homogenous ethnic group. Spanish authors have compared the prevalence of hepatitis B in two communities (ciganes and gypsies), presumably pertaining to the same ethnic group and considered to have high risk for the disease. Serologic markers were determined in 245 ciganes (65% of the

total of the cigane population) and in 127 gypsies (45% of the total gypsy population). HBsAg was negative in the gypsies and positive in 27% of the ciganes. Antibodies were found in 12% of the gypsies and in 72% of the ciganes (15).

One possible route of infection is vertical transmission from mother to the child during birth. Hepatitis B prevalence in Roma mothers is a lot higher than in the general population. In the Spanish study the determination of HBsAg in 3,404 pregnant women showed 84 positive cases (2.46%), which is above the average for the Spanish population. Gypsy women showed a statistically higher rate of chronic HBV infection (8.4%) than the non-Gypsy population (1.4%) (16). Slovak authors reported that average hepatitis B prevalence in pregnant women in regions with less than 5% of Roma population was 0.98% compared with 2.72% in regions where Roma accounted for $\geq 5\%$ of inhabitants (13).

Horizontal transmission is a second important route of infection in hepatitis B. We found two important facts that support this route of infection in this cohort. First, men constitute 50.9% of HBsAg-positive and only 30.8% of HBcIgG-negative participants; and second, HBsAg-positive and HBcIgG-positive participants were significantly older than participants negative for all serological markers of hepatitis B virus infection. Therefore, the high hepatitis B prevalence in Roma communities in eastern Slovakia is probably caused by high intrafamily horizontal transmission in infancy in addition to vertical transmission.

Behavioural factors could play an important role in the high prevalence of chronic active hepatitis B virus infection in Roma. HBsAg-positive participants were twice as often inmates in a correctional facility compared with HBsAg-negative/HBcIgG-negative participants (12.7% vs. 6.4%, NS). Anti-HBc IgG-positive but HBsAg-negative participants were significantly more often prison inmates than participants negative for all serological markers of hepatitis B (13.7% vs. 6.4%). A higher prevalence of hepatitis B and C among prison inmates compared with the general population has been confirmed in the published literature as well (17).

We have observed an overall trend toward more frequent tattoos among HBsAg-positive participants compared with HBsAg-/anti-HBc IgG-negative participants (44.2% vs. 33.7%, NS). HBsAg-positive patients had also been more frequently tattooed privately, rather than in an official tattoo parlour. HBsAg-/anti-HBc IgG-positive participants had also been significantly more tattooed compared with HBsAg-/anti-HBc IgG-negative participants (44.3% vs. 33.7%) and were more often tattooed outside an official tattoo studio (43.6% vs. 32.3%). In a meta-analysis performed by Canadian authors, the pooled odds ratios (95% CI) of the association of tattooing and hepatitis B infection was 1.48 (1.30–1.68) (18). Tattooing in the Roma population could be means of hepatitis B transmission through the use of shared needles (19), especially when the tattoo is performed at home. Unfortunately, the study data does not show either tattooing or intravenous drug use as being significant risk factors for HBsAg positivity.

Sexual intercourse was not proven to be a risk factor in hepatitis B transmission in this study. We found no significant difference in HBsAg positivity between participants who reported more than 4 sexual partners and participants with 4 or less sexual partners, or participants who reported that they had received money for sexual intercourse. This is probably caused by the data obtaining method. Roma participants provided lifestyle associated data via a structured interview, which probably led to gender-specific under-reporting/over-reporting of the number of sexual partners. Male participants reported having had significantly more sexual partners than women (Fig. 1).

The use of condoms could lower the risk of hepatitis B transmission. Regular use of condom decreased the prevalence of anti-HBc positivity almost three-times (20). Natural condoms allowed leakage of the hepatitis B virus, whereas synthetic condoms prevented leakage of the hepatitis B virus (21). In this study, 20% of HBsAg-positive participants used condom always or frequently compared with 7.4% of participants negative for HBsAg and anti-HBc IgG. This contradiction is probably caused by the low number of participants who reported using condom (41 participants, 9.3%) and by the fact that participants who reported

using condom had significantly more sexual partners (Fig. 2). Out of the participants who reported more than 4 sexual partners, 21.2% used condom always or frequently, compared with 7.8% who did not use condom at all. Therefore, it is clear that there is greater promiscuity among Roma participants who use condom frequently and have higher risk of contracting hepatitis B.

Hepatitis B vaccination, if it produces protective titers of antibodies, could significantly lower the prevalence of the disease. In the above-mentioned Greek study the authors found protective titers of anti-HBs antibodies in 14% of Roma children but in 96% of children from the majority population (12). Hungarian authors reported that only 6% of Roma had effective titers of anti-HBs antibodies, compared with 28.6% of the majority population (11). The compulsory vaccination of newborns in Slovakia was put into effect in 1998 (22). Therefore, participants in this study have not been vaccinated, only a small number (15 participants, 3.3%) reported having been vaccinated against hepatitis B in adulthood.

The vaccination rate among Italian gypsy children living in Rome was also low. In a short time period during the year 2002, two thousand out of 2,400 13-year old children living in 32 Roma communities were vaccinated (23). Vaccination of the majority of HBsAg and anti-HBc-negative Roma population could stop further spreading of hepatitis B in Roma communities in eastern Slovakia.

Hepatitis C prevalence in this study was very low. We detected anti-HCV antibodies in only 3 (0.7%) Roma participants. Two participants were coinfectd with hepatitis B. The prevalence of anti-HCV positivity in the general Slovak population is 1.52% and half of these patients are HCV RNA positive (24). Hepatitis C prevalence in the Roma population of the Czech city of Brno was 4.3%, which is almost 20-times higher than in the general Czech population. Intravenous drug use and former imprisonment were the significant parameters associated with HCV infection. Heroin abuse prevailed over pervitin (methamphetamine) abuse especially in unemployed men under 20 years of age, and heroin abuse was associated with a higher risk of HCV infection than pervitin abuse (25). In this study we found that hepatitis C prevalence in the Roma population is approximately the same as in the general population. In contrast to the Roma community from the Czech study, only 2.1% of the study participants reported intravenous drug use. Out of 3 anti-HCV positive patients, one had tattoo, one had received blood transfusion and one had more than 4 sexual partners. No anti-HCV positive patients had been in prison and those who were anti-HCV positive were younger (25.5 vs. 35.5 years), however, due to low number of anti-HCV positive participants no relevant analysis could be performed.

CONCLUSION

Hepatitis B prevalence in the Roma population of eastern Slovakia is very high. Serological markers of active or resolved hepatitis B infection were found in more than half of participants aged 15–45 years. Males and older people were more likely to acquire hepatitis B infection. Imprisonment and a tattoo, particularly one performed at home, were identified as risk factors for hepatitis B infection. The vaccination of the Roma population negative for serological markers of hepatitis B infection is an urgent socioeconomic and medical challenge and was proved

to be an effective and sustainable model for prevention (26). In contrast to hepatitis B, hepatitis C prevalence among Roma in eastern Slovakia is relatively low (0.7%). We suppose that this is associated with the very rare use of intravenous drugs.

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Conflict of Interests

None declared

APPENDIX

HepaMeta Team: Peter Jarčuška, Andrea Madarasová Gecková, Mária Mareková, Daniel Pella, Leonard Siegfried, Pavol Jarčuška, Lýdia Pastvová, Ján Fedačko, Jana Kollárová, Peter Kolarčík, Daniela Bobáková, Zuzana Veselská, Ingrid Babinská, Sylvia Dražilová, Jaroslav Rosenberger, Ivan Schréter, Pavol Kristian, Eduard Veselíný, Martin Janičko, Ladislav Virág, Anna Birková, Marta Kmeťová, Monika Halánová, Darina Petrášová, Katarína Cáríková, Viera Lovayová, Lucia Merkovská, Lucia Jedličková, Ivana Valková

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