Prevalence, risk factors and hepatitis B immunization: helping fill the gap on hepatitis B epidemiology among homeless people, Goiânia, Central Brazil

Prevalência, fatores de risco e imunização contra a hepatite B: ajudando a preencher as lacunas na epidemiologia da hepatite B entre pessoas em situação de rua em Goiânia, Goiás, Brasil

Prevalencia, factores de riesgo e inmunización contra la hepatitis B: ayudando a completar las lagunas en la epidemiología de la hepatitis B entre personas sin techo en Goiânia, Goiás, Brasil

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Abstract

Data are limited in Brazil on hepatitis B infection among homeless individuals, a marginalized population with high risk of sexually transmissible infections (STI), including hepatitis B. The aim of this study was to investigate hepatitis B epidemiology in homeless persons lodged in a public shelter in Goiânia, Central Brazil. From August 2014 to June 2015, 353 individuals were interviewed and tested for markers of HBV infection. Overall HBV prevalence was 21.8% (95%CI: 17,82-26,41), and 19,5% (95%CI: 15,75-24,0) showed a serological profile of previous HBV vaccination. Older individuals (> 50 years), blacks, and homosexuals or bisexuals showed increased exposure to HBV. The low frequency of individuals immunized against HBV, high social vulnerability, and risk behaviors emphasize the need for health services administrators to provide more opportunities for HBV vaccination in this target population.

Hepatitis B; Immunization; Homeless Persons

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Introduction

Street population experiences prejudice and discrimination, and has a strong intersection with drug users and sex workers, representing a vulnerable population that mostly has poor access to health services [1]. Globally, the number of people living on the streets is estimated at 100 million. These people have death rates four times higher than the general population and a high prevalence of psychiatric disorders, abuse of licit and illicit drugs, and infectious diseases [2]. In Brazil, about 50,000 people live on the streets in state capitals, the Federal District and cities with over 300,000 inhabitants [3].

It is estimated that 2 billion people have been infected with hepatitis B virus (HBV) worldwide, and that every year 600,000 people die due to the consequences of viral infection such as chronic hepatitis, cirrhosis, and hepatocellular carcinoma [4]. In Brazil, where the overall prevalence of HBV is low, the burden of the infection is concentrated mainly in populations with social vulnerability and risk behaviors [5,6].

Homeless people have been disproportionately affected by infectious diseases including HBV infection. In Brazil, the only study on hepatitis B in this population was carried out in the beginning of 2000 among 330 shelter users in the city of São Paulo, Southeastern Region of the country. The author showed 30.6% were previously exposed to HBV and 3.3% were chronic HBsAg carriers [7], suggesting a high prevalence of hepatitis B among this population.

Hepatitis B vaccine has been available for almost 20 years in our country [8], and therefore it should be of great interest to decision-makers to know whether this policy has reached this target-population. Therefore the purpose of this study was to investigate the prevalence, risk factors and HBV immunization status among homeless people being served in a public shelter in the city of Goiânia, Central Brazil.

Methodology

This is a cross-sectional study carried out among homeless people served at a public shelter in the city of Goiânia (1,302,001 inhabitants). Data collection was conducted from August 2014 to June 2015. This shelter was opened in 2007, and has the capacity to serve approximately 240 individuals. This facility represented the only public shelter in the city during the period of investigation.

The *Brazilian National Survey on Homelessness* carried out in 2008 estimated the number of homeless people in Goiânia at 563 [9]. The study sample was calculated on the basis of an alpha and beta error of 5% and 20%, respectively, with an expected HBV prevalence of 30.6% [7] and a precision of 1.5%. According to these data, the minimum sample size necessary was 311 individuals.

Those included in the study were individuals served by the public shelter, aged over 18 years. Subjects were excluded if they were under the effects of medication/psychoactive drugs at the time of the interview; and/or displayed behavior that would preclude the collection of a blood sample.

Data collection was conducted three days a week during the morning, afternoon, or evening. All individuals were interviewed in a private place, using a structured questionnaire containing questions about sociodemographic characteristics and predictors of HBV infection. 10mL of blood collected by venipuncture was subjected to detection of HBV markers: HBsAg, total anti-HBc and anti-HBs (Bioelisa, Biokit S.A., Barcelona, Spain). Individuals whose sera were positive only for anti-HBs were considered vaccinated against HBV.

Data were analyzed using Stata SE, version 13 (StataCorp LP, College Station, USA). Prevalence was calculated with 95% confidence intervals (95%CI). Descriptive analysis was conducted by frequency distribution, arithmetic mean and standard deviation. For analysis of potential predictors of exposure to HBV (HBsAg and/or total anti-HBc positive), individuals who had serological profile of previous vaccination against HBV were excluded. This study used the chi-square test (χ^2) or Fisher's exact test to assess differences between proportions. For calculation of the adjusted prevalence ratio (PR), variables that presented a p-value < 0.10 were included in a Poisson regression model with robust error variance. P-values < 0.05 were considered statistically significant.

This project was approved by the Ethics Committee of the Federal University of Goiás (protocol n. 045/13). Since individuals living on the streets have great geographical mobility and poor access for

returning surveys, rapid testing was carried out for the detection of HBsAg markers (VIKIA – HBsAg, BioMérieux Brasil S/A, Rio de Janeiro, Brazil), following the recommendations of the Brazilian Ministry of Health. Individuals HBsAg positive were referred to the public health service, per prior agreements with the Municipal Health Secretariat of Goiânia, for evaluation and treatment (if necessary).

Results

A total of 353 eligible individuals participated in the study. Of them, 81.3% were male, and 20.4% were married. The median age of study participants was 36 years, ranging between 18 and 86 years. Eighty-nine (25.2%) individuals reported less than five years of education, 188 (53.3%) 5-9 years, and 76 (21.5%) more than nine years. Two hundred and fifteen (61%) individuals self-declared mixed race, 62 (17.6%) white, 58 (16.4%) black, and 18 (5%) other race/ethnicity. Most (57.5%) of the participants had experienced sleeping on the street.

Some serological markers for HBV infection were found in 77 participants, resulting in an overall prevalence of 21.8% (95%CI: 17.8-26.4). Two participants (0.6; 95%CI: 0.15-2.04) were HBsAg and total anti-HBc positive, 14 (4.53; 95%CI: 2.80-7.23) were positive for only anti-HBc and 61 (17.28; 95%CI: 13.69-21.57) for anti-HBs and anti-HBc. Isolated anti-HBs positivity was detected in 19.5% (95%CI: 15.7-24.0) of participants (Table 1).

It was found that the prevalence of HBV exposure (anti-HBc) increased from 10.8% in subjects aged 18-30 years to 46.8% in individuals older than 50 years. The prevalence of immunized (anti-HBs isolated) participants dropped from 53.6% in subjects aged 18-30 years to 1.4% in individuals older than 50 years ($p < 0.001$). There is no difference between the proportions of vaccinated vs. unvaccinated homeless regarding sex, ethnicity, and years of education ($p > 0.05$).

Statistically significant differences were observed in the proportion of individuals exposed to HBV, considering the following variables: age, sleeping on the street, and sexual intercourse with people living with HIV/AIDS ($p < 0.05$). Also, the variables ethnicity (self-identified), sexual orientation, and history of sexual violence tended to be associated ($p < 0.10$) (Table 2).

These variables, as well as sex, were included in a Poisson regression model with robust error variance, and age > 50 years (adjusted PR: 3.06), black (adjusted PR: 1.81), and homosexuality or bisexuality (adjusted PR: 2.60 and 1.80, respectively) were independently associated with exposure to HBV (Table 3).

Discussion

Corroborating findings observed by other investigators in countries of low to intermediate endemicity [10,11,12,13], a high prevalence of HBV markers (21.8%; 95%CI: 17.8-26.4) was observed among homeless people in Goiânia. This was higher than that estimated for the adult population of capitals in the same region of the country (13.2%; 95%CI: 10.9%-15.5%) [14], and also for those found in other

Table 1

Prevalence of hepatitis B virus (HBV) markers among 353 homeless individuals in Goiânia, Central Brazil.

HBV marker	n	%	95%CI
Anti-HBc/HBsAg	2	0.57	0.15-2.04
Anti-HBc/Anti-HBs	61	17.28	13.69-21.57
Anti-HBc only	14	4.53	2.80-7.23
Any exposure marker	77	21.81	17.82-26.41
Anti-HBs only	69	19.55	15.75-24.00

95%CI: 95% confidence interval.

Table 2

Bivariate analysis of risk factors associated with exposure to hepatitis B virus (HBV) among 353 homeless individuals in Goiânia, Central Brazil.

Variables	HBV		χ^2	p-value
	Positive (n = 77) n (%)	Negative (n = 207) n (%)		
Age (years)				
18-30	11 (16.9)	54 (83.1)	19.24	< 0.001
31-40	20 (19.8)	81 (80.2)		
41-50	17 (29.8)	40 (70.2)		
> 50	29 (47.5)	32 (52.5)		
Sex				
Male	65 (27.8)	169 (72.2)	0.298	0.585
Female	12 (24.0)	38 (76.0)		
Black				
No	60 (25.1)	179 (74.9)		
Yes	17 (37.8)	28 (62.2)	3.078	0.079
Education (years)				
> 9	14 (21.5)	51 (78.5)		
5-9	38 (27.1)	102 (72.9)	1.843	0.398
≤ 4	25 (31.6)	54 (68.4)		
Sleeping on the street				
No	38 (32.2)	80 (67.8)		
Yes	39 (23.5)	127 (76.5)	2.647	0.104
Sexual orientation				
Heterosexual	66 (25.3)	195 (74.7)		
Homosexual	6 (46.2)	7 (53.8)	5.476	0.065
Bisexual	5 (50.0)	5 (50.0)		
Previous sexual violence *				
No	55 (24.8)	167 (75.2)		
Yes	22 (36.1)	39 (63.9)	3.080	0.079
Number of partners				
≤ 10	29 (30.2)	67 (69.8)		
11-20	10 (22.2)	35 (77.8)		
21-30	5 (22.7)	17 (77.3)	1.226	0.747
> 30	33 (27.3)	88 (72.7)		
Condom use with steady partner (n = 110) *				
Always	6 (33.3)	12 (66.7)		
Sometimes	9 (23.1)	30 (76.9)	0.667	0.716
Never	14 (26.4)	36 (73.6)		
Condom use with occasional partner (n = 152)				
Always	17 (25.4)	50 (74.6)		
Sometimes	13 (26.5)	36 (73.5)	2.149	0.342
Never	8 (42.1)	11 (57.9)		
Sex in exchange for money or drugs *				
No	70 (27.7)	183 (72.3)	0.163	0.686
Yes	7 (24.1)	22 (75.9)		
Sex with partner living with HIV/AIDS (n = 284) *				
No	52 (25.5)	152 (74.5)	4.187	0.041
Yes	9 (47.4)	10 (52.6)		
Sex with drug users (n = 284) *				
No	36 (30.8)	81 (69.2)	1.390	0.238
Yes	38 (24.4)	118 (75.6)		

(continues)

Table 2 (continued)

Variables	HBV		χ²	p-value
	Positive (n = 77 n (%)	Negative (n = 207 n (%)		
Anal sex (n = 284) *				
No	34 (24.5)	105 (75.5)	0.863	0.353
Yes	42 (29.4)	101 (70.6)		
Illicit drug use (previous six months)				
No	32 (32.0)	68 (68.0)	1.866	0.172
Yes	45 (24.5)	139 (75.5)		
Sharing of objects for personal use				
No	23 (25.3)	68 (74.7)	0.229	0.632
Yes	54 (28.0)	139 (72.0)		
Tattoos/Piercings				
No	46 (27.4)	122 (72.6)	0.015	0.903
Yes	31 (26.7)	85 (73.3)		
Previously incarcerated *				
No	36 (27.3)	96 (72.7)	0.013	0.909
Yes	40 (26.7)	110 (73.3)		
Previous STI *				
No	42 (24.7)	128 (75.3)	1.154	0.283
Yes	31 (30.7)	70 (69.3)		
History of hepatitis in family				
No	62 (25.8)	178 (74.2)		
Yes	15 (34.1)	29 (65.9)	1.283	0.257
Previous blood transfusion *				
No	59 (25.2)	175 (74.8)		
Yes	14 (32.6)	29 (67.4)	1.010	0.315

STI: sexually transmitted infection.

* No information: previous sexual violence = 1; condom use with steady partner = 174; condom use with occasional partner = 149; sex in exchange for money or drugs = 2; sex with partner living with HIV/AIDS = 61; sex with drug users = 11; anal sex = 2; previously incarcerated = 2; previous STI = 13; previous blood transfusion = 7.

Table 3

Multivariate analysis of variables associated with hepatitis B markers.

Variable	Adjusted PR (95%CI)	p-value
Age (years)		
18-30	1.00	
31-40	1.14 (0.60-2.20)	0.685
41-50	1.59 (0.82-3.08)	0.168
> 50	3.06 (1.71-5.47)	0.000
Black	1.81 (1.17-2.79)	0.007
Sleeping on the street	0.76 (0.53-1.10)	0.137
Sexual orientation		
Heterosexual	1.00	
Homosexual	2.60 (1.28-5.28)	0.008
Bisexual	1.80 (1.06-3.08)	0.030
Sex with partner living with HIV/AIDS	1.00 (0.99-1.00)	0.806
Previous sexual violence	0.99 (0.96-1.01)	0.407

95%CI: 95% confidence interval; PR: prevalence ratio.

vulnerable populations from the same region who have a large intersection with homeless such as recyclable waste collectors (n = 431; 12.8%; 95%CI: 9.8-16.2) [15] and users of illicit drugs (n = 852; 14%; 95%CI: 11.7-16.5) [16]. However, the prevalence found among homeless people in Goiânia was lower than that found ten years before by Brito et al. [7] (30.6%; 95%CI: 25.9-35.8) in São Paulo. In Goiânia, the participants were younger and had better education levels. These characteristics very likely contributed to these findings.

The gold standard for assessment of vaccine coverage is the immunization record (a card issued by the public health system). However, in adult populations there is little chance of access to this information, especially if the population has little access to public health services such as those people living on the streets [1]. Furthermore, the verbal report of previous hepatitis B vaccination is poorly reliable [17,18]. Therefore, despite methodological limitations, detection of anti-HBs in serum alone is used as indicator prior immunization.

In our study, only 19.5% of participants presented a serological profile of prior immunization, confirming the low frequency of hepatitis B vaccination among vulnerable populations in our region and elsewhere [16,19,20,21]. However, it should be noted the wide variation observed in the distribution by age group, with prevalence of 53.6% in individuals aged 18 to 30 years dropping to 1.4% among those aged above 50 years. These better results among younger subjects very likely reflects the outcome of the Brazilian National Immunization Program policy, which from the 2000s effectively implemented hepatitis B vaccination in children and adolescents nationwide. This policy was also gradually extended to older people and vulnerable populations, and is currently available to older people [22]. These findings and that of higher HBV prevalence among older homeless reinforce the need of health managers to invest in more persuasive strategies to vaccinate these specific populations, particularly older subjects.

We found that self-reported homosexual or bisexual orientation was statistically associated with HBV exposure (p = 0.009 and p = 0.030), corroborating previous studies that have shown a higher risk of hepatitis B among men who have sex with men (MSM) [23,24]. Many MSM have multiple sexual partners and use condoms inconsistently during sexual intercourse, behaviors that put them at increased risk for sexually transmitted infections, including hepatitis B [23,25].

In our country, social racial categorization depends on appearance of the individual, being classified as white, black, mixed race, indigenous and yellow [26]. According to the 2010 demographic census 2010, the Brazilian population is 47.7% white, 43.1% mixed race, and 7.6% black [27]. This composition is dramatically different from that found among the homeless studied here, with 78.6% self-declared mixed race or black. In addition, in our country and elsewhere [28,29,30], the black population is subject to greater economic and social vulnerability, which can contribute to disproportionate susceptibility to infectious diseases. Our findings reinforce these assumptions, since ethnicity was predictive of HBV infection (adjusted PR: 1.70; p = 0.024).

Some limitations of the study should be presented. The study was conducted in a public institution that houses people on the streets and may not be representative of the entire homeless population in the city. However, the characteristics of the individuals studied were similar to those in the *Brazilian National Survey on Homelessness* [3], giving the findings external validity. The prevalence data for vaccination coverage may be underestimated, since the date of the last dose of vaccine is unknown, and according to the kinetics of this marker, the titers of anti-HBs decline over the years. However, our results are consistent with other studies in vulnerable populations. Finally, many questions are morally sensitive, and despite the team's efforts to assure the respondent of privacy and anonymity, some answers may not have been truthful.

Although the study has been limited to individuals housed in a shelter, it is believed that the obtained data will contribute to the body of knowledge on the homeless population, and encourage more specific health policies for this population, which in most cases is outside the public health services and presents social and individual vulnerabilities that put them at risk of infections such as hepatitis B.

Contributors

Acknowledgments

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Resumo

No Brasil, existem poucos dados sobre a infecção por hepatite B entre pessoas em situação de rua, uma população marginalizada com alto risco para infecções sexualmente transmissíveis (IST), incluindo a hepatite B. O objetivo deste estudo foi investigar a epidemiologia da hepatite B em pessoas alojadas em um abrigo público da cidade de Goiânia, Brasil Central. De agosto de 2014 a junho de 2015, 353 indivíduos foram entrevistados e testados para os marcadores da infecção pelo HBV. Uma prevalência global de 21,8% (IC95%: 17,82-26,41) para HBV foi estimado, e 19,5% (IC95%: 15,75-24,0) apresentaram perfil sorológico de vacinação prévia contra o HBV. Ser mais velho (acima de 50 anos de idade), preto e homossexual ou bissexual foram preditores de exposição ao HBV. A baixa frequência de indivíduos imunizados contra o HBV, bem como de alta vulnerabilidade social e ocorrência de comportamentos de risco reforçam a necessidade dos gestores de saúde proporcionar mais oportunidades de vacinação para esta população-alvo.

Hepatite B; Imunização; Pessoas em Situação de Rua

Resumen

En Brasil, existen pocos datos sobre la infección por hepatitis B entre personas sin techo, una población marginalizada con un alto riesgo de infecciones sexualmente transmisibles (IST), incluyendo la hepatitis B. El objetivo de este estudio fue investigar la epidemiología de la hepatitis B en personas alojadas en un albergue público de la ciudad de Goiânia, Brasil Central. De agosto de 2014 a junio de 2015, se entrevistó a 353 individuos y se probaron los marcadores de la infección por HBV. Se estimó una prevalencia global de un 21,8% (IC95%: 17,82-26,41) para HBV, y 19,5% (IC95%: 15,75-24,0) presentaron un perfil serológico de vacunación previa contra el HBV. Ser más viejo (por encima de 50 años de edad), negro y homosexual o bisexual fueron predictores de exposición al HBV. La baja frecuencia de individuos inmunizados contra el HBV, así como la alta vulnerabilidad social y ocurrencia de comportamientos de riesgo refuerzan la necesidad de los gestores de salud de proporcionar más oportunidades de vacunación para esta población-objetivo.

Hepatitis B; Inmunización; Personas sin Hogar