



Acta Paulista de Enfermagem

ISSN: 0103-2100

ape@unifesp.br

Universidade Federal de São Paulo  
Brasil

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Acta Paulista de Enfermagem, vol. 30, núm. 1, enero-febrero, 2017, pp. 66-72  
Universidade Federal de São Paulo  
São Paulo, Brasil

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# Prevalence of hepatitis B and associated factors in prisoners

Prevalência de hepatite B e fatores associados em internos de sistema prisional

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## Keywords

Hepatite B; Prisons; Risk factors; Public health nursing

## Descritores

Hepatite B; Prisões; Fatores de risco; Enfermagem em saúde pública

## Submitted

October 18, 2016

## Accepted

January 18, 2017

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DOI: <http://dx.doi.org/10.1590/1982-0194201700010>



## Abstract

**Objective:** To estimate the prevalence of HBsAg marker in prisoners of the Brazilian prison system, correlating it to associated factors.

**Methods:** An epidemiological, cross-sectional study was conducted in prison units with closed or semi-open regime (n=12), totaling 2,131 participant prisoners. Data were collected in an interview, followed by rapid testing for Hepatitis B (HBsAg). Simple, bivariate and multivariate descriptive analyses were carried out, with the use of logistic regression with the p value settled at 0.05.

**Results:** The prevalence of positive HBsAg was 0.5%, with a statistically significant association with the variables "does not like to wear condoms" (ORa=3.63) and "does not know how to prevent sexually transmissible diseases" (ORa=5.02).

**Conclusion:** The estimated prevalence was equal to or lower than that found in the general population of the country and the results proved that there are factors statistically associated with the prevalence of HBsAg positivity in the studied population.

## Resumo

**Objetivo:** Estimar a prevalência do marcador HBsAg em internos de sistema prisional brasileiro, correlacionando-a a fatores associados.

**Métodos:** Pesquisa epidemiológica, transversal, realizada nas unidades prisionais com regime fechado ou semiaberto (n=12), totalizando 2.131 internos participantes. A coleta de dados ocorreu por meio da realização de entrevista, seguida de testagem rápida para Hepatite B (HBsAg). Foram realizadas análises descritivas simples, bivariadas e multivariadas, utilizando-se a Regressão Logística com o valor de p fixado em 0,05.

**Resultados:** A prevalência de HBsAg positivo foi de 0,5%, com associação estatisticamente significativa com as variáveis "não gostar de utilizar preservativo" (ORa=3,63) e "não saber como prevenir infecções sexualmente transmissíveis" (ORa=5,02).

**Conclusão:** A prevalência estimada esteve igual ou menor que a encontrada na população geral do país e comprovou-se que existem fatores estatisticamente associados à prevalência de positividade do HBsAg na população estudada.

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**Conflicts of interest:** there are no conflicts of interest to declare. \*Originated from the master thesis entitled: Prevalência de Hepatite b e fatores de risco associados em internos no sistema prisional do estado do Piauí, presented at the Nursing Graduate Program, of Universidade Federal do Piauí.

## Introduction

The population that is deprived of freedom (PDF) has showed higher vulnerability to sexually transmissible infections (STIs), because of the existing conditions in the prison units, which enhance the possibilities of transmission of infectious diseases, such as hepatitis B. Poor infra-structure, prison cell overcrowding, low socioeconomic level, and risky sexual practices potentiate infection possibilities.<sup>(1-3)</sup>

The topic of health in prisons has been constantly addressed by the scientific community that sees it as question of public health to be faced, emphasizing the need for implementing specific strategies for this population.<sup>(4)</sup>

Health care appears as an element that contributes to the return to life in society, with health care to the population deprived of freedom being legally provided and guaranteed, with actions related to prevention, early diagnosis, and timely treatment to the STI included in the minimum list of procedures.<sup>(5,6)</sup>

Studying the occurrence of hepatitis B and its associated factors in prisons is relevant to public health, since the risk behaviors of inmates can contribute to maintain the chain of infection transmission. Thus, the objective of this study was to estimate the prevalence of HBsAg marker, correlating it to associated factors in inmates of the prison system of a Brazilian northeast state.

## Methods

This cross-sectional epidemiological survey was carried out in 12 criminal units of the state of Piauí, distributed in nine cities, with concentration in the capital of the state. Inmates in closed and semi-open regimes (n=2,839) were selected to compose the study population, in a universe of 2,955 inmates. Those who were not in conditions to answer the study questions of interest (n=73); and inmates who, in the period of data collection, were in units with riots/rebellions (n= 464) were excluded. In addition, 171 people refused to participate, resulting in 2,131 participants.

Data were collected after signature of a free and informed consent form by the studied population, from January to July 2014, by the researchers and a team of professionals specifically trained in testing and counseling on STI/Aids/viral Hepatitis.

The collection took place in two stages, in the pavilions of the prison units, in order to guarantee privacy during the interview, with the supervision of the safety team of each institution. Initially, an interview was conducted using a pre-tested form, adapted from other studies.<sup>(7,8)</sup> The next stage, for testing, was performed by means of rapid tests with the lateral immunocromatography method for detection of HBsAg (VIKIA HBsAg test, BioMérieux Brazil S/A). Collection tests and materials were supplied by the State Health Department of Piauí.

The rapid test for Hepatitis B is a screening test; therefore, positive cases were referred by the Department of Justice to the state or municipal reference services, for the performance of confirmatory serological tests, and the necessary follow-up. Reports were provided regarding the examination, in two copies (one for the researcher and another one that was attached to the prisoner's report), with the final interpretation of the results of the samples: "Reactive sample for hepatitis B or non-reactive sample for hepatitis B".

The dependent variable was positive result in the rapid test for HBsAg. The independent variables were: sociodemographic (age, gender, city of origin, marital status, skin color, level of education, personal income); pattern of use of alcohol and other drugs (type and frequency); parenteral exposure (sharing of needlestick and sharp materials, having tattoos, having piercings); sexual behaviors (sexual practice, number of partners, criterion for selection of sexual partner, use of condoms, reason for not wearing a condom, use of alcoholic beverages, and drugs before sexual intercourse); information on hepatitis B (about the infection and the vaccine), existence of some STI throughout life, information on how to prevent STIs; and immunization status.

For the analysis of the immunization status, the schedule was considered complete for those who

received the three doses of the hepatitis B vaccine. This information was collected verbally, because of the unavailability of vaccine cards in the prisons investigated.

Data were typed and analyzed with the use of the software Statistical Package for the Social Sciences (SPSS), version 20.0. In the inferential statistics, bivariate and multivariate hypotheses tests were applied. Simple logistic regression was used as the bivariate test of association among the qualitative variables, referred here as unadjusted odds, with the objective to select the possible factors that could explain the prevalence of hepatitis B. As selection criterion for the reference categories, clinical importance was adopted. The variables, which in the bivariate analysis presented  $p$  value  $< 0.05$ , were submitted to the multivariate model of logistic regression, called here adjusted odds.<sup>(9)</sup>

For all other analyses, significance at 0.05 was kept for rejection of the null hypothesis. The absence of multicollinearity between the variables selected through bivariate analysis was examined by means of the variance inflation factor (VIF), and the cutoff value adopted for the existence of multicollinearity was  $VIF \geq 4$ .<sup>(9)</sup>

To conduct the research, authorization from the Department of Justice of the State of Piauí, and appreciation of the Research Ethics Committee of the Federal University of Piauí were requested, being approved under Report 345.469 and CAAE 17610613.4.0000.5214.

## Results

Of the participants, 92.8% were male, with predominant residence in the interior of the state (52.4%), 48.6% were aged 23 to 32 years old, with mean age of 30.9 years, maximum and minimum 17 and 81 years. Regarding self-reported skin color, 61.6% were brown, and 58.8% declared being single, separated or widowed. The mean length of education was 6.3 years, with the education level of most participants being compatible with incomplete primary education (63.0%). A significant

part of the participants did not have any income (37.2%) or received a minimum wage (32.4%).

Regarding their immunization status, 58.0% of the prisoners reported having received a dose of the vaccine, and 42.0% did not receive or could not answer. Only 17.7% reported to have received the complete schedule (Table 1).

**Table 1.** Immunization status of inmates of the prison system (n=2131)

Variables	n (%)	CI 95%
Has already been vaccinated		
Yes	1236(58.0)	55.9-60.1
No/does not know	895(42.0)	39.9-44.1
Doses received		
1 dose	618(50.0)	47.2-52.7
2 doses	399(32.3)	29.7-34.9
3 doses	219(17.7)	15.7-19.9

Of all prisoners, 11 (0.5%) were reactive in the test for hepatitis B specific antigens (Table 2).

**Table 2.** Prevalence of HBsAg in inmates of the prison system (n=2131)

Variables	n (%)	CI95%	Standard error
Positive	11(0.5)	0.2-0.8	0.2
Negative	2120(99.5)	99.2-99.8	0.2

HBsAg positivity in the population occurred in its totality in male patients, with no significant predominance for skin color and marital status. Mean age was 33.36 years, with 6.36 years of study. No sociodemographic variable was statistically associated with HBsAg positivity, neither those regarding use of alcohol and other drugs. Absolute frequencies were 81.8% for the use of alcohol, and 72.7% for the use of other drugs, such as crack, cocaine and marijuana.

The variables related to parenteral exposure did not present a statistically significant association, but it is worth emphasizing that, among reactive cases, 54.5% reported sharing needlestick and sharps in prison, and having tattoos.

Regarding sexual practice, the nonuse of condoms was highlighted; only 27.2% of the positive cases reported making regular use of condoms

during intercourse. Among the reasons for not wearing condoms, the variable “*does not like to wear a condom in sexual intercourses*” presented a strong association in the bivariate analysis, with OR= 3.52 (CI95% 1.02-12.09), and p value =0.04. More than half of the prisoners who were reactive to HBsAg (63.3%) reported using alcoholic beverages and other drugs before sexual intercourses. Regarding the type of sexual intercourse practised, it is worth considering that in a bivariate analysis vaginal intercourse was a marginally protective factor for hepatitis B in the prisoners studied (OR=0.14 - CI95% 0.01-1.19; p=0.07).

Of the variables related to the information on hepatitis B, only 18.1% of the cases had information on the infection, with only one of the cases having knowledge about the vaccine. Among the questions on the prevention of STIs, the variable “*does not know how to prevent STIs*” was statistically associated with the presence of HBsAg in bivariate analysis (OR=4.90 CI95% 1.48-16.13; p= <0.01). Regarding the existence of STIs, 90.9% reported that they had never had any sexual infection in life, with 81.8% reporting fear to contract a STI.

In the model of multiple logistic regression, the variables that presented significant association in the bivariate analyses kept the strongest relation (Table 3).

**Table 3.** Multiple logistic regression of the factors related to the prevalence of HBsAg positivity (n=11)

Variables	Odds (Adjusted)	p-value	CI95%
<i>Does not like to wear a condom in sexual intercourse</i>	3.63	0.04	1.05-12.48
<i>Does not know how to prevent STIs</i>	5.02	<0.01	1.52-16.59

Statistical significance was set at  $p \leq 0.05$

## Discussion

The study had some limitations because the answers were self-reported. The immunization status survey considered only the prisoners reports, since they did not have the vaccine card in hands, and the prison units did not have immunization information on the medical records, which may have underestimated or overestimated the data. In addition, the organization diversity of the institutions

visited, the safety logistics of the criminal system, and the prison environment itself were factors that brought difficulties to the development of the research, since during counseling and application of the questionnaire the presence of the prison agent was constant, and may have influenced the answers, especially those regarding the use of drugs and sexual behaviors.

The results show the need for public health actions, including the coordination of the governmental spheres, and between the management of health and justice areas, to elaborate strategies considering the prisoners' health needs. The research brought, as a contribution for the strengthening of the National Health Plan in the Prison System (PNSSP, as per its acronym in Portuguese), the expansion of the offer of rapid tests, allowing the early diagnosis of the infection to the prison population. It suggests the use of STI testing at admission, and as a routine in the criminal units, as well as continuous activities of health education for prisoners and training of health professionals that work in these environments, reinforcing surveillance through the active search and notification of problems.

The reports of prisoners from the prison system studied showed that they have poor immunization coverage, and prevalence of HBsAg positivity consistent with the trend of the region. These findings are related to their demographic, social and behavioral characteristics.<sup>(3,10-15)</sup>

The low frequency of history of vaccination against hepatitis B was below the expected, considering that the implementation of a vaccination program is a goal of the PNSSP, and an international recommendation.<sup>(1,6,16)</sup> Low vaccination coverage in prisons and, therefore, the high number of individuals susceptible to infection, are common and confirm the need to ensure access to health services, education programs, and implementation of vaccination programs to prevent HBV infection in prisons.<sup>(17,18)</sup> It should be noted that there was a certain devaluation of vaccination records by some health services, nowadays minimized by the computerization and systematization of the registration of doses in the health units. Users who do not follow the dates of doses, or that do not keep their cards

are also common. These practices result in lack of knowledge of the immunization status of the population and, therefore, in possible administration of unnecessary doses.<sup>(19)</sup> In this perspective, many prisoners could have received the three doses of the vaccine before going to prison, since this a predominantly young population.

The prevalence of HBsAg in the study population was a little higher than that found in the general urban population of the Northeast region of Brazil (0.42%, CI 95% 0.16-0.67), a fact that can be explained by the high frequency of risky behaviors presented.<sup>(3)</sup> The finding was similar to that found in other Brazilian prison complexes, as that of Goiânia (0.7%, CI95% 0.0-4.3)<sup>(20)</sup> and Mato Grosso do Sul (0.5%, CI95% 0.08-1.9).<sup>(21)</sup> The serological investigation in the prison of the city of Ribeirão Preto, Southeastern region of Brazil, presented a higher rate (2.4%) because, unlike the findings of this study, behaviors such as the use of injectable drugs and sharing of syringes were shown and strongly associated.<sup>(22)</sup> In comparison with other countries, the rate was also low, such as in Iran (3.3%) and Spain (2.6% CI95% 0.2-4.9).<sup>(23,24)</sup>

Studies show that the condition of being imprisoned by itself increases the risk for infection of hepatitis B, and in particular when associated with the structural quality of the confinement, and with the marginal social position predominantly occupied by the PDF, that in turn triggers a process of poor life conditions correlated to crime and abusive use of drugs, favoring the occurrence of several health problems.<sup>(4,21,23)</sup> The high social, programmatic and individual vulnerability suffered by this population can exacerbate the situation. Ruptured affective bonds, emotional instability, little motivation, low self-esteem, and generally the exclusion experienced by prisoners are noteworthy.<sup>(25)</sup>

The low frequency of condom use found, as well as the reasons for not wearing it are noteworthy: not liking it, not having it available at the moment, trusting the partner, believing in the divine protection, having sexual intercourse only with clean people, having allergy to the condom material, insufficient time for putting it, and lower sensitivity during the sexual act. International surveys have

shown that a small portion of the world imprisoned population has consistent access to measures for prevention of STIs, highlighting the low frequency of condom use in the prison environment, which, among other factors, has the existence of imposed sexual relations as determinant.<sup>(26,27)</sup>

Condom use is an important measure for the prevention of new cases of hepatitis B, because its efficacy is proven as a physical barrier in the transmission of particles with size similar to that of small STI-causing viruses. In addition, if used correctly, it reduces the risks of slides or ruptures. In this perspective, its use is indispensable in this population, being the main measure of prevention for STIs.<sup>(23,28)</sup>

It is recommended that condoms and lubricants be of easy, discrete and of free access in the prisons, being available in accordance with the physical spaces and prisoners movement.<sup>(1,2)</sup> It is noteworthy that the simple delivery of the method does not ensure good results. The institution of educative health programs in prisons should induce the change of prisoners' behaviors and attitudes. In this case, the guidelines regarding the adequate use should precede the action.

The information on hepatitis B revealed to be insufficient. The possibility for a person who did not know how to prevent STIs of having hepatitis B was about five times higher when compared with those who knew. This result confirms the importance of implementing educative programs in the prison environment addressing measures for the prevention of these infections in the units of the criminal system. Low knowledge concerning STIs has been observed in some studies.<sup>(29,30)</sup>

The fact that most of the prisoners participating in this study stated that they do not have information on hepatitis B can be explained by the few years of referred studies. However, the low level of education did not present any association with the prevalence of HBsAb antigen positivity, contradicting some studies.<sup>(21,29)</sup> Having few years of education leads to lower comprehension and apprehension of information in general, which probably makes it difficult to assimilate the strategies of prevention regarding the ways of transmission of this infection.

## Conclusion

The prevalence found was equal to or lower than that found in the general population of the country (0.5%), but within that expected for this population. It was proved that there are factors statistically associated with the prevalence of HBsAg positivity in the population studied, which are: not liking to wear a condom in sexual intercourse, and not knowing how to prevent STIs.

## Collaborations

Silva AAS and Araújo TME declare that they contributed in the stages of study conception, data analysis and interpretation, article writing, relevant critical review of its intellectual content, and final approval of the version to be published. Teles SA collaborated in the data analysis, writing and critical review. Magalhães RLB and Andrade ELR collaborated with the article writing, critical review of its intellectual content, and final approval of the version to be published.

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