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ORIGINAL ARTICLE

HIGH PREVALENCE OF HBV CARRIERS AMONG WASTE COLLECTORS IN THE LARGEST LANDFILL IN LATIN AMERICA

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ABSTRACT

Hepatitis B virus (HBV) is a serious public health problem. Some professions are at an increased risk for HBV infection, such as recyclable waste collectors. In this study, the aim was to evaluate the prevalence of HBV carriers and vaccination coverage among waste collectors in the largest landfill in the Rio de Janeiro metropolitan area, as well as to determine the association between risk factors and HBV infection in the studied population. In this study 73 participants answered a questionnaire on their socio-demographic variables and occupational exposure to waste. All of the subjects in the study were tested for HBsAg and their vaccination cards were evaluated in order to assess their HBV vaccination status. The vaccination coverage among the individuals who had a vaccination card was 57.4%. The overall prevalence of HBsAg was 12.3%. The prevalence of HBsAg was significantly higher among men ($p = 0.002$). However, no statistical differences were found in the prevalence of HBsAg between individuals with a history of occupational accidents involving sharp edges and non-injured individuals ($p = 0.267$). The results of this study demonstrate the need to strengthen prevention measures and increase HBV vaccination among waste collectors.

KEY WORDS: Hepatitis B; HBV; HBsAg; waste collectors.

INTRODUCTION

Hepatitis B virus (HBV) infection is a serious public health problem, especially in developing countries. It is estimated that approximately 250 million people are infected with HBV globally (WHO, 2017).

Transmission routes of the hepatitis B virus include parenteral or mucosal exposure to infectious blood or other body fluids, unprotected sexual intercourse and mother-to-child transmission (Franco et al., 2012; Niederau, 2014). Some professions are at an increased risk for hepatitis B virus infection,

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including health care workers. Moreover, some neglected professions, such as recyclable waste collectors, can also be exposed to this blood-borne pathogen through occupational injuries (Shepard et al., 2006; Franco et al., 2012; Marinho, et al., 2014).

The collection of recyclable waste materials is a widespread activity among the urban poor communities in many countries. In Brazil, selective waste collection work is performed on an individual, informal and autonomous basis or in organised recycling cooperatives or associations. Despite its economic and environmental importance, this occupation is associated with unsafe and unhealthy working conditions. In addition, recyclable waste collectors have a lifestyle that is characterised by socioeconomic exclusion and stigmatisation (Porto et al., 2010; Auler et al., 2014; Marinho, et al., 2014).

In this study, the aim was to evaluate the prevalence of HBV carriers and vaccination coverage among waste collectors in the largest landfill in the Rio de Janeiro metropolitan area, as well as to determine the association between risk factors and HBV infection in the studied population.

MATERIAL AND METHODS

Study design

A cross-sectional prevalence study was conducted during July 2015, in a population of waste collectors in the region of Jardim Gramacho, in the Rio de Janeiro metropolitan area, considered the biggest landfill in Latin America (Bastos, 2008).

Subjects

The participants in this survey were residents of Jardim Gramacho who did work or still work as garbage collectors on the landfill. The sample was composed of 73 individuals who volunteered to participate in the study after a sensitization lecture.

Before testing, participants answered a questionnaire on their socio-demographic variables (sex and age) and occupational exposure to waste (sharp instruments and needle-stick injury). All of the subjects in the study were tested for HBsAg. In addition, their vaccination cards were evaluated in order to assess their hepatitis B vaccination status.

Participants were distributed into groups according to gender (male or female); age (<35 years or ≥35 years) (based on the mean age of the sample); hepatitis B vaccination status (unvaccinated, vaccinated or without vaccination card); occupational exposure to waste (sharp instruments/needle-stick injury) and positivity in the HBsAg test.

Assessments

A capillary whole blood sample was collected by fingerstick from each participant for the qualitative determination of HBsAg. The HBsAg marker was evaluated using a commercially available kit (Vikia HBsAg®, Biomérieux, France), according to the manufacturers' instructions.

Statistical analysis

Pearson's chi-square or Fisher's exact tests were used to examine the association between categorical variables. Odds ratios were used to study the association of factors with HBsAg seropositivity. A p value <0.05 was considered statistically significant. Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS®) for Windows version 17.0 (SPSS, Chicago, IL, USA).

Ethical approval

The study was approved by the Ethics Committee of the Regional University of Blumenau (Protocol number 1.138.237). Informed written consent was obtained from all participants or responsible parties after they were supplied with written and oral information. No monetary incentives were offered for participation.

RESULTS

The socio-demographic characteristics of the studied population and positivity for HBsAg marker are presented in Table 1. In this study, participants were aged between 16 and 64 years, with a mean age of 33.7 ± 12.3 years. Among the individuals analysed, 35.6% (26/73) did not have a vaccination card at the time of the survey (Table 1). The overall vaccination coverage among the individuals who had a vaccination card was 57.4% (27/47). Participants who had received three doses, two doses or one dose of HBV vaccine comprised 48.1% (13/27), 25.9% (7/27) and 25.9% (7/27) of the vaccinated individuals, respectively. Five of the 26 individuals (19.2%) who did not have a vaccination card were positive for HBsAg.

In this study, the overall prevalence of HBsAg was 12.3% (9/73). When analysed according to gender, the prevalence of HBsAg was significantly higher among men ($p = 0.002$) (Table 1). Furthermore, in the logistic regression analysis men had a higher risk of being infected with HBV (Table 2).

As shown in Table 1, no statistical differences were found in the prevalence of HBV carriers between individuals with a history of occupational accidents involving sharp edges and non-injured individuals ($p = 0.267$). In addition, no differences were found in the prevalence of HBsAg between the two age groups or between vaccinated and non-vaccinated individuals.

Table 1. Prevalence of HBV carriers and demographic variables

Characteristic	n (%)	HBsAg positive n (%)	HBsAg negative n (%)	p value
Gender				
Female	64 (87.7)	5 (7.8)	59 (92.2)	0.002*
Male	9 (12.3)	4 (44.4)	5 (55.6)	
Age				
<35 years	45 (61.6)	4 (8.9)	41 (91.1)	0.257
≥35 years	28 (38.4)	5 (17.9)	23 (82.1)	
Occupational accidents with sharp edges				
Injured	20 (27.4)	3 (15.0)	17 (85.0)	0.267
Non-injured	53 (72.6)	6 (11.3)	47 (88.7)	
Vaccination status against HBV				
Vaccinated	27 (57.4)	2 (7.4)	25 (92.6)	0.574
Non-vaccinated	20 (42.6)	2 (10.0)	18 (90.0)	

*Statistically significant at $p<0.05$

Table 2. Logistic regression analysis of HBsAg positive individuals

Factor	Odds Ratio (OR)	Confidence Interval (CI)
Gender		
Female	0.603	0.334 – 1.086
Male	5.689	1.867 – 17.338
Age		
<35 years	0.694	0.327 – 1.473
≥35 years	1.546	0.791 – 3.020
Occupational accidents with sharp edges		
Injured	1.673	0.725 – 3.862
Non-injured	0.757	0.414 – 1.382
Vaccination status against HBV		
Vaccinated	0.860	0.313 – 2.367
Non-vaccinated	1.194	0.422 – 3.384

DISCUSSION

The case of Jardim Gramacho landfill is quite unique since theoretically, according to the paradigms of sanitary engineering, workers should not roam the mountains formed by waste. Nevertheless, there is a constant presence of people living and working amid open waste dumps (Porto et al., 2010). In addition, even with prevention efforts over the years and attempts to close this dump, the emergence of other dumps near the landfill has been reported, as well as the illegal dumping of medical waste (Rodrigues, 2014).

In this study, occupational accidents (sharp instruments/needle-stick injury) were self-reported by 27.4% of the participants. Although no statistical differences were found in the prevalence of HBV infection between individuals with a history of occupational accidents involving sharp edges and non-injured individuals, the data of this study clearly reflects the risk of exposure to blood-borne pathogens among these collectors in their work environment. Furthermore, the overall prevalence of HBsAg of 12.3% shows a high endemicity in this locality. A similar prevalence of HBsAg was found in recyclable material collectors in the city of Goiania in central Brazil (12.8%) (Marinho et al., 2014). Other studies have also reported a high prevalence of HBV infection among garbage workers in other places around the world. In Karachi, the largest metropolis of Pakistan, the prevalence of hepatitis B between garbage scavengers was 18.8% (Rauf et al., 2013). Among municipal solid waste workers in Keratsini (Greece) and Alexandria (Egypt), the seroprevalence of HBsAg was 7.0% and 9.5%, respectively (Dounias et al., 2005; El-Wahab et al., 2015). HBsAg detected by an immune-complex dissociation method among waste workers in Alexandria was 17.3% (El-Wahab et al., 2015). These data show the vulnerability of waste collectors to HBV infection.

In this survey, the prevalence of HBsAg was significantly higher among men than women. However, it is necessary to emphasize that HBV is a sexually transmitted virus and, therefore, it would be important to investigate whether these individuals usually use preventive methods in sexual relations.

The vaccination coverage found in the present study demonstrates the need for public health approaches and preventive measures against HBV in the studied population. All of the health and environmental problems of Jardim Gramacho make the place an epidemiological focus, where diseases such as dengue fever, worms, cholera and hepatitis are reported (Porto et al., 2010; Rodrigues, 2014). In this sense, it is necessary to increase the knowledge and awareness of the diseases to which these workers are exposed, to ensure better quality of life and increased safety (Dounias et al., 2005; Rauf et al., 2013; Rodrigues, 2014; El-Wahab et al., 2015).

One limitation of the present study is the small size of the sample, which may influence the accuracy of the findings. Another limitation was not having anti-HBc and anti-HBs antibodies tested. Anti-HBc could show other exposed subjects that had the infection controlled (HBsAg negative). Anti-HBs could identify

subjects who were vaccinated and are immunized but who do not remember having taken the vaccine or lost the vaccination card.

In conclusion, the results of this study demonstrate the need for strengthening the prevention measures and increase HBV vaccination among waste collectors. The prevention of viral infections might allow a reduction in expenditure on the treatment of diseases and their evolution. However, it is important to point out that the findings of this study should be used with caution given the small number of participants. In this sense, the results must be confirmed through well-designed studies and a larger sample.

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