

DOI: <https://doi.org/10.36489/saudecoletiva.2021v11i64p5690-5701>

Analysis of post vaccine hepatitis seroconversion in ribeirinhos in the municipality of Mocajuba, Pará, Brazil

Análisis de seroconversión después de la vacuna contra la hepatitis B en costillas del municipio de Mocajuba, Pará, Brasil

Análise de seroconversão pós vacina hepatite B em ribeirinhos do município de Mocajuba, Pará, Brasil

ABSTRACT

Objective: To evaluate the seroprevalence of anti-HBs antibodies in a riverside population of the São Pedro do Vizeu community, in the municipality of Mocajuba, Pará State, Brazil. **Method:** Field research, descriptive, exploratory, quantitative, cross-sectional, conducted with members of the 25 families living in the São Pedro do Vizeu Community, Mocajuba Municipality, Pará, between August 2018 and July 2019. Approximately 16 mL of blood was collected from each participant, and serological tests were performed by immunoenzymatic technique. **Result:** The study participants 133 individuals who presented the hepatitis B vaccination card, of which 61.7% had the anti-HBs+ marker isolated, demonstrating the profile of vaccine immunity for HBV. **Conclusion:** In the population studied, 38.3% took the vaccine, but did not have sufficient titration levels and are susceptible to infection. It was inferred that the vaccine, when used correctly, is the main tool capable of reducing the rates of confirmed cases and mortality.

DESCRIPTORS: Hepatitis B; Vaccination; Epidemiology; Seroconversão.

RESUMEN

Objetivo: Evaluar la seroprevalencia de anticuerpos anti-HBs en una población ribereña de la comunidad de San Pedro do Vizeu, en el municipio de Mocajuba, Estado de Pará, Brasil. **Método:** Investigación de campo, descriptiva, exploratoria, cuantitativa, transversal, realizada con miembros de las 25 familias que viven en la Comunidad de San Pedro do Vizeu, Municipio de Mocajuba, Pará, entre agosto de 2018 y julio de 2019. Se recogieron aproximadamente 16 ml de sangre de cada participante, y se realizaron pruebas serológicas mediante una técnica inmunoenzimática. **Resultado:** El estudio participa 133 personas que presentaron la tarjeta de vacunación contra la hepatitis B, de las cuales el 61,7% tenían aislado el marcador anti-HBs+, lo que demuestra el perfil de inmunidad vacuna para el VHB. **Conclusión:** En la población estudiada, el 38,3% tomó la vacuna, pero no tenía niveles de valoración suficientes y son susceptibles a la infección. Se dedujo que la vacuna, cuando se utiliza correctamente, es la principal herramienta capaz de reducir las tasas de casos confirmados y mortalidad.

DESCRIPTORES: Hepatitis B; Vacunación; Epidemiología, Seroconversión.

RESUMO

Objetivo: Avaliar a soroprevalência de anticorpos anti-HBs em população ribeirinha da comunidade São Pedro do Vizeu, do Município de Mocajuba, Estado do Pará, Brasil. **Método:** Pesquisa de campo, descritiva, exploratória, quantitativa, de corte transversal, realizada com membros das 25 famílias residentes na Comunidade São Pedro do Vizeu, Município de Mocajuba, Pará, entre agosto de 2018 e julho de 2019. Foi coletado cerca de 16mL de sangue de cada participante, e realizada os testes sorológicos por técnica imunoenzimática. **Resultado:** Participaram da pesquisa 133 indivíduos que apresentaram a carteira de vacinação contra hepatite B, destes 61,7% apresentaram o marcador anti-HBs+ isolado, demonstrando o perfil de imunidade vacinal para o VHB. **Conclusão:** Na população estudada, 38,3% tomaram a vacina, porém não apresentaram níveis de titulação suficiente e estão suscetíveis a infecção. Inferiu-se que a vacina, quando utilizada corretamente, é a principal ferramenta capaz de reduzir os índices de casos confirmados e mortalidade.

DESCRIPTORIOS: Hepatite B; Vacinação; Epidemiologia; Seroconversão.

RECEIVED ON: 01/19/2021 APPROVED ON: 01/27/2021

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INTRODUCTION

Infections with the hepatitis B virus (HBV) are a serious global public health problem. According to the World Health Organization (WHO), there are approximately two billion people infected with HBV worldwide.⁽¹⁾ In the period from 1999 to 2018, 233,027 cases of hepatitis B were reported in Brazil, with 6.7 cases for every 100 thousand inhabitants, in 2018. The detection rates of the South and North regions have shown to be higher than the national rate, being the highly prevalent hepatitis B in quilombola, indigenous and riverside populations.^(2,3)

There are rapid tests available in the Unified Health System (SUS) for the detection of HBV infection, which recommends testing all people at least once in their lives, and vulnerable populations need to test periodically. The drugs used to treat hepatitis B do not guarantee the cure of the disease, but it is immunopreventable and the vaccine can be applied in any age group, regardless of vulnerable conditions.^(2,4)

HBV vaccines are available in monovalent formulations that protect only against hepatitis B and also in combination that protect against HBV and other diseases.⁽⁵⁾ The standard vaccination schedule includes one mL, with 20 mg of recombinant HBsAg administered in three doses.⁽⁶⁾ The second dose should be administered 2 weeks

after the first, from that dose there is already a response, but for long-term protection, a third should be applied from six months after the first dose. When seroconversion does not occur, the individual must repeat the vaccination schedule. In the case of

immunosuppression, the second regimen should preferably be applied at a dose of two mL.⁽⁷⁾

Vaccination is the act of applying the vaccine and immunization is the development of specific antibodies derived from the applied vaccine, there is a mechanism that assesses the effectiveness of the hepatitis B vaccine through the anti-HBs serological test, however, different from the vaccine, the exam is not routinely available in the public health system after vaccination.⁽⁸⁾

Considering the various forms of transmission of HBV infection and the higher prevalence of infection, in populations of greater vulnerability, such as riverside dwellers⁽⁹⁾, this research sought to answer: "What is the rate of seroconversion of the vaccine against Hepatitis B, in the riverside population of the Municipality of Mocajuba, Pará?". Thus, this study aimed to evaluate the seroprevalence of anti-HBs antibodies in a riverside population in the São Pedro do Vizeu community, in the municipality of Mocajuba, State of Pará, Brazil.

METHOD

This is a descriptive, exploratory, quantitative, cross-sectional field research carried out in the São Pedro do Vizeu Community, Mocajuba, Pará, between August 2018 and July 2019, approved by the Research Ethics Committee with Human Beings, from the

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Evandro Chagas Institute (CEP / IEC) 90604418.4.0000.0019.

under Opinion No. 2.736.328 and CAEE

The study included members of the 25

Table 1 - Distribution of the population according to age and sex, São Pedro do Vizeu Community, Mocajuba, Pará, Brazil, October 2018.

AGE RANGE (YEARS OLD)	POPULATION EXAMINED	%	SEX			
			MALE	%	FEMALE	%
<1	2	1,5	-	-	2	100
1 a 9	39	29,3	22	56,4	17	43,6
10 a 19	41	30,8	18	43,9	23	56,1
20 a 29	18	15,5	7	38,9	11	51,1
30 a 39	11	8,3	2	18,2	9	81,8
40 a 49	11	8,3	3	27,3	8	72,7
50 a 59	9	5,7	3	33,3	6	66,7
≥ 60						
2	1,5	1	50,0	1	50,0	
Total	133	100,0	56	42,1	77	57,9

Source: Field research, October 2018; - = numeric data equal to zero, not resulting from rounding

Table 2 - Profile of study participants, according to usual occupation, education and marital status, São Pedro do Vizeu Community, Mocajuba, Pará, Brazil, October 2018.

VARIABLES	PARTICIPANTS (N= 133)	%	
Usual occupation	Student	78	58,6
	Fisherman	28	21,0
	Farmer	11	8,4
	Underage (no occupation)	6	4,5
	Professor	2	3,8
	Retired	3	2,2
	Home worker	3	2,2
	Public agent	1	0,7
	Incomplete elementary school	98	73,7
Education	Incomplete high school	11	8,4
	Does not apply	6	4,5
	Illiterate	4	3,0
	Complete high school	4	3,0
	Maternal	4	3,0
	Incomplete higher education	3	2,2
	Complete higher education	2	1,5
Marital Status	Complete elementary school	1	0,7
	Single	94	70,7
	Married	37	27,8
	Widowed	2	1,5

Source: Field research, October 2018

families residing in this community, of any age group and gender, present at the time of data and sample collection, who had already received the hepatitis B vaccine, as evidenced by the vaccination card. Non-vaccinated individuals and non-residents in the community were excluded.

For clarification about the research, the Free and Informed Consent Term was read and signed, and under 18 years old, the Free and Informed Consent Term. Then, a questionnaire was applied that evaluated: sex, age, marital status, occupation, education level, vaccination against HBV, serological response and factors that made access to the vaccine difficult.

About 16 mL of blood was collected from each participant, by intravenous puncture, the samples were centrifuged to separate the serum. Serological tests were performed using an immunoenzymatic technique (ELISA) in accordance with the manufacturer's recommendations.

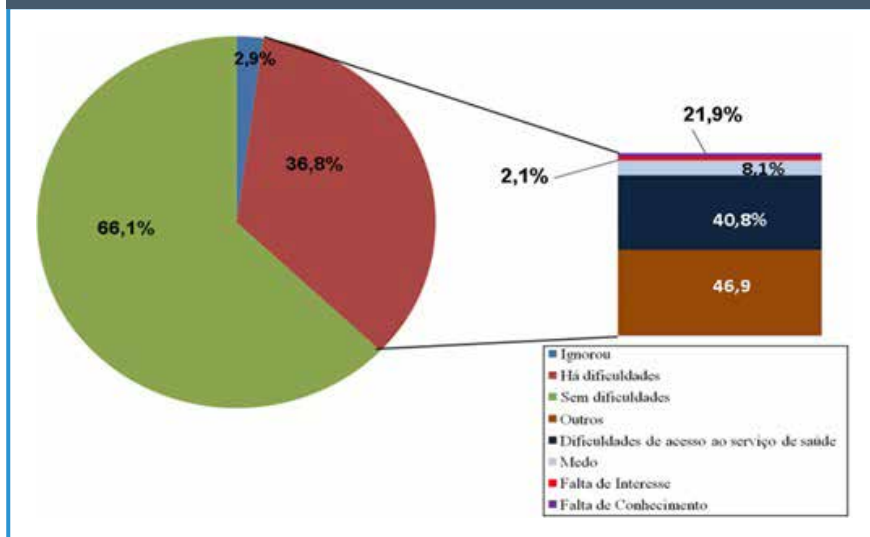
The collected information was stored in a database in the EPIINFO 2007 Program, version 7.1.0.6. and in the Microsoft Office Excel 2007 program, which were later exported to the Bioestat 5.0 Program.⁽¹⁰⁾ For statistical analysis, the chi-square test was used. The mean and median for quantitative variables were calculated, due to their practicality and applicability in several areas, with a 95% confidence level.

RESULTS

133 individuals participated in the research, 57,9% (77/133) of female. In the population examined, the highest frequency was in the age group of 10 to 19 years, which corresponded to 30,8% (41/133) and the lowest frequency among children under one year of age 1,5% (2/133) and higher of 60 years in 1,5% (2/133), as shown in table 1. The average age of the population was 20,6 (range from 3 months to 87 years) and the median was 13 years.

Regarding the variables regarding the usual occupation, 57,1% (81/133) were students and 21% (29/133) were fishermen; as for education 73,7% (98/133) had incomplete elementary education; as for

Figure 1 - Distribution of factors that hinder access to the hepatitis B vaccine among participants from the São Pedro do Vizeu Community, Mocajuba, Pará, Brazil, October 2018



Source: Field research, October 2018

Table 3 - Levels of anti-HBs antibodies produced after vaccination in participants from the São Pedro do Vizeu Community, Mocajuba, Pará, Brazil, October 2018

ANTI-HBS QUANTIFICATION MUI/ML	N	%
<10	51	38,3
10 – 100	44	33,7
101 – 200	14	10,4
201 – 300	5	3,6
301 – 400	7	5,1
401 – 499	1	0,7
>500	11	8,2
Total	133	100,0

Source: SHAPE, field research, 2018; anti-HBs isolated = profile compatible with vaccine protection.

marital status, it was observed that 70,7% (94/133) were single individuals, as shown in table 2.

When asked about the barriers to access to the hepatitis B vaccine, 66,1% (88/133) stated that they did not have any type of difficulty. In contrast, 36,8% (49/133) reported having difficulties to get the vaccine, among the most cited reasons were access to health services in 40,8% (20/49) and fear of having the vaccine in 8,1% (4/49), as shown in figure 1.

Among the 133 individuals who registered in the hepatitis B vaccine application list, 61,7% (82/133) presented the isolated anti-HBs + marker, demonstrating the vaccine immunity profile for HBV, therefore 38,3 % (51/133) had levels of titration below the limit considered immune (10 mUI / mL), meaning that there was no seroconversion and that they were susceptible to infection, as shown in Table 3.

Among the study participants, 21,8% (29/133) presented the vaccination card with the three doses of the vaccine, recommended by the Ministry of Health, among these 37,9% (11/29) developed protective titles for the serological marker anti-HBs after completing the vaccination schedule. It was identified through the vaccination card that one person took only one dose of vaccine and achieved seroconversion to anti-HBs and that four people were vaccinated with two doses of the vaccine, with 50% (2/4) of seroconversion. It was also identified that 69,6% (69/99) of the

Table 4 - Distribution of the number of doses of vaccines applied and seroconversion to anti-HBs isolated among participants from the São Pedro do Vizeu Community, Mocajuba, Pará, Brazil, October 2018

AGE GROUP (YEARS)	N	N° OF VACCINE DOSES APPLIED AND SEROCONVERSION TO ANTI-HBS						N° UNKNOWN DOSES	ANTI-HBS+ (%)
		1	ANTI-HBS+ (%)	2	ANTI-HBS+ (%)	3	ANTI-HBS+ (%)		
<1	2	-	-	1	0 (0,0)	-	-	1	1 (100,0)
01-09	39	-	-	1	0 (0,0)	6	3 (50,0)	32	17 (53,1)
10-19	41	-	-	1	1 (100,0)	16	6 (37,5)	24	13 (54,1)
20 - 29	18	1	1 (100,0)	1	1 (100,0)	4	2 (50,0)	12	11 (91,7)
30 - 39	11	-	-	-	-	1	0 (0,0)	10	10 (100,0)
40 - 49	11	-	-	-	-	2	0 (0,0)	9	7 (77,8)
50 - 59	9	-	-	-	-	-	-	9	8 (88,9)

≥ 60	2	-	-	-	-	-	-	2	2 (100,0)
Total	133	1	1 (100,0)	4	2 (50,0)	29	11 (37,9)	99	69 (69,6)

Source: SAHEP, field research, 2018; N = population examined; - = numeric data equal to zero, not resulting from rounding; anti-HBs + isolated = profile compatible with vaccine protection.

individuals tested for anti-HBs had no information on the number of vaccine doses applied (Table 4).

DISCUSSION

The great challenge related to vaccination against hepatitis B in the studied community was the low adherence to the completion of the vaccination schedule. Studies by several researchers have shown that vaccine completion of three doses against hepatitis B has been difficult in populations of greater vulnerability.^(11, 12, 13)

Considering that the living conditions of riverside populations, who live far from the main urban centers and whose main means of transportation is the river, having access to the vaccine seems a distant ideal, the study showed the difficulties in completing the conventional scheme against hepatitis B, configured as a remaining challenge for the prevention of HBV.⁽¹⁴⁾

The expansion of HBV vaccination can be a strategy to improve vaccine coverage in populations of greater vulnerability.⁽¹⁵⁾ Thus, the implementation of the accelerated scheme against hepatitis B seems to be a promising strategy for immunizing vulnerable populations.

Several factors may be associated with a lack of seroconversion of anti-HBs, such as inadequate storage of the vaccine, administration that is not recommended, age, body mass index, cirrhosis or chronic renal failure, immunosuppression, transplant recipients, chronic hemodialysis, type I diabetes, alcoholism and smoking or infections at the time of vaccination.^(17, 18)

HBV vaccination is a proven and well-established strategy for disease prevention. According to the CDC⁽¹⁹⁾ the HBV vaccine in the general population confers immunity to more than 90% of vaccinated individuals. In this study, it was possible to

note that 38,3% received the vaccine, but had levels of titration below the threshold considered immune (10mUI / mL), a percentage above what is estimated by several studies that indicate about 5% to 10% of irresponsiveness after the completion of the vaccination schedule.^(20, 21)

It was possible to identify that those over 60 years old responded to the vaccine differently from the studies by Locarrini

et al., (2015), which states that elderly people are not as responsive as children or adolescents.⁽²²⁾

It is also noted the low adherence to the completeness of the vaccine, where it was not possible to identify at which stage of application the dosage was. It may be associated with the interval and suggests an accelerated vaccination schedule against hepatitis B of 0, 7 and 21 days, for vulnerable populations, presenting itself as a strategy that can qualify the assistance to this population, preventing HBV infection.⁽²³⁾

There is no indication for testing anti-HBs in the general population, it is only indicated for health professionals⁽²⁴⁾, the creation of serological surveillance in line with epidemiological surveillance, would be a great advance because it would be possible to track people who are immune and not just confirmed cases of Hepatitis B disease.

CONCLUSION

It can be inferred that the vaccine is the main tool capable of reducing the rates of confirmed cases and mortality from HBV, when this tool is used correctly. It was noticed that in the riverside population of the municipality of Mocajuba, 38,3% took the vaccine at some point in their lives, but had levels of titration below the limit and are susceptible to infection.

It is surprising how favorable the scenario is for the vaccine condition and unfavorable for the immune condition in the population studied, mainly because it is an immune-preventable disease. Thus, it is necessary to create strategies to expand vaccine coverage and increase immunity, especially in groups of greater vulnerability, such as the population of São Pedro do Vizeu. In addition, the importance of continuous training of professionals on the vaccine room and transport of immu-

The expansion of HBV vaccination can be a strategy to improve vaccine coverage in populations of greater vulnerability. Thus, the implementation of the accelerated scheme against hepatitis B seems to be a promising strategy for immunizing vulnerable populations.

nobiologicals to populations far from urban centers is highlighted.

In the present study, only 21,8% of individuals presented the three doses registered in the vaccination card, considering that this document is the

main proof that the individual received the vaccination scheme, it is suggested as a way to improve the conservation of the card. vaccination, that it is also requested at the time of school enrollment.

And lastly, who knows, in the not-so-distant future, to be able to extend the general population access to the serological test of the vaccine marker (anti-HBs) to confirm the effectiveness of the vaccine after its application. ■

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