Vaccination Response to Hepatitis B Virus in the Population of the Marajó Archipelago, Amazon, Brazil

Resposta Vacinal ao Vírus da Hepatite B em População do Arquipélago do Marajó, Amazônia, Brasil

Respuesta Vacunal al virus de la Hepatitis B en Una Población del Archipiélago de Marajó, Amazonía, Brasil

RESUMO

Objetivou-se avaliar e descrever a resposta vacinal ao vírus da hepatite B em população do município de Melgaço, estado do Pará. Tratou-se de um estudo transversal, descritivo, com inquérito individual para determinação da resposta vacinal por meio dos marcadores sorológicos HBsAg, anti-HBc total e anti-HBs por enzimaimunoensaio em 407 amostras. A faixa etária variou entre 01 e 101 anos, onde 57,7% eram do sexo feminino. O anti-HBs isolado com valores ≥10mIU/mL, foi detectado em 27,3%, indicando proteção vacinal contra o VHB; 63,6% eram suscetíveis a infecção, entre esses,23,2% possuíam carteira de vacinação com esquema completo de três doses, não apresentando títulos de anticorpos que confirmasse a efetividade do esquema recebido.Os achados revelaram que a resposta vacinal nessa população foi menor que a esperada, sugerindo a necessidade de adaptar estratégias de vacinação às condições locais para garantir uma cobertura mais eficaz.

DESCRITORES: Hepatite B; Vacina contra hepatite B; Cobertura vacinal; Amazônia.

ABSTRACT

The objective of this study was to evaluate and describe the vaccination response to hepatitis B virus in a population of the municipality of Melgaço, state of Pará. This was a cross-sectional, descriptive study, with an individual survey to determine the vaccination response through the serological markers HBsAg, total anti-HBc and anti-HBs by enzyme immunoassay in 407 samples. The age range varied between 01 and 101 years, where 57.7% were female. Isolated anti-HBs with values ≥10mIU/mL was detected in 27.3%, indicating vaccination protection against HBV; 63.6% were susceptible to infection, among these, 23.2% had a vaccination card with a complete three-dose schedule, not presenting antibody titers that confirmed the effectiveness of the schedule received. The findings revealed that the vaccine response in this population was lower than expected, suggesting the need to adapt vaccination strategies to local conditions to ensure more effective coverage.

DESCRIPTORS: Hepatitis B; Hepatitis B vaccine; Vaccination coverage; Amazon.

RESUMEN

El objetivo fue evaluar y describir la respuesta vacunal contra el virus de la hepatitis B en una población del municipio de Melgaço, estado de Pará. Se trata de un estudio descriptivo transversal, con encuesta individual para determinar la respuesta vacunal mediante los marcadores serológicos HBsAg, anti-HBc total y anti--HBs mediante enzimoinmunoensayo en 407 muestras. El rango de edad varió entre 01 y 101 años, donde el 57,7% eran del sexo femenino. Se detectaron anti-HBs aislados con valores ≥10mUI/mL en el 27,3%, lo que indica protección vacunal contra el VHB; El 63,6% eran susceptibles de infectarse, entre estos, el 23,2% contaba con cartilla de vacunación con esquema completo de tres dosis, sin presentar títulos de anticuerpos que confirmen la efectividad del esquema recibido. Los hallazgos revelaron que la respuesta de vacunación en esta población fue menor de lo esperado, lo que sugiere la necesidad de adaptar las estrategias de vacunación a las condiciones locales para garantizar una cobertura más efectiva.

DESCRIPTORES: Hepatitis B; Vacuna contra la hepatitis B; Cobertura vacunal; Amazonía.

RECEIVED: 04/03/2025 **APPROVED:** 04/18/2025

How to cite this article: Barbosa KMV, Oliveira CMA, Brasil MJS, Brito DCN, Malheiros AP, Souza AJS, Lucas MLSA, Nunes HM. Vaccination Response to Hepatitis B Virus in the Population of the Marajó Archipelago, Amazon, Brazil. Saúde Coletiva (Edição Brasileira) [Internet]. 2025 [acesso ano mês dia];15(95):15590-15599. Disponível em: DOI: 10.36489/saudecoletiva.2025v15i95p15590-15599

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INTRODUCTION

Hepatitis B is a hepatotropic infectious disease caused by the hepatitis B virus (HBV), which can be acute or chronic. [1] Several factors can influence the progression to the chronic carrier state, with age at the time of infection being one of the main factors. [2]

Vaccination is the main preventive measure against the disease, as provided for in the National Immunization Program (PNI - Programa Nacional de Imunização). The hepatitis B (HB) vaccine is available through the Unified Health System (SUS) for all people, regardless of age and vulnerability. [3]

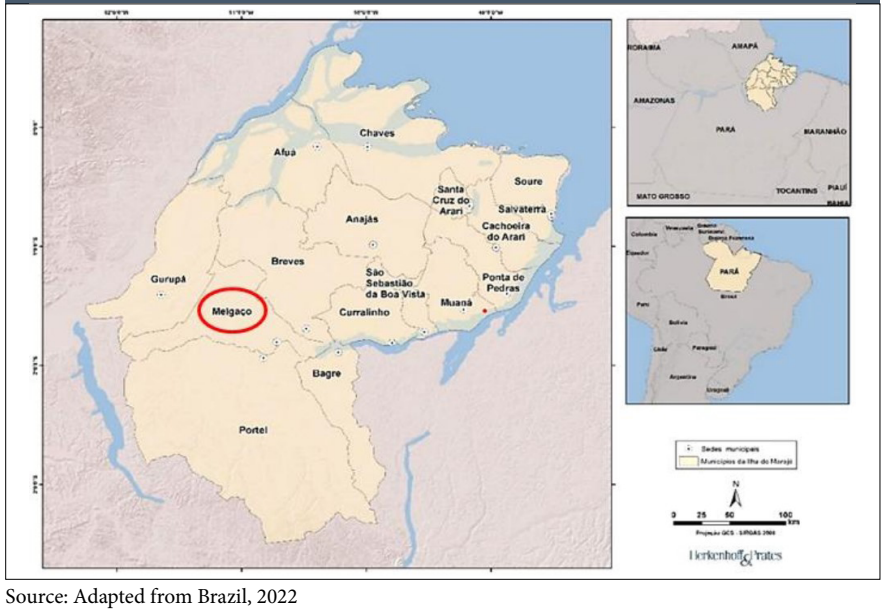
The introduction of the HB vaccine had a major global impact on the prevalence of the disease, reducing the number of chronic HBV carriers and the incidence of hepatocarcinoma. [4] In Brazil, endemicity went from moderate to low, remaining higher in groups with risk behaviors, indigenous populations and in some areas of the Amazon. [5]

The lack of information on the prevalence of hepatitis B in the municipality led to the objective of this study to describe the vaccination response to HBV in the riverside population of the municipality of Melgaço/PA and to investigate the possible factors that hinder the population's access to the vaccine.

METHOD

Study approved by the IEC Research Ethics Committee, Opinion No. 5,793,307 and CAAE: 64969722.3.0000.0019. It consists of a cross-sectional and descriptive field research, with an individual survey in the municipality of Melgaço/PA, Marajó Archipelago, Amazon, Brazil (Figure 1).

Figure 1 – Map of the Marajó Archipelago, municipality of Melgaço, Pará, Brazil



Source: Adapted from Brazil, 2022

DOI: 10.36489/saudecoletiva.2025v15i95p15590-15599

Considering the universe of 28,121 inhabitants [6] a minimum sample size of 394 participants was estimated, with a 95% confidence level and a 5% margin of error. The survey was conducted from June 2023 onwards, with educational activities; voluntary participation, by spontaneous demand; regardless of gender and age group; upon signing the Informed Consent Form (ICF), Free and Informed Assent Form (TALE), semi-structured form and collection by venipuncture of approximately 8 mL of blood that was centrifuged to obtain serum.

Serology was performed by immunoenzymatic technique (ELISA), using commercial kits from the Wiener® Lab. 2000- Rosario - Argentina (HBsAg and total anti-HBc) and Bioclin® Quibasa Química Basica Ltda - Belo Horizonte - MG - Brazil (anti-HBs), according to the manufacturer's instructions.

The total HBsAg and anti-HBc markers (indicators of disease and infection, respectively) and anti-HBs (indicator of natural or vaccine immunity) were tested to exclude infected individuals from the analysis and include only isolated anti-HBs with values ≥10mIU/mL, with a vaccine protection profile.

The sociodemographic/epidemiological characteristics were described using descriptive statistics. Categorical variables were presented as frequencies and percentages, and numerical variables as median/quartile deviation or mean/standard deviation. Microsoft Office Excel 2016 and Bioestat 5.3 were used for data storage and statistical analysis.

RESULTS

A total of 407 individuals participated in the study; 57.5% were female, and the age groups 10-19 (80; 19.6%) and 30-39 (75; 18.4%) years predominated. The mean age was 32.7 years (range: 01-101 years) and the median was 10 years; 269 (66.1%) self-identified as brown; 111 (27.3%) were single and 157 (38.5%) had incomplete elementary education.

Among the participants, 159 (39%) presented a vaccination card and 101 (24.8%) had completed the HB vaccine schedule, as recommended by the Ministry of Health. Of the total number of individuals, 197 (48.4%) reported not having received any dose of the vaccine or not knowing whether they had been vaccinated; 214 (52.6%) reported that there were no difficulties in taking the vaccine. Among those who had difficulties, access to the public health network was mentioned by 37 (9.1%), as shown in table 1.

Table 1 – Profile of participants regarding presentation of vaccination card, vaccination schedule received and difficulty in taking the vaccine, Melgaço, Pará, Brazil, 2023

	Variables	N= 407	%
Vaccination card	Yes	159	39,0
	No	248	61,0
Hepatitis B vaccine (Dose)	1	10	2,5
	2	12	3,0
	3	101	24,8
	Yes (self-report)	42	10,3
	Did not receive/don't know	197	48,4
	NI	45	11,0
Difficulty getting vaccinated	No difficulty	214	52,6
	Difficult access to the basic health network	37	9,1
	Lack of knowledge	29	7,1
	Lack of interest	28	6,9
	Fear	29	7,1
	Number of doses	18	4,4
	NI	48	11,8
	Others	04	1,0

Source: Own authorship. Caption: N = number of participants; % = frequency; NI = Not informed

Of the 407 samples tested, 111 (27.3%) presented non-reactive HBsAg and total anti-HBc and isolated anti-HBs with values ≥10mIU/mL, indicating vaccine immunity. The highest frequency was observed in the age group of 20-29 years (44.4%; 28/63), as shown in Table 2.

Tabela 2 – Perfil de anti-HBs vacinal, por faixa etária, Melgaço, Pará, Brasil, 2023

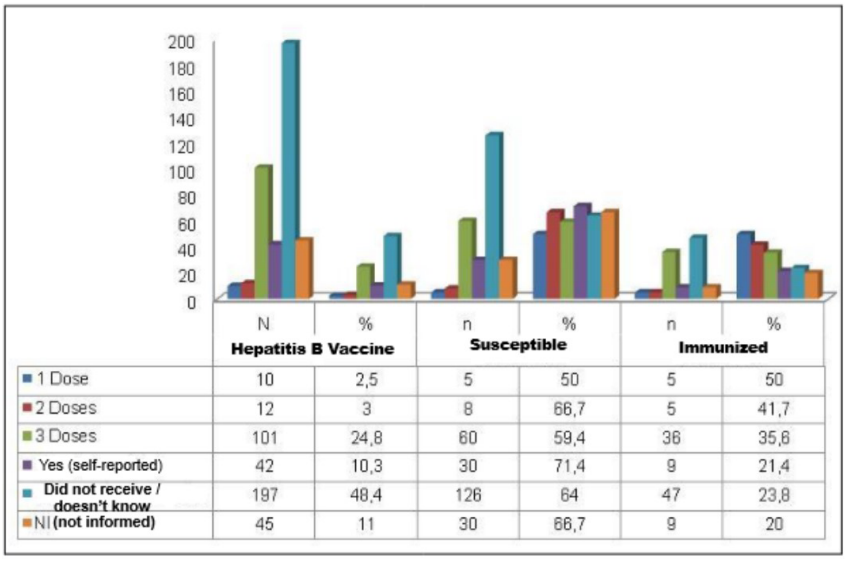
Age groups (years)	N	isolated anti-HBs(≥10 mIU/mL)	
		n	%
< 1	-	-	-
01 – 04	06	02	33,3
05 – 09	40	16	40,0
10 – 19	80	10	12,5
20 –29	63	28	44,4
30 – 39	75	31	41,3
40 – 49	63	17	27,0
50 – 59	46	03	6,5
≥ 60	34	04	12,0
Total	407	111	27,3

Source: Own authorship. Caption: N = number of participants; n = sample n; % = frequency; – = numerical data equal to zero, not resulting from rounding.

DOI: 10.36489/saudecoletiva.2025v15i95p15590-15599

Among the participants, 259 (63.6%) had non-reactive HBsAg, total anti-HBc and anti-HBs, indicating a profile of susceptibility to infection/no previous contact with HBV. When relating the number of doses of the HB vaccine with the presence of isolated anti-HBs with values ≥10mIU/mL; those who had 1 or 2 doses on the vaccination card showed a frequency of 50% (5/10) and 41.7% (5/12), respectively, while, in those with a complete three-dose schedule, a frequency of 35.6% (36/101) was observed. In contrast, among those who had a record of a complete schedule, 59.4% (60/101) did not present antibody titers that confirmed the effectiveness of the schedule received (Graph 1).

Gráfico1– Relação entre o número de doses da vacina HB aplicadas, indivíduos suscetíveis e imunizados, Melgaço, Pará, Brasil, 2023



Hepatitis B Vaccine	N	%	Susceptible n	Susceptible %	Immunized n	Immunized %
1 Dose	10	2,5	5	50	5	50
2 Doses	12	3	8	66,7	5	41,7
3 Doses	101	24,8	60	59,4	36	35,6
Yes (self-reported)	42	10,3	30	71,4	9	21,4
Did not receive / doesn't know	197	48,4	126	64	47	23,8
NI (not informed)	45	11	30	66,7	9	20

Source: Own authorship. Caption: N = number of participants; n = sample n; % = frequency

DISCUSSION

Hepatitis B remains a public health challenge despite the availability of a vaccine, an important element in preventing HBV infection. [4] In Brazil, the HB vaccine has been available through the SUS since the 1990s. In 2023, the country reached 73.2% vaccination coverage, falling below the 90% target set by the World Health Organization by 2030. [7] This coverage may be even lower among traditional populations such as riverside dwellers who have difficulty accessing health services, for whom the river is their main means of transportation. Due to regional inequalities, these populations have the worst vaccination rates in the North region. [8]

Only 39% of participants presented a vaccination card, of which 63.5% had completed the three-dose schedule. When asked about the difficulty in getting vaccinated, 52.6% reported no difficulties, although some of them (9.1%) reported difficulties in accessing the public health system. Solutions need to be found that take into account the reality of the populations in the Amazon region, who have difficulties, both for logistical and financial reasons, in accessing health services to obtain effective and quality vaccination.

Vaccination against hepatitis B was expanded in 2016 to include the entire population, regardless of age and/or vulnerability. [9] However, the vaccination coverage found in the study (27.3%) was low considering the Brazilian average, which in 2023 was 73.2%[4,10] showing the need for educational actions that reinforce the importance of vaccination for the general population and for health professionals.

Studies carried out in traditional riverside and quilombola populations of the Madeira River, Porto Velho/RO; in the municipalities of Barcarena and Acará in Pará; and in Afro-descendant communities in São João do Piauí/PI observed frequencies of 17.9%; 35.1%; 26.7% and 31.5% of reactive anti-HBs isolates, demonstrating low vaccination coverage in these populations, respectively. [11-12-13-14]

In this study, the highest vaccination coverage rates were observed in the age groups of 5-9 years and 20-39 years. It is noteworthy that the PNI recommends that among immunocompetent children and adolescents, the efficacy of the HB vaccine should be ≥95% in children and >90% in healthy adults and young people. [15]

When relating the number of doses of the HB vaccine with the presence or absence of isolated anti-HBs with values ≥10mIU/mL, those with 1 or 2 doses on the vaccination card presented a frequency of 50% and 41,7%, respectively. While, in those with a complete three-dose schedule, a frequency of 35.6% was observed. On the other hand, of those who had a record of a complete schedule, 54.4% had non-reactive anti-HBs, indicating that there was no vaccine response to the schedule received, that is, the number of non-responders vaccinated with the complete schedule was greater than those vaccinated who responded to the schedule received.

Several factors may be associated with an inadequate response to the HB vaccine, such as the immunological response to the vaccine, ineffectiveness of the regimen received, inadequate transportation and storage of the vaccine, age, body mass index, cirrhosis or chronic renal failure, immunosuppression, transplant recipients, chronic hemodialysis, type I diabetes, stress, alcoholism/smoking or infections at the time of vaccination. [15]

CONCLUSION

It was observed that 63.6% of the population studied were susceptible to HBV infection and that most of those who had completed the vaccination schedule did not

DOI: 10.36489/saudecoletiva.2025v15i95p15590-15599

have antibody titers that would confirm the effectiveness of the schedule received. It is suggested that there is a need to create strategies to expand vaccination coverage for this population and others living in hard-to-reach areas. The data generated, in addition to providing support for the formulation of targeted health policies, suggest the need to understand the factors that interfere with acceptance of vaccines and compliance with the vaccination schedule to ensure more effective coverage.

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ACKNOWLEDGMENTS

To all those who participated in making the study possible; and to the staff of SEHEP/IEC/SVSA/MS, for their collaboration in the development and review of the article.

FINANCIAL SUPPORT

The financial support for the execution of the work was provided by IEC/SVSA/MS.

CONFLICTS OF INTEREST

The authors have no conflicts of interest regarding this study.