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Hepatitis B Birth Dose (HepB-BD) Vaccination: Coverage and Associated Factors in Senegal

Abou Ba MD[1,2*], Ndèye Fatou Sow MD[2], Jean Baptiste Niokhor Diouf MD[3], Aliou Thiongane MD[4], Younoussa Keïta MD[5], Babacar Niang MD[4], Fatou Ly[5], Ndiaye O MD[4]

Abstract

Introduction: Hepatitis b is a global public health problem, with a high morbidity and mortality rate, particularly in sub-Saharan Africa and the Western Pacific. It is most often secondary to perinatal transmission. Prevention relies on vaccination. The aim of our study is to assess hepatitis B vaccination coverage at birth and associated factors in Senegal.

Methods: This is a cross-sectional study, carried out during the period from mars 1, 2021 to November 31, 2021 at the Dalal Jamm Hospital's pediatric department at Dakar. All children aged 0 to 15 years were included.

Results: A total of 328 children (180 boys; 54.9%) were included. The mean age of the children was 25.3 ± 4.2 months. Almost all (99.39%) mothers had HBsAg serology, which was positive in 12.8% of cases. Almost all deliveries took place in a health facility (99.7%). Most women (79.9%) had given birth vaginally. Of the children in the study population, 316 had received HepB-BD, giving vaccination coverage of 96.34%. Of them, 89.5% was vaccinated within the first 24 hours after birth. HepB-BD within 24 hours of birth was related to the term of pregnancy (p=0.018).

Conclusion: Vaccination against hepatitis b at birth is widely practiced in Senegal. Vaccination coverage within 24 hours of birth is satisfactory.

Keywords: B hepatitis; Birth dose vaccination; Children

Introduction

Hepatitis B is a major public health problem worldwide. Global estimates suggest that more than 2 billion people have been infected with hepatitis B virus (HBV), 296 million of them living with chronic hepatitis B in 2019. Each year, there are 1.5 million new infections and around 820,000 deaths, mainly from cirrhosis or hepatocellular carcinoma, have been reported in 2019 [1,2]. Sub-Saharan Africa and the Western Pacific region are the areas with the highest hepatitis B prevalence, ranging from 5% to over 8%, and exceed 15% in several countries [3,4]. In Senegal, 85% of the general population have at least one HBV serological marker, and around 11% are chronic carriers of the virus' surface antigen [5]. Chronic hepatitis B is secondary to perinatal transmission of HBV (90%), or when is acquired in early childhood (30%) or after age five years (6%) [6]. Infection with hepatitis B virus can be prevented by vaccination. The HepB-BD protects against undiagnosed cases of maternal HBV and household exposure, and represents the first in a series that will lead to lifelong immunity [7]. When HepB-BD is administered within 24 hours of birth, it can prevent between 75% and 95% of perinatal HBV transmission. When combined with the timely administration of anti-HBV immunoglobulins

Affiliation:

[1]Institut de pédiatrie sociale, CHN Dalal Jamm, Dakar, Senegal

[2]CHN Dalal Jamm, Dakar, Senegal

[3]EPS Roi Baudoin, Dakar, Senegal

[4]Hôpital Albert Royer, Dakar, Senegal

[5]Hôpital Abass NDAO, Dakar, Senegal

[6]CHN de Pikine, Dakar, Senegal

***Corresponding author:**

Abou Ba, Faculty of Medicine, Pharmacy and Odonto-Stomatology, Cheikh Anta Diop University, Dakar-Fann, BP 5005, Dakar, Senegal.

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and supplemented with three doses of HepB vaccine, perinatal transmissions drop from 0.7% to 1.1% [8]. Senegal had introduced since 2004 hepatitis B vaccine into Expanded Program of Immunization (EPI) at 6-10 and 14 weeks of life in the form of a combined vaccine (pentavalent), and added a dose of HepB dose vaccine at birth to the EPI in 2016 [9]. To reduce the number of new B hepatitis infections by 90%, the World Health Assembly also set a target of 90% hepatitis B vaccination coverage at birth [10]. In 2022, Hepatitis B vaccination coverage within 24 hours of birth varies from country around the world, with global coverage at 45% and only 18% in Africa [11]. In 2021, Senegal was one of the best countries in Africa in terms of vaccination coverage. Indeed, 83% of newborns are vaccinated against hepatitis B, either in the delivery room or within 24 hours of birth [12]. The aim of this study was to assess vaccination coverage and factors associated with HepB-BD in Senegalese children.

Methods

Study design

This is a cross-sectional study, carried out during the period from March 1, 2021 to November 31, 2021 at the Dalal Jamm Hospital's pediatric department. The Dalal Jamm national hospital center is a highest public hospital located in the suburbs of Dakar with medical and surgical ward. It is the hospital reference for pediatric gastrointestinal and liver diseases. Children of all ages with are referred to it from secondary or peripheral health facilities as well as from other hospitals of the same standing (level III).

Populations

Eligibility criteria

All children and adolescents aged 0 - 15 years received at the paediatric outpatient clinic in the Dalal Jamm National Hospital Center for which immunization record is available were included.

Data collection

Data were collected from the children's follow-up booklet. We collected sociodemographic data (sex, child and mother's age, address, occupation and level of education of the mothers), pregnancy follow-up (number of prenatal visits, place of pregnancy follow-up, mother's AgHbs serology) and delivery (term of pregnancy, place and route of delivery, newborn resuscitation).

Statistical analysis

Statistical analysis was carried out using Epi Info software, version 7.5.3.3. Variables were first described using univariate analysis, with frequencies and percentages calculated for qualitative variables, and means and standard deviations calculated for quantitative variables. A bivariate analysis was then performed to compare proportions. Pearson Chi-square tests were used, according to their applicability conditions, for significant p-values less than or equal to 0.05.

Results

Socio-demographic characteristics

A total of 328 children (180 boys; 54.9%) were included. The mean age of the children was 25.3 ± 4.2 months. The age range [7-24 months] was predominant (61%). The mean age of the mothers was 29.27 ± 5.97 years. More than half (54.1%) were over 36 years of age. Forty-four-point eight percent (44.8%) of mothers had between 2 and 3 children. They were educated in 77.8% of cases, married in 95.7% and monogamous regime (75.9%). Pregnancy was monitored by at least 4 antenatal consultations (93.2%) and in most cases by midwives (77%). Almost all (99.39%) mothers had HBsAg serology, which was positive in 12.8% of cases. Deliveries took place in a health facility (99.7%), most often (43%) in a hospital. Most women (79.9%) had given birth vaginally,

Table 1: Sociodemographic characteristics.

Sex	Frequency (n)	Percentage (%)
Male	180	54.9
Female	148	45.1
Age (months)		
0-1	17	5.2
02	61	18.5
7-24	199	60,7
>24	51	15.6
Mother's age (years)		
<25	76	23.1
25-35	74	22.6
>36	178	54.3
Mother's education		
No schooling	77	23.5
Primary	73	22.3
Secondary and higher	178	54.2
Mother's Ag Hbs status		
Positive	42	12.8
Négative	286	87.2
Term of pregnancy		
Full term	306	9 3.3
Premature	13	4
Post term	9	2.7
Place of delivery		
Health center level I	74	22.6
Health center level II	67	20.4
Hospital	141	43
Private hospital	45	13.7
Home	1	0.3
Mode of delivery		
Vaginal delivery	262	79.9
Cesarean section	66	20.1
New Born ressuscitation		
Yes	26	7.9
No	302	92.1

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and newborn resuscitation was reported in 8% of infants, with a favorable outcome after birth, and a return home noted in 94.2% of infants (Table 1).

Hepatitis B vaccination at birth

Of the children in the study population, 316 had received HepB-BD, giving vaccination coverage of 96.34%. The majority (89.5%) of them had been vaccinated within the first 24 hours after birth. Vaccination against hepatitis B within 24 hours of birth was related to the term of pregnancy (p=0.018). In addition, the mother's level of education, place of delivery, HBsAg status, route of delivery and notion of neonatal resuscitation were not associated with timely vaccination (Table 2).

Discussion

Our study found that 96.34% of children seen in the pediatric department of CHN Dalal Jamm had received HepB-BD, and 89.5% of them had been vaccinated within the first 24 hours after birth. This vaccination was associated with term of pregnancy (p=0.018). Our result is better those reported in the country. In 2017, according official estimates, vaccination coverage was 82% in the country [9], and in the study carried out by Bassoum in the Podor health district, north of the country, which reported a hepatitis B vaccination rate at birth of 88.1% [13]. At national level, according to the results of the 2019 Demographic and Health Survey (DHS), hepatitis B vaccination coverage rates were better among girls (82.1% vs. 80.5%) and in urban areas than in rural areas (91.4% vs. 75.2%) [14]. The high vaccination coverage rate observed in our study could be explained by the fact that almost all deliveries (99.7%) took place in a health facility, and that the Senegalese government has developed a good strategy to ensure that vaccines are available in almost all health facilities. A study by Olakunde in Nigeria using data from the 2018 Demographic and Health Survey reported a vaccination rate of 53% [15]. A study in southeastern Nigeria showed low hepatitis B vaccination coverage at birth of just 26.2% [16]. A multicenter study in African countries showed variable hepatitis B vaccination coverage rates of 84% in Gambia, 23% in Nigeria and 94% in Botswana [17]. In Democratic Republic of the Congo, only 68% of infants born received a birth-dose vaccine, and, of these, 77% received a birth-dose vaccine within 24 hours of birth [18]. Better vaccination rates were reported in Beijing, China, at 98.39% [19]. Other authors have reported lower rates in the Marshall Islands [20], the Philippines [21] and the USA [22], with 79%, 54% and 83% hepatitis B vaccination coverage at birth respectively. In the Bassoum study, in addition to delivery in a health facility, access to a television, weighing at birth and hospitalization at birth were factors associated with hepatitis B vaccination at birth [13]. In study carried out by Okenwa in Enugu state, Nigeria, factors associated with non-vaccination children included lack of vaccines in labor rooms or maternity wards, delivery on a day other than the vaccination day, lack of knowledge of the valid hepatitis B vaccination schedule, vaccine stock-outs, payment of fees for vaccination, and long distance [16]. Olakunde also found that hepatitis B vaccination was better when delivery took place in a public health facility

Table 2: Bivariate analysis of factor associated with HepB-BD within 24H.

Characteristics		HepB-BD within 24 hours		p
		Yes ; n (%)	No ; n (%)	
Mother's education	No schooling	67 (84.8)	12 (15.2)	0,204
	Primary	64 (88.9)	8 (11.1)	
	Secondary and Higher	152 (85.9)	25 (14.1)	
Term of pregnancy	Full term	268 (87.6)	38 (12.4)	0,018
	Premature	11 (84,6)	2 (15.4)	
	Post term	4 (44.4)	5 (55.5)	
Place of delivery	Health center level I	74 (94.9)	4 (5,1)	0.361
	Health center level II	56 (83.6)	11 (16.4)	
	Hospital	122 (86.5)	19 (13.5)	
	Private hospital	31 (68.9)	14 (31.1)	
	Home	0	1(100)	
Mother's Ag Hbs status	Positive	39 (92.9)	3 (7.1)	1
	Négative	244 (85.3)	42 (14.7)	
Mode of delivery	Vaginal delivery	227 (89.4)	27(10.6)	0,788
	Cesarean section	56 (84.8)	10 (15.2)	
New Born ressuscitation	Yes	12 (46.2)	14 (53.8)	0,268
	No	271 (89.7)	31 (10.3)	

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Abou Ba MD, et al., J Pediatr Perinatol Child Health 2023
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earlier than in a private facility or at home [15]. According to a study by Wilson et al, vaccination against hepatitis B at birth is associated with better vaccination rates. He found that, by 18 months of age, 44% of children vaccinated at birth had received all recommended vaccines, compared with 23% of the not vaccinated at birth group ($p < 0.001$) [23]. In the study by Oster et al, 60% of infants who had been vaccinated during hospitalization after birth had completed the seven-vaccine series by 19 months, compared with 33.8% of those who had not been vaccinated at discharge ($p<0.001$). The probability of completing the series was almost three times higher in infants who had been vaccinated against hepatitis B during hospitalization at birth than in those who had not [24]. In our study, the majority of children (89.5%) were vaccinated within 24 hours. In the Bassoum study, only 42.1% of children born in the Podor health district received their first dose within 24 hours of birth [13]. In the study by Périères et al carried out in Niakhar in the west of the Senegal, 31.0% and 66.8% of children had been within 24 hours in 2016 and 2017-2018 [25]. These results are significantly better than those found in a systematic review of the literature assessing the coverage and delay in administration of hepatitis B vaccine at birth in sub-Saharan Africa. Vaccination within the first 24 hours was only 1.3%, rising to 60.8% by the twenty-eighth day after birth [26]. In the Gambia, although 93.1% of six-month-old had been vaccinated, only 1.1% had received the vaccine within 24 hours, 5.4% by day 7 and 58.4% by day 28 [27]. Our result is similar to that found in a study carried out in the French Polynesia, where 89% of children received the birth dose within 24 hours [28]. On the other hand, they are clearly superior to those obtained in Papua New Guinea in 2005, where the 24-hour coverage rate was only 23%, despite the fact that this area is highly endemic [29]. Other results weaker than those of our study were found by Ekra et al. in Côte d'Ivoire [30] and Choconta-Piraquive in the Colombian Amazon [31]. Although several countries, including Senegal, have achieved the goal of hepatitis B vaccination coverage at birth, there is still a need to intensify prevention and treatment efforts to achieve global vaccination coverage of at least 90% by 2030, which will reduce incident cases of chronic HBV and HBsAg prevalence in children under 5 years of age, cut HBV-related deaths by around 710,000 [580,000 to 890,000]. In the WHO African region, where HepB-BD coverage is currently very low, a more realistic increase in HepB-BD coverage to ≥25% by 2030 would avert 150,000 [120,000 to 190,000] deaths in this birth cohort [32,33].

Conclusion

Vaccination against hepatitis B at birth is an effective means of preventing infection by the hepatitis B virus. It is widely practiced in Senegal, with a vaccination coverage rate higher than the target set by the World Health Assembly.

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