

# Seroprevalence of Hepatitis B Virus in N'Djamena, Chad

Mayanna Habkreo<sup>1,\*</sup>, Hassan Adam Annour<sup>2</sup>, Gouaye Yahvourne Daiba<sup>4</sup>, Maire Dehainssala<sup>1</sup>, Adama Ngare<sup>1</sup>, Moussa Elefi<sup>1</sup>, Tahir Mahamat Saleh<sup>3</sup>, Ali Mahamat Moussa<sup>1</sup>, Ibrahim Hamat<sup>1</sup>

<sup>1</sup>Gastroenterology, Internal Medicine Department, National Reference Hospital of N'Djamena, N'Djamena, Chad

<sup>2</sup>Pediatrics Department, University Hospital of the Renaissance, N'Djamena, Chad

<sup>3</sup>Internal Medicine Department, University Hospital of the Renaissance, N'Djamena, Chad

<sup>4</sup>Department of Public Health, Toukra District Hospital, N'Djamena, Chad

## Email address:

mayannahabkreo@yahoo.fr (M. Habkreo)

\*Corresponding author

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**Abstract:** *Introduction:* Chronic hepatitis B virus infection is very common in sub-Saharan Africa and widely distributed worldwide. The purpose of this study was to determine the prevalence of hepatitis B virus in N'Djamena, Chad. *Methodology:* This was a cross-sectional study conducted in the city of N'Djamena. Three neighborhoods were randomly selected. The methodology applied was a two-stage probability survey with the neighborhoods as the primary unit and the squares (sectors) as the secondary unit. Persons from the selected households were screened for HBV infection. *Results:* Two hundred and ninety-nine (299) individuals were recruited in this study series. The majority were men (69.6%). The mean age was  $29.5 \pm 9$  years with extremes of 15 to 45 years. The prevalence of those screened was 24.1% with a male predominance (54.1%). There was a statistically significant difference between HBsAg carriage and sex ( $p = 0.001$ ). On the other hand, the difference between HBV carriage and education level was not statistically significant. In addition, few people had information on the modes of transmission of HBV and their serological status. *Conclusion:* Viral hepatitis B is a major global public health problem. However, most of the people recruited in this series were unaware of their status and very few had information on this disease.

**Keywords:** Prevalence, Viral Hepatitis B, HBsAg, N'Djamena, Chad

## 1. Introduction

Viral hepatitis B is an inflammation of the liver parenchyma, which occurs as a result of an attack by the viral hepatitis B virus (HBV), of the Hepadnaviridae family, and can lead to hepatocyte necrosis [1]. HBV infection is a real global public health problem with approximately two billion infected people and 257 million chronic carriers [1-3].

The frequency of chronic HBV carriage is high in sub-Saharan Africa with a prevalence of more than 8% in most countries. The lifetime risk of acquiring the infection in this sub-region is 60% [4]. In this part of Africa, infection occurs preferentially in childhood. The transition to chronicity can concern up to 90% of subjects infected in early childhood, a

problem that is all the more serious in areas where vertical transmission and horizontal transmission at this age are frequent. In order to better understand this problem, it seems essential to introduce vaccination against HBV at birth in these high prevalence areas. Despite this high prevalence and the high mortality rate, there is very little communication about this condition, its modes of transmission, screening and prevention.

In Chad, apart from the study by Bessimbaye et al. in patients living with HIV, few studies on viral hepatitis B have been carried out [5]. Hence the interest of this study which aims to determine the prevalence of HBV in the city of N'Djamena in order to identify the problem of this condition in the country.

## 2. Patients and Method

This series included people of both sexes, aged 15 to 45 years, residing in N'Djamena and not belonging to the medical or paramedical profession.

This was a cross-sectional study. The sampling was random. Three neighborhoods were randomly selected. A two-stage probability survey with the neighborhoods as the primary unit and the squares (sectors) as the secondary unit. The sampling procedure for this study was the "route" method. This method consisted of selecting a starting point from a given concession from which a first household was drawn. Subsequent households were then drawn according to the previously calculated draw step. In each square (sector), a number of households were drawn and the persons from the households were screened. The test used was a rapid diagnostic test: Diaspot\* (USA, ACON laboratory) with a sensitivity of 5ng/ml and an accuracy of over 99.5%. A drop of blood was taken from the pulp of the finger and placed on the strip, at the level of the arrow indicated. The reading was taken after 10 minutes.

The results were given in terms of frequency and percentage. A comparison was made according to gender, age and education level. A significant difference was retained for a  $p$  value  $< 0.05$ .

## 3. Results

### 3.1. Sociodemographic Characteristics

Two hundred ninety-nine individuals (299) were included. Men were in the majority (69.6%). The sex ratio M/F was 2.2. The average age of the screened individuals was  $29.5 \pm 9$  with extremes of 15 and 45 years. The 41-45 age group was the most represented. Most of the respondents were uneducated and unemployed in 53.8% and 56.9% of the cases respectively.

### 3.2. HBV Prevalence

In this study, of the 299 individuals sampled, 72 were positive on the rapid test, for a prevalence rate of 24.1%.

### 3.3. HBsAg Carriage by Sex

The gender difference was statistically significant between men and women ( $\chi^2 = 10.621$  and  $p = 0.001$ ). Of the HBsAg positive individuals, 54.2% were male.

### 3.4. HBsAg Carriage According to Level of Education

There was no statistically significant difference between education level and HBV carriage ( $\chi^2 = 2.922$  and  $p = 0.404$ ). The uneducated were predominantly HBsAg positive and represented 56.9%.

### 3.5. HBsAg Carriage by Age

The difference was not statistically significant between the age groups ( $\chi^2 = 28.557$  and  $p = 0.541$ ).

Table 1. Distribution of carriage according to sex, education level and age.

HBs antigen	Negative	Positive	Total	p
Gender				0,001
Female	58 (25,5)	33 (45,8)	91 (30,4)	
Male	169 (74,4)	39 (54,2)	208 (69,6)	
Level of education				0,404
Uneducated	120 (52,9)	41 (56,9)	161 (53,8)	
Primary	49 (21,6)	19 (26,4)	68 (22,7)	
Secondary	43 (18,9)	10 (13,9)	53 (17,7)	
College	15 (6,6)	2 (2,8)	17 (5,7)	
Age groups (%)				0,541
15-20	53 (23,3)	13 (18,0)	66 (22,1)	
21-25	30 (13,2)	13 (18,0)	43 (14,4)	
26-30	49 (21,6)	17 (23,6)	66 (22,1)	
31-35	29 (12,8)	7 (9,7)	36 (12)	
36-40	15 (6,6)	2 (2,8)	17 (5,7)	
41-45	51 (22,5)	20 (27,8)	71 (23,7)	

## 4. Discussion

### 4.1. Sociodemographic Characteristics of the Study Population

The average age of our study population was  $29.5 \pm 9$  years with extremes of 15 and 45 years. Men represented a significant proportion of 69.6%, against 30.4% of women, i.e. a sex ratio M/F=2.2. A similar finding was reported by Huda et al. in Benghazi where the male proportion represented 65.8% for 35.2% of women and an average age of 28.5 years [6]. This male predominance in our context could be explained by socio-cultural and religious constraints limiting male-female contact. Our study population is essentially composed of young people, in line with the African population reported by several studies in Africa south of the Sahara [7-9]. The people surveyed were mostly uneducated (53.8%), followed by those with primary education (22.7%). This would be explained by the low schooling rate in Chad, which is 32% for women and 48% for men according to INSEED 2016 data in the general population and the lack of access to education for certain segments of the population. This rate was 13.5% in 2009 [10].

The majority of people surveyed were unemployed (56.9%), followed by students (26.3%). Our result differs from those of Huda et al. in Benghazi who reported (43.7%) employees and company executives, housewives (28%) and students (11.2%) [6]. Our study population, young and with a low socio-economic level, contrasts with the Libyan series where all socio-professional strata were represented. Also, this difference could be explained by the high unemployment rate in Chad [10], compared to Libya before the revolution where stability reigned and the economy flourished.

### 4.2. Prevalence of HBV

The prevalence of HBsAg positive subjects during this survey was 24.1%. This high rate is in line with the data in the literature classifying most sub-Saharan countries, including Chad, as high prevalence areas [2, 3]. Viral hepatitis B is thus a major public health problem in our country.

This result is higher than those of other African countries

in the so-called high HBV prevalence zone. In Cameroon in the extreme north, the prevalence was 18.4% [11].

It was 11.1% in Mali [12]; 8.4% in Niger [13]. In Benin, Kadidjatou *et al.* found a prevalence of 14.02% [14]; Meda *et al.* in Burkina Faso obtained a rate of 9.1% [15]. This high prevalence explains the high frequency of chronic HBV carriage in sub-Saharan Africa, with a prevalence of over 8% in most countries [4]. Also in the Chadian context, the mass vaccination carried out in the 1980s and 1990s as well as certain cultural practices (circumcision and mass excision) would have contributed to the proliferation of the infection.

However, the prevalence of HBsAg is heterogeneous in the different neighborhoods. The Ardebjournal neighborhood, for example, has a higher HBsAg prevalence rate than the others (40.3%).

According to gender, this study shows a male predominance of 54.1% compared to 45.9% for women. The gender difference was statistically significant between men and women ( $p = 0.001$ ). This male predominance had also been demonstrated in the literature and could be explained by several theories, including a lower clearance of HBsAg in men [2].

This work shows that the majority of uneducated people are HBsAg positive (56.9%). The lack of access to education and information on this pathology makes this category of the population vulnerable, hence the importance of using poster campaigns, TV, radio and internet commercials on HBV infection as a communication medium. Although uneducated people seem to be in the majority, the difference between education levels and HBV carriage was not statistically significant ( $\chi^2 = 2.922$  and  $p = 0.404$ ).

There was no statistically significant difference between HBV carriage and age groups ( $\chi^2 = 28.557$  and  $p = 0.541$ ). In terms of HBV infection, all age groups were involved. However, the most frequent transmission route in Africa is vertical. Transmission occurs in most cases in early childhood.

## 5. Conclusion

A major public health problem, Chad is not spared from hepatitis B virus infection. This work shows a high prevalence, confirming the WHO's 2020 data, making Chad one of the most HBV-infected countries in the world. It is therefore essential to conduct a campaign to promote screening among the entire community. The development of information programs should be encouraged. The conduct of a new study should largely involve health care professionals considered to be the most exposed to HBV.

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