



## Prevalence of Hepatitis B Core Antibody in Sudanese Random Blood Donors at Khartoum state, 2022

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### Article Info:



#### Article History:

Received 08 Sep 2022  
Reviewed 11 Oct 2022  
Accepted 29 Oct 2022  
Published 15 Nov 2022

### Cite this article as:

Ebar MHO, Abdalla MAM, Osman MAA, Ahmed A, Prevalence of Hepatitis B Core Antibody in Sudanese Random Blood Donors at Khartoum state, 2022, Journal of Drug Delivery and Therapeutics. 2022; 12(6):44-47

DOI: <http://dx.doi.org/10.22270/jddt.v12i6.5785>

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### Abstract

**Background:** Hepatitis B virus is a DNA virus belonging to the Hepadnaviridae family attacking the liver and can cause both acute and chronic disease. The aim of this study was to determine the prevalence of Hepatitis B core antibody in Sudanese random blood donors.

**Materials and methods:** The study was descriptive cross-sectional study conducted at Ibn Sina Specialized Hospital, Khartoum, Sudan during the period from May 2022 to September 2022. Blood samples were collected from 100 random blood donors. A total of three ml of whole blood were collected from each participant in plain tube. Hepatitis B core antibody test was done by using biochemistry analyzer (Cobas 411).

**Results:** The results of this study revealed that all blood donors were negative for HBsAg but 51% of them were positive for HBcAb. The mean average of hepatitis B core antibody in blood donors was  $0.984 \pm 0.950$ , where the mean average of hepatitis B surface antigen was  $0.685 \pm 0.170$ . The educational background had a positive correlation with the prevalence of hepatitis B core antibody.

**Conclusion:** This study concluded that the prevalence of hepatitis B core antibody in blood donors was high.

**Keywords:** Hepatitis B virus infection, hepatitis B core antibody, enzyme linked immunosorbent assay, blood donation, blood transfusion, random blood donors

## INTRODUCTION

Hepatitis B virus is a DNA virus belonging to the Hepadnaviridae family causing hepatitis B in humans, hepatitis B is a viral infection that attacks the liver and can cause both acute and chronic disease.<sup>1</sup>

Serological markers for HBV infection include HBsAg, anti-HBs, HBeAg, anti-HBe, and anti-HBc IgM and IgG. HBsAg is the hallmark of infection. During acute infection, anti-HBc (initially both IgM and IgG) appears 1–2 weeks after the appearance of HBsAg at the same time as raised aminotransferase concentrations and symptoms, while IgG persists during chronic infection. IgM anti-HBc can be present in some patients with severe exacerbations of chronic HBV infection but the titre is lower than that in acute infection.<sup>2</sup>

Hepatitis B virus (HBV) infection is a major public health problem in most countries, with approximately 2 billion people worldwide showing exposure to the virus, nearly 300 million carrying HBV chronic infection and over 1 million deaths per year due to HBV-related end-stage liver disease, liver cirrhosis and liver cancer.<sup>3</sup>

Risk factors for HBV infection include transfusion of unscreened blood, renal dialysis, sexual promiscuity, sharing or re-using syringes among injection drug users, tattooing,

piercing, working or residing in a health-care setting, living in a correctional facility and long-term household or intimate non-sexual contact with an HBsAg-positive individual.<sup>4</sup>

Presently, screening for HBsAg is the only mandatory screening test for the detection of Hepatitis B virus (HBV) infection in many blood banks in developing countries.<sup>5</sup> However, this does not rule out the risk of transmission of hepatitis B totally, because during the serological response of the host to infection, there is a phase during which the HBsAg cannot be detected in the blood, although hepatitis B infection is present. This phase is called as the “core window period.” During this “window period,” detection of the antibody to the hepatitis B core antigen (anti-HBc) serves as a useful serological marker for hepatitis B infection.<sup>6</sup>

Some studies revealed high prevalence of HBcAb in random blood donors and stated that screening of HBcAb could contribute to reduce the residual risk of posttransfusion HBV infection. Also in Sudan, there was no a published data regarding to the prevalence of HBcAb in random blood donors, therefore, the aim of our study was to assess the prevalence of HBcAb in sudanese random blood donors.

## MATERIALS AND METHODS

This study was descriptive cross-sectional study and conducted at Ibn Sina Specialized Hospital, Khartoum, Sudan during the period of May 2022 to August 2022. Random blood donors who came at blood bank department of the Ibn Sina Specialized hospital during the aforementioned period were included. In addition to that, any participant who refused to give consent were excluded. 100 subjects were included. From each participant three ml of venous blood samples were collected and dispensed into sterile plain containers. Hepatitis B core antibody test was done by using biochemistry analyzer (Cobas 411). The data was gathered using pre-designed structural questionnaire and the SPSS 23.0 statistical software (SPSS Inc., USA) was used for statistical analysis. Finally, the

study was licensed by the ethical committee ethical committee of national university.

## RESULTS

### Socio- demographic data

Total of 100 samples were collected from the blood donors; the mean age of the donors was  $32.25 \pm 12.245$  years, and 98% of the study population were males, where 2% of them were females. The frequency of educational background level was 17%, 27%, and 56% (primary, secondary, and university) respectively. the prevalence of chronic disease in the donors of this study; 20% had chronic diseases, where 80% had no chronic diseases. Regarding to the frequency of treatment taken by the donors of this study; 26% were taking drugs, where 74 were not taking drugs. (Tables 1,2,3,4,5).

**Table 1: The descriptive statistics of age in the study population**

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
<b>AGE</b>	100	18.00	60.00	32.25	12.245	.610	.241

**Table 2: Distribution of gender in the study population**

	Gender	Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	<b>Male</b>	98	98.0	98.0	98.0
	<b>Female</b>	2	2.0	2.0	100.0
	<b>Total</b>	100	100.0	100.0	

**Table 3: Distribution of Educational background level in the study population**

	Educational background	Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	<b>Primary</b>	17	17.0	17.0	17.0
	<b>Secondary</b>	27	27.0	27.0	44.0
	<b>University</b>	56	56.0	56.0	100.0
	<b>Total</b>	100	100.0	100.0	

**Table 4: Distribution of chronic disease in the study population**

	Chronic disease	Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	<b>yes</b>	20	20.0	20.0	20.0
	<b>No</b>	80	80.0	80.0	100.0
	<b>Total</b>	100	100.0	100.0	

**Table 5: Distribution of treatment taking in the study population**

	Treatment taking	Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	<b>yes</b>	26	26.0	26.0	26.0
	<b>No</b>	74	74.0	74.0	100.0
	<b>Total</b>	100	100.0	100.0	

## Laboratory Results

The laboratory results revealed that all blood donors in this study were negative for Hepatitis B surface antigen but 51% of

them were positive for hepatitis B core antibody. The mean average of hepatitis B core antibody in blood donors was  $0.984 \pm 0.950$ , where the mean average of hepatitis B surface antigen was  $0.685 \pm 0.170$ . (Tables 6, 7).

**Table 6: The descriptive statistics of Hepatitis B surface and antigen and core antibody in the study population:**

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
HBCAb	100	.01	2.72	0.984	0.950	.208	.241
HBSAg	100	.15	0.97	0.685	0.170	-.675	.241
Valid N (listwise)	100						

**Table 7: Distribution of hepatitis B core antibody in the study population**

	HBCAb	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Positive HBCAb	51	51.0	51.0	51.0
	Negative HBCAb	49	49.0	49.0	100.0
	Total	100	100.0	100.0	

## DISCUSSION

Hepatitis B virus (HBV) infection is a major public health problem in most countries, with approximately 2 billion people worldwide showing exposure to the virus, nearly 300 million carrying HBV chronic infection and over 1 million deaths per year due to HBV-related end-stage liver disease, liver cirrhosis and liver cancer. The present study is a cross sectional study conducted at Khartoum state, for the determination of prevalence of Hepatitis B core antibody in Sudanese random blood donors.

The results revealed that; the mean age of the donors was  $32.2 \pm 12.2$  years. This finding was similar with a study done by Donge Hee seo, et al in which of the 12,461 donors, 1682 (13.5%) were reactive for anti-HBc. Among different age groups, there was a steady increase in the anti-HBc-positive rate, ranging from 2.0% in the age group of less than 20 years to 80.0% in the age group of 60 years and older ( $p < 0.0001$ ).<sup>7</sup> And 98% of this study were males, where 2% of them were females. Which agrees with a study done by Saeeda Baig which found that Gender differences prevail in the infections caused by the Hepatitis B virus. Four hundred and seventy-two patients with HBV infection were selected for the study. The frequency of hepatic infection in males was 79.5% ( $n=375$ ) and in females 20.5% ( $n=97$ ), with a male to female ratio of 3.8:1.<sup>8</sup>

The frequency of educational background level was 17%, 27%, and 56% (primary, secondary, and university) respectively. This finding agrees with a study done by Cornejo, M.I, et al which stated that Higher prevalence of hepatitis B markers was associated with a lower level of education ( $p < 0.05$ ) and higher age ( $p < 0.05$ ).<sup>9</sup>

The laboratory results revealed that all blood donors in this study were negative for Hepatitis B surface antigen but 51% of them were positive for hepatitis B core antibody. The mean average of hepatitis B core antibody in blood donors was  $0.984 \pm 0.950$ , where the mean average of hepatitis B surface antigen was  $0.685 \pm 0.170$ . Similar findings were found by Lavanya, et al and stated that the prevalence of HBsAg, anti-HBc total (IgG and IgM), anti-HBc IgM and anti-HBs were investigated and was found to be 3.5, 10.9, 5.7, and 3%, respectively.<sup>10</sup> In contrast with a study done by the

Department of Transfusion Medicine, PGIMER, Chandigarh which found A relatively less prevalence of hepatitis core antibody in blood donors. Their study revealed an anti-HBc prevalence of 6.9% in voluntary donors and 10.4% in replacement donors.<sup>11</sup> But the present study agrees with another study conducted by Bhattacharya et al in Ganjam, West Bengal blood donors in 2004 and 2005 showed anti-HBc seropositivity as high as 18.3% in voluntary blood donors. Also, a report from New Delhi revealed that 6.92% of voluntary donors and 12.53% of the replacement donors were found to be positive for anti-HBc.<sup>12</sup>

Also, the findings in this study agree with a study done by D.D. Douglas, et al which stated that during this time, only 1 unit (0.004%) was HBsAg positive. An additional 158 units (0.6%) were repeatedly reactive for anti-HBc. These 158 HBsAg-negative, anti-HBc-positive units were given by 119 donors of blood for allogeneic and autologous use.<sup>13</sup> A study done in Sudan by Mahmoud, Ola Abd El Kader et al in Detection of occult hepatitis B virus infection among blood donors, showed that the anti-HBc was detected in 42% of the blood donors, among whom 90.5% were positive for HBV-DNA. Two main profiles have been detected, namely, the presence of the three genes (S, C, and X genes) together in 35.7% of the blood donors or the presence of the X gene in addition to the core gene.<sup>14</sup> Which was similar to our results.

## CONCLUSION

This study concluded that the prevalence of hepatitis B core antibody in blood donors was high. The educational background had a positive correlation with the prevalence of hepatitis B core antibody.

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