

Seroprevalence of hepatitis B virus, hepatitis C virus, and human immunodeficiency virus among volunteer blood donors in the National Blood Transfusion Center of Lomé

Liza Koboyo Nadjir, Malewe Kolou, Gnatoulma Katawa,
Alexander Kwame Kwarteng, Abdoul Raouf Issa,
Hèzouwè Magnang, Koffi Mawussi, Lochina Feteke,
Koffi Yvon Segbena

ABSTRACT

Aims: This study aimed to evaluate the prevalence of hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) at the Centre National de Transfusion (CNTS) of Lomé, Togo. **Methods:** This is a cross-sectional study, which included volunteer blood donors from 2011–2015 at the CNTS of Lomé. The age ranged from 18–60 years old. All donors were screened for HBV, HCV and HIV using ELISA and the seroprevalence of these viruses was calculated using Graph Pad

Prism software. **Results:** Male donors (86.44%) were significantly more represented than female (13.71%). Regular donors (72.2%) were more than first time donors (28%, $p < 0.001$). The overall seroprevalence during the study period was 2.63%, 1.58% and 0.92% for HBV, HCV and HIV, respectively. The seroprevalence of these viruses in blood donors decreased from 2011–2015. The proportion of HBV among blood-borne viral infection represented, 48.81%, 54.16%, 51.71%, 46.71% and 58.10% in 2011, 2012, 2013, 2014 and 2015, respectively. **Conclusion:** This study permitted to monitor the dynamics of HBV, HCV and HIV in blood donors for five years in Lomé, and revealed the need to reinforce screening, preventive and sensitization strategies to improve transfusion safety in Togo.

Keywords: Centre National de Transfusion (CNTS), Hepatitis B virus (HBV), Hepatitis C virus (HCV), Human immunodeficiency virus (HIV)

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Liza Koboyo Nadjir¹, Malewe Kolou², Gnatoulma Katawa³, Alexander Kwame Kwarteng⁴, Abdoul Raouf Issa⁵, Hèzouwè Magnang⁶, Koffi Mawussi⁷, Lochina Feteke⁸, Koffi Yvon Segbena⁹

Affiliations: ¹Biologist Medical doctor, Liza Koboyo NADJIR, CNTS of Lomé, Université de Lomé, Lomé, Togo; ²Biologist Medical doctor, Malewe KOLOU, CHU Campus, University of Lomé, Lomé, Togo; ³PhD, Gnatoulma Katawa, ESTBA, Université de Lomé, Lomé, Togo; ⁴PhD, Alexander Kwame Kwarteng, Kumasi Centre for Collaborative Research in Tropical Medicine, Kumassi, Ghana; ⁵PhD, Abdoul Raouf Issa, BIOLIM, University of Lomé, Lomé, Togo; ⁶Biologist Medical Doctor, Hèzouwè MAGNANG, CNTS of Lomé, University of Lomé, Lomé, Togo; ⁷Biologist Medical Doctor, Koffi MAWUSSI, CNTS of Lomé, University of Lomé, Lomé, Togo; ⁸Biologist Medical Doctor, Lochina FETEKE, CNTS of Lomé, University of Lomé, Lomé, Togo; ⁹Professor, Koffi Yvon SEGBENA, CHU Campus, University of Lomé, Lomé, Togo.

Corresponding Author: Liza Koboyo NADJIR, Lomé, Togo, BP: 4090 Lomé, Togo; Email:lizanadjir@yahoo.fr

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INTRODUCTION

Transfusion-transmitted infections have been a major concern in transfusion medicine [1]. In the mid 1980s, hepatitis B core antibody (HBc) testing was introduced to screen blood donors in hepatitis B virus (HBV) non-endemic countries [1]. Safe blood transfusions remain a challenge in resource-limited settings where blood-transmitted diseases are endemic, mainly in Sub-Saharan Africa [2, 3]. Hepatitis B is one of most common infectious diseases of the world infecting about two billion people of which an estimated 350 million chronically infected cases have been reported so far [4]. Hepatitis C virus infection is another common chronic blood-borne infection with an estimated 3.9 million persons infected with the virus and with a positive correlation with the onset and progression of liver cirrhosis. Infections by hepatitis B virus (HBV) and hepatitis C virus (HCV) cause serious mortality, morbidity as well as financial burden and are thus a major global health problem [5].

Although blood transfusion saves millions of lives worldwide each year, recipients of transfusions risk becoming infected with blood-borne pathogens such as HBV, HCH and HIV. Each year, up to four million blood donations worldwide are not tested for human immunodeficiency virus (HIV) and few are tested for hepatitis B and hepatitis C viruses (HBV and HCV, respectively) [6]. Monitoring the trends in the residual risks of transfusion-transmitted infections or the incidence of transmissible agents in blood donations provides a way not only of evaluating the safety of the blood supply. Therefore, the National Blood Transfusion Center of Lomé (CNTS) screens all blood for HBV, HCV, HIV and syphilis.

In this study, we present the prevalence of HBV, HCV, and HIV among Togolese blood donors for the period 2011–2015 in National Blood Transfusion Center of Lomé.

Table 1: Population characteristics

	Gender				Type of donors				Total
	Female		Male		Regular donors		First time donors		
	N	%	N	%	N	%	N	%	
2011	4128	15.1	23208	84.9	18315	67	9021	33	27336
2012	3633	12.84	24663	87.16	20939	74	7357	26	28296
2013	3561	13.03	23966	86.94	20818	75	6739	25	27557
2014	4990	13.95	30787	86.05	25402	71	10375	29	35777 ⁽²⁾
2015	4232	13.4	27353	86.6	23373	74	8212	26	31585
Mean ± SD	4109±574.1	13.71±0.88	25995 ⁽¹⁾ ±3101	86.44 ⁽¹⁾ ±0.92	21769 ⁽¹⁾ ±2706	72.20 ⁽¹⁾ ±1.46	8341±1427	28±1.64	30110 ⁽¹⁾ ±3590

⁽¹⁾p<0.0001, ⁽²⁾p<0.05

MATERIALS AND METHODS

This cross-sectional study was based on data analyzed from records of blood donors containing results of serological screening. We used the records from 2011–2015. All donors signed an informed consent form. Donors are male and female with an age range of 18–60 years old. Volunteer blood donors were screened first by clinical examination including their medical history and second by biological blood tests such as HBV, HCV and HIV. Human immunodeficiency virus was tested using either Genscreen ULTRA HIV Ag-Ab[®] (BIO-RAD, Marnes-la-Coquette, France) or VIRONOSTIKA[®] HIV (bioMérieux, Marcy-l’Etoile, France). Hepatitis B virus was tested using either Monolisa HBsAg[®] (Bio-RAD, Marnes-la-Coquette, France), Murex HBsAg[®] (DIASORIN, Dartford, UK) or Inteck HBsAg[®]. For HCV testing, either Murex anti-HCV[®] (DIASORIN, Dartford, UK) or Access[®] HCV Ab Plus (Bio-RAD, Marnes-la-Coquette, France) was used.

Statistical analysis

Seroprevalence was calculated for each infection using Graph Pad Prism 5.02 software. Chi-square was used for statistical analysis. A p-value < 0.05 was considered significant.

RESULTS

Study population characteristics

Table 1 gives the characteristics of the study population. Volunteer blood donors aged from 18–60 years. Males were more represented than females (86.44% vs 13.71%, p < 0.0001). The number of blood donors ranged from 27,336–35,777 donors in the period of 2011–2015. The number of donors in 2014 was significantly higher (p < 0.05). In addition, regular donors (72.20%) were statistically more represented than first time donors (28%, p < 0.0001). Interestingly, for each year, the number of regular donors was also higher than first time donors.

Seroprevalence of HCV, HBV and HIV from 2011–2015

To ensure the security of blood transfusion and to avoid contamination, CNTS screened systematically all donors for HBV, HCV and HIV. Figure 1 shows the prevalence of HBV, HCV and HIV. The seroprevalence of HBV was higher than HCV and HIV from 2011–2015. The mean prevalence of HBV from 2011–2015 was $3.63 \pm 0.35\%$ while HCV and HIV were $1.58 \pm 0.56\%$ and $0.92 \pm 0.15\%$ respectively. The seroprevalence of HBV was the highest and was observed in 2011. The lowest seroprevalence of HBV was observed in 2013. Regarding HCV, the highest prevalence was observed in 2012 and lowest in 2015. For HIV, there was no difference between 2011 and 2015. In general, we found that the seroprevalence of these viruses in blood donors decreased from 2011–2015. However, there was a peak in 2014. In addition, the proportion of HBV among blood-borne viral infection represented, 48.81%, 54.16%, 51.71%, 46.71% and 58.10% in 2011, 2012, 2013, 2014 and 2015, respectively (Figure 2). This indicates that HBV is a big concern for blood transfusion safety in the CNTS.

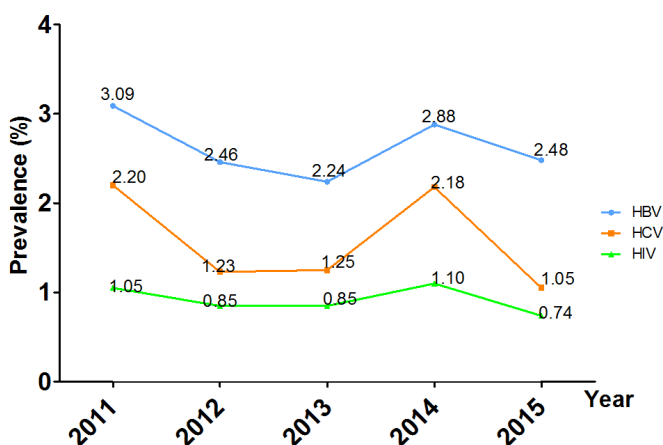


Figure 1: Prevalence of HBV, HCV and HIV from 2011–2015.

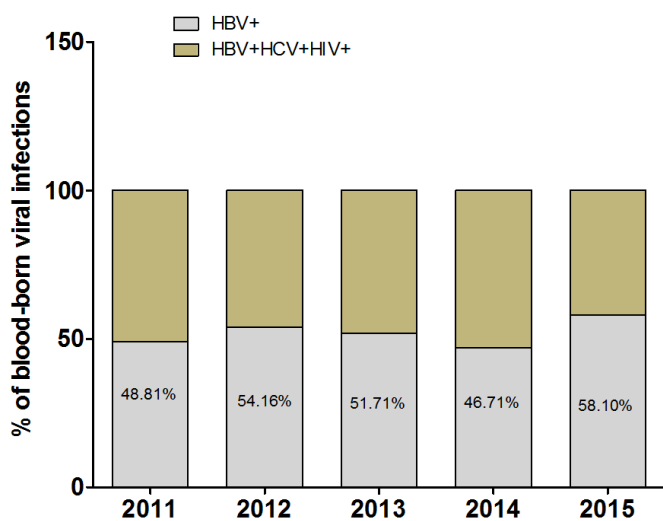


Figure 2: Blood-borne viral infection.

DISCUSSION

Blood transfusion is one of the most important therapeutic options of life-saving intervention for recipients who are in diseased or non-diseased conditions with severe blood loss. However, it is associated with certain risks, which can lead to adverse consequences that may cause acute or delayed complications and bring the risk of transfusion-transmissible infections including HIV, hepatitis B and hepatitis C and syphilis [7–9]. Therefore, the National Blood Transfusion Center of Lomé (CNTS) qualifies blood for transfusion by testing HBV, HCV, HIV and syphilis. This study aimed to evaluate the seroprevalence of HBV, HCV and HIV from 2011–2015. We consider a cohort of donors including regular donors and first time donors. The number of donors ranged from 27,336–35,777 and was higher in 2014. In our study, male blood donors were higher compared to female. Adjele et al. found a similar trend in Serbian blood donors [10]. Ou et al. found in Hong Kong that male donors were more likely to be frequent donors [11]. First time blood donors were lesser than regular donors who participated in the study. This can probably be attributed to the low engagement of people in blood donation exercises despite its enormous benefits. Moore et al. in a similar study observed that in a cohort of 48,725 donors, only 3% were first time donors [12], therefore supporting the need for advocacy and community intervention exercises to increase the pool of blood donors for this life-saving exercise.

The study reported seroprevalence of 3.63%, 1.58% and 0.92% for HBV, HCV and HIV over a five-year period (2011–2015). The highest seroprevalence was found for HBV followed by HCV and HIV. From 2004–2014, Farshadpour et al. found that the seroprevalence of HBV was higher than HCV and HIV but the overall seroprevalence of HBV, HCV and HIV was lower compared to our study [8]. Many studies showed that the prevalence of HBV in blood transfusion was higher than HCV [13, 14].

In 2013, Motayo et al. [15] found a seroprevalence of 10% for HBsAg, similar to a scenario in Equatorial Guinea with a seroprevalence of 10.1% for HBV [16]. However, in our study the seroprevalence of HBV was 3.63% from 2012–2015. In contrast, the seroprevalence of HCV in their study (1.5%) was similar to our study (1.58%). Seroprevalence of HBV has been widely evaluated in Togo [17]. While the seroprevalence of HBV among HIV-infected individuals was 9.7% [18], Segbena et al. found a prevalence of 20.2% in patients with sickle-cell disease in Togo [19]. In this study, the prevalence of HCV was 1.58% in volunteer blood donors at the blood transfusion center in Lomé. Agbodjan et al. found a prevalence of 3.3% at the University Hospital of Lomé [20]. In addition, Segbena et al. found the HCV prevalence of 6.5% in patients with sickle-cell disease in Togo [19]. The prevalence of HCV has been reported as 1.0% in the general population of Burkina Faso recently [21]. The seroprevalence of HBV

and HCV in West African countries was 12.5% and 0.5% respectively [22]. Regarding HIV infection, the seroprevalence in our study was 0.92%. The prevalence of HIV among female sex workers in Togo was 13.1% in 2011 [23]. This prevalence was 5.5% among drug users in Lomé [24]. Furthermore, two recent studies similarly conducted at hospital blood banks in Cameroon found the seroprevalence of HBV to be 10.1% and 12.1% and HCV prevalence to account for 4.8% and 1.14% respectively [25, 26].

Interestingly, there is increasing evidence that points to decrease in the incidence of acute hepatitis B and the prevalence of hepatitis B surface antigens chronic carriers in several countries, particularly low and middle income countries due to the successful vaccination programs [27]. However, while we recorded a low level of HBV seroprevalence, that of HCV was not significantly affected compared to other studies. This, therefore, questions the effectiveness of the recent and ongoing viral vaccination programs in Togo. In general, the prevalence of HBV, HCV and HIV was lower in our study. This could be that in blood transfusion the donors were selected and were apparently healthy whereas in the other studies the population was people at risk.

CONCLUSION

The present study assessed the seroprevalence of major viral infections of particular interest to blood transfusion among individuals in Lomé, Togo. We reported that HBV was very common among the transfusion-associated infections, and thus poses an eminent risk to recipients. In addition, our data showed the need to reinforce screening, prevention and sanitization strategies to improve transfusion safety in Togo.

Author Contributions

Nadjir Liza Koboyo – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Kolou Malewe – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Katawa Gnatoulma – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Kwarteng Alexander Kwame – Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

ISSA Abdoul Raouf – Substantial contributions to

conception and design, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Magnang Hèzouwè – Substantial contributions to conception and design, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Mawussi Koffi – Substantial contributions to conception and design, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Feteke Lochina – Substantial contributions to conception and design, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Segbena Koffi Yvon – Substantial contributions to conception and design, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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