Original Research Article

Seroprevalence of the carriage of Hepatitis B Surface Antigen among blood donors in a rural health area in the northeast of DR Congo (Isangi)

ABSTRACT

OBJECTIVE: To determine the seroprevalence of carriage of Hepatitis B surface antigen among blood donors in Isangi, a rural health area in northeastern of DR Congo.

METHODS: This was a retrospective study conducted in the Isangi Rural Health Zone from January 1, 2010 to December 31, 2017, involving 2,298 volunteer blood donors. Data was collected anonymously from blood donor records and registers taking into account the following variables: age, sex, profession, educational level, marital status and type of donor. Alere Determine™ HBsAg test (Chiba, Japan) was used for screening donors' serum samples.

RESULTS: The prevalence of HBs antigen carriage was 3.2% among volunteer blood donors in Isangi. It was higher among donor aged 20 to 29, males, jobless, low education; donors live alone and family/replacement donors. The seropositivity of the HBs antigen was significantly associated with sex and marital status.

CONCLUSION: The prevalence of carriage of HBs antigen is low in Isangi blood donors (3.2%). But this seroprevalence would be underestimated because of the use of the rapid diagnostic test in the biological qualification of blood donations. On the other hand, it would reflect an epidemiological difference of infectious agents between rural and urban areas. Strategies to improve blood safety in the Isangi Rural Health Zone should be geared towards abandoning family giving, promoting volunteer giving, organizing club donors and keeping them loyal.

KEY WORDS: Prevalence, carriage, HBs antigen, blood donor, Isangi.

INTRODUCTION

Blood safety is a serious public health concern for health authorities in sub-Saharan African countries. To cope with this, much has been done to develop measures to reduce the risk of transmission of infectious agents by blood transfusion [1]. Despite this, blood transfusion is a

major mode of transmission of viral hepatitis B, particularly in sub-Saharan Africa, where high prevalence of blood-borne diseases is found in the blood donor population [2, 3]. Hepatitis B is a major public health problem in developing countries of sub-Saharan Africa. The World Health Organization (WHO) estimates that more than 2 billion people have been infected with hepatitis B virus (HBV) worldwide and 350 million (5%) are chronic carriers, of which one million die each year from complications such as cirrhosis and hepatocellular carcinoma [4, 5]. The prevalence of chronic HBV carriage is between 8% and 20% in Africa and Asia [6]. Hepatitis B virus can be transmitted by blood transfusion. According to WHO recommendations, donated blood must be screened for HBV, in addition to human immunodeficiency virus (HIV), hepatitis C virus (HCV) and syphilis, prior to use [4].

In the Democratic Republic of Congo, hepatitis B infection, particularly by transfusion, remains a major public health problem, as the geographic distribution of the prevalence of hepatitis B different from that of other African countries, the seroprevalence of chronic carriage of the Hbs antigen varies between 8 and 15% in the general population [7]. As a result, blood transfusion poses a serious threat to blood recipients. The results of previous studies relating to this topic across this country relate to those conducted in urban areas [8-10]. Little is known about the epidemiology of viral hepatitis B in rural areas in general, and in blood donors in particular. Blood banks are characterized by a lack of adequate equipment to ensure good blood safety to recipients, and by under-qualified and unmotivated personnel. The aim of this study, the first to be conducted in our country, is to determine the seroprevalence of carrying Hepatitis B surface antigen among blood donors in Isangi, a rural health area in northeastern DR Congo.

METHODS

This was a retrospective study conducted in the Rural Health Zone of Isangi (located in the North-East of the DRC) within the health structures where blood transfusions are authorized (General Hospital of Isangi, Health Center Inera and Lomboto Health Center). The study population consisted of all subjects who donated blood during the study period from January 1, 2010 to December 31, 2017. Thus 2,298 blood donors were counted, including 1896 male and 402 blood donors female. The inclusion criteria in this study were: all blood donors (volunteers and families) of both sexes, to have good health, donors aged 17 to 65 years and weighing 50 kg or more. The exclusion criteria were: having been previously transfused, having signs of hepatitis or signs of any other infection, being pregnant, having risky sexual behavior in the three months prior to blood donation. Data was collected anonymously from

the blood donor records and registers, taking into account the following variables: age, sex, occupation, educational level, marital status, donor category. Venous blood was collected from the donors who presented in the Isangi Rural Health Zone for blood donation. The blood was screened for hepatitis b surface antigen. Alere Determine^{TM} HBsAg test (Chiba, Japan) was used for screening donors 'serum samples. The test was based on the principle of immuno-chromatography. The procedure in obtaining test results was carried out according to the standard operating procedures which were based on manufacturer's instruction in the package insert of the test strip. The collected data was encoded, captured, processed and analyzed using the Epi Info^{TM7} software. The descriptive analysis was performed using the proportions calculations for the qualitative variables and the different frequency comparisons were quantified using the Pearson Chi-square test and the Fisher test if necessary. We set the statistical significance level at $p < 0.05$. This study used data collected during routine screening, and did not require ethical approval. Personal data from donors was kept strictly confidential. We obtained authorization from the director of the blood transfusion unit and the health workers who participated in the study.

RESULTS

Table 1 presents blood donors in the Isangi Rural Health Zone according to their socio-demographic characteristics.

Table 1.Description of blood donors in the Isangi Rural Health Zone according to their socio-demographic characteristics.

Socio-demographic characteristics.	N (%)
Age group (years)	
<20	451 (19.7)
20-29	1201 (52.2)
30-39	530 (23)
40-49	91 (4)
50-59	22 (1)
60-65	3 (0.1)
Sex	
Male	1896 (82.5)

Female	402 (17.5)
Profession	
Pupils	842 (36.7)
Students	315 (13.7)
Nurses	45 (2)
Tradepeople	254 (11)
Teachers	88 (3.8)
Jobless	754 (32.8)
Level of education	
Illiterate	115 (5)
Primary	160 (7)
Secondary	1255 (54,.6)
Superior	768 (33.4)
Marital status	
Married	602 (26)
Not married	1696 (74)
Type of donor	
Family/replacement	2068 (90)
Volunteers	230 (10)

The majority of blood donors were aged 20 to 29 years (median age 27.5 years), male, students, secondary school level, not married and family/replacement.

Table 2 presents prevalence of the carriage of Hepatitis B surface antigen among blood donors in the Isangi Rural Health Zone.

Prevalence of carriage of Hepatitis B surface antigen among blood donors in the Isangi Rural Health Zone.

HBs antigen	N (%)
Positive	74 (3.2)
Négative	2224 (96.8)
Total	2298 (100)

Of 2,298 respondents, 74 out of them had HBs antigen in their blood, a prevalence of 3.2%.

Table 3 illustrates the association between socio-demographics characteristics and positive serology for Hepatitis B surface antigen.

Association between socio-demographic characteristics and positive serology for Hepatitis B surface antigen.

Socio-demographic characteristics	HBs Antigen positive N	(%)	p-val
Age group (years)			0,299
<20	451	6 (2.2)	
20-29	1201	57 (9.5)	
30-39	530	10 (3.7)	
40-49	91	1 (4.3)	
50-59	22	0 (0)	
60-65	3	0 (0)	
Sex			0,0019
Male	1896	71 (3.7)	
Female	402	3 (0.7)	
Profession			0,256
Pupils	842	24 (2.7)	
Students	315	4 (1.2)	
Nurses	45	0 (0)	
Traders	254	4 (1.5)	
Teachers	88	1 (1.3)	
Jobless	754	41 (5.4)	

Level of education			
Illiterate	115	15 (13)	0,4641
Primary	160	15 (9.3)	
Secondary	1255	29 (2.3)	
Superior	768	15 (1.9)	
Marital status			
Married	602	11(1.8)	0,0242
Not married	1696	63(3.7)	
Type of donor			
Family/replacement	2068	70 (3.3)	0,179
Volunteers	230	4 (1.7)	

The prevalence of carriage of HBs antigen was higher in subjects aged 20 to 29, male, without profession, illiterate, not married and family/replacement. The seropositivity of the antigen was significantly associated with sex and marital status.

DISCUSSION

1. Prevalence

In this study, the prevalence of carrying HBs antigen in blood donors in the Isangi Rural Health Zone was 3.2%. This prevalence is near that found in Kinshasa (3.6%) [11] and Kisangani (3%) [8]. On the other hand, it is lower than that found by Mbendi et al. in

Kinshasa East (9.2%) [10] and results reported by other authors in Cameroon (10.8%), in Ghana (8.2%), in Angola (15%) and in Ivory Coast (12.5%) [12-15]. This relatively low prevalence among blood donors in Isangi would be underestimated by the fact that other immunological markers of viral hepatitis B are not being sought by the Isangi Rural Health Zone and excluding at-risk individuals when recruiting blood donors. Mutations affecting the HBs antigen may make it undetectable by serologic testing may also justify the prevalence found in this study [16].

2. Age

The most affected age group in our study is the one between 20 and 29 years old. This result is similar to those of Dongdem and al. in Ghana [17], and Noah and et al. in Cameroon [12]. This study population consisted of a majority of young people, which is characteristic of the population and blood donors of developing countries [10].

3. Sex

Obstetrical factors limiting blood donation in female blood donors (pregnancy, breastfeeding for less than 6 months, menstrual period) and the role of sociocultural characteristics only present in men such as circumcision argue in favor of a high prevalence of carriage of HBs antigen in male blood donors [18,19]. These ties in with the finding of some authors who believe that according to certain beliefs, men are generally in better health than women [20, 21].

4. Occupation and level of education

Students, teachers and highly educated are less infected with hepatitis B. O Kra et al have achieved the same result in Ivory Coast [15]. We believe that a high level of education about infection patterns and preventative measures against viral hepatitis B seems to explain this low prevalence in these blood donor categories. This group of donors should be privileged over others (without profession and pupils) in our rural areas. Health authorities should also develop and fund educational programs for blood donor categories with a prevalence of carriage of hepatitis B surface antigen.

5. Marital status

Donors married are less infected than those not married. The marital status of donors is poorly addressed in most studies. The trend observed in our series deserves further

investigation to clarify the possible effect of this parameter on the viral safety of the given blood.

6. Type of donors

Family/replacement blood donors were more affected than volunteer donors. This is confirmed by several previous studies that have shown that the majority of blood donors in sub-Saharan Africa remain family donors and that this category of donors presents a higher risk of infection than that of volunteer blood donors [8, 9, 22].

CONCLUSION

The prevalence of HBs antigen carriage was low among blood donors in the Isangi Rural Health Zone (3.2%). But this seroprevalence would be underestimated because of the use of the rapid diagnostic test in the biological qualification of blood donations. On the other hand, it would reflect an epidemiological difference of infectious agents between rural and urban areas. Strategies to improve blood safety in the Isangi Rural Health Zone should be geared towards abandoning family giving, promoting volunteer giving, organizing club donors and keeping them loyal.

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