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Original Research Article

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SEROPREVALENCE OF THE CARRIAGE OF ANTIGEN HBs

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IN BLOOD DONORS IN A RURAL HEALTH AREA IN THE

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NORTHEAST OF DR CONGO (ISANGI)

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ABSTRACT

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OBJECTIVE: To determine the prevalence of carriage of HBs antigen in blood donors in Isangi, a rural health area in northeastern DR Congo.

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METHODS: A cross-sectional study was 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, occupation, educational level, donor status, and residential setting. The HBs antigen has been demonstrated by the Alere Determine™ test. Other markers of viral hepatitis B have not been sought in DBS because they are not available in the DRC's National Blood Transfusion Program.

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RESULTS: The prevalence of HBs antigen carriage was 3.2% among volunteer blood donors in Kisangani. It was higher in subjects aged 20 to 29, males, no occupation, low education, single donors and family donors. The seropositivity of the HBs antigen was significantly associated with gender, occupation, and educational level.

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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.

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

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30 INTRODUCTION

31 Blood safety is a serious public health concern for health authorities in sub-Saharan African
32 countries. To cope with this, much has been done to develop measures to reduce the risk of
33 transmission of infectious agents by blood transfusion [1]. Despite this, blood transfusion is a
34 major mode of transmission of viral hepatitis B, particularly in sub-Saharan Africa, where
35 high prevalence of blood-borne diseases is found in the blood donor population [2,3]. With a
36 prevalence of asymptomatic HBV carriage estimated at 3-22% in blood donors, viral hepatitis
37 B screening is performed on less than 50% of blood bags in most African countries [4,5] .
38 The Democratic Republic of Congo is located in the highly endemic area where viral
39 hepatitis B. As a result, blood transfusion poses a serious threat to blood recipients. The
40 results of previous studies relating to this topic across this country relate to those conducted
41 in urban areas [6-8]. Little is known about the epidemiology of viral hepatitis B in rural areas
42 in general, and in blood donors in particular. These environments are characterized by a lack
43 of adequate equipment (ELISA, PCR ...) to ensure good blood safety to recipients of blood
44 often in an altered general state, and by under-qualified and unmotivated personnel. The aim
45 of this study, the first to be conducted in our community, is to determine the seroprevalence
46 of carrying HBs antigen in blood donors in Isangi, a rural health area in northeastern DR
47 Congo.

48 METHODS

49 This is a cross-sectional study carried out in the Rural Health Zone of Isangi (located in the
50 North-East of the DRC) within the health structures where blood transfusions are authorized
51 (General Hospital of Isangi, Health Center Inera and Lomboto Health Center). The study
52 population consisted of all subjects who donated blood during the study period from January
53 1, 2010 to December 31, 2017. Thus 2,298 blood donors were counted, including 1896 male
54 and 402 blood donors female, aged 17 to 60 and weighing 50 kg or more. The exclusion
55 criteria were: having been previously transfused, having signs of hepatitis or signs of any
56 other infection, being pregnant, having risky sexual behavior in the three months prior to
57 blood donation. Data was collected anonymously from the blood donor records and registers,
58 taking into account the following variables: age, sex, occupation, educational level, marital
59 status, donor category. The HBs antigen was demonstrated by the Alere Determine TM
60 HBsAg test (Chiba, Japan). Other markers for viral hepatitis B were not sought because they

61 were not available and not recommended by the DRC's National Blood Transfusion Program.
 62 The collected data was encoded, captured, processed and analyzed using the Epi Info™7
 63 software. The descriptive analysis was performed using the proportions calculations for the
 64 qualitative variables and the different frequency comparisons were quantified using the
 65 Pearson Chi-square test and the Fisher test if necessary. We set the statistical significance
 66 level at $p < 0.05$.

67 RESULTS

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

Socio-demographic characteristics.	N (%)
Age (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 (54,61)

Superior	768 (33,42)
Marital status	
Live with spouse	602 (26)
Live alone	1696 (74)
Donor categories	
Family	2068 (90)
Volunteers	230 (10)

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71 The majority of blood donors were aged 20 to 29 years (median age 27.5 years), male,
72 students, secondary school level, living alone and family (Table I).

73 Prevalence of carriage of HBs antigen among blood donors in the Isangi Rural Health Zone.

HBs antigen	N (%)
Positive	74 (3,2)
Négative	2224 (96,8)
Total	2298 (100)

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75 Of 2,298 respondents, 74 out of them had HBs antigen in their blood, a prevalence of 3.2%
76 (Table II).

77 Association between socio-demographic characteristics and positive serology for HBs
78 antigen.

Socio-demographic characteristics	N (%)	p-val
Age (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)	

[5]

Sex		0,001
Male	1896 (82,5)	
Female	402 (17,5)	
Profession		0,02
Pupils	842 (36,7)	
Students	315 (13,7)	
Nurses	45 (2)	
Traderpeople	254 (11)	
Teachers	88 (3,8)	
Jobless	754 (32,8)	
Niveau d'instruction		<0,001
Illiterate	115 (5)	
Primary	160 (7)	
Secondary	1255 (54,61)	
Superior	768 (33,42)	
Matrimonial status		0,203
Live with spouse	602 (26)	
Live alone	1696 (74)	
Donors categories		0,68
Family	2068 (90)	
Volunteers	230 (10)	

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80 The prevalence of carriage of HBs antigen was higher in subjects aged 20 to 29, male,
81 without occupation, illiterate, living alone and family. The seropositivity of the antigen was
82 significantly associated with gender, occupation, and educational level.

83 DISCUSSION

84 1. Prevalence

85 In this study, the prevalence of carrying HBs antigen in blood donors was 3.2%. This
86 prevalence is near that found in Kinshasa (3.63%) [9] and Kisangani (3%) [6]. On the other
87 hand, it is lower than that found by Mbendi et al. in Kinshasa East (9.2%) [8] and results
88 reported by other authors in Africa and Cameroon (10.8%), Ghana (8.2%), Angola (15%),
89 1%) and Ivory Coast (12.5%) [10-13]. This relatively low prevalence of DBS in Kisangani
90 would be underestimated by the fact that other immunological markers of viral hepatitis B are
91 not being sought by the Provincial Blood Transfusion Center in Kisangani City - like HBsAg,
92 HBcAg, HBcAb, HBeAg, HBeAg - and excluding at-risk individuals when recruiting blood
93 donors. Mutations affecting the HBs antigen may make it undetectable by serologic testing
94 may also justify the prevalence found in this study [14].

95 2. Age

96 The most affected age group in our study is the one between 20 and 29 years old. This result
97 is similar to those of Dongdem JT et al. in Ghana [15] and Noah ND et al. in Cameroon [10].
98 This study population consisted of a majority of young people, which is characteristic of the
99 population and blood donors of developing countries [8].

100 3. Sex

101 Obstetrical factors limiting blood donation in female blood donors (pregnancy, breastfeeding
102 for less than 6 months, menstrual period) and the role of sociocultural characteristics only
103 present in men such as circumcision argue in favor of a high prevalence of carriage of HBs
104 antigen in male blood donors [16,17]. These ties in with the finding of some authors who
105 believe that according to certain beliefs, men are generally in better health than women [18-
106 20].

107 4. Occupation and level of education

108 Students, teachers and higher blood donors are less infected with hepatitis B. O Kra et al have
109 achieved the same result in Côte d'Ivoire [13]. We believe that a high level of education about
110 infection patterns and preventative measures against viral hepatitis B seems to explain this
111 low prevalence in these blood donor categories. This group of donors should be privileged
112 over others (without professions and students) in our rural areas.

113 5. Marital status

114 Donors living with a spouse are less infected than those living alone. The marital status of
115 donors is poorly addressed in most studies. The trend observed in our series deserves further
116 investigation to clarify the possible effect of this parameter on the viral safety of the given
117 blood.

118 6. Donor category

119 Family blood donors were more affected than volunteer donors. This is confirmed by several
120 previous studies that have shown that the majority of blood donors in sub-Saharan Africa
121 remain family donors and that this category of donors presents a higher risk of infection than
122 that of volunteer blood donors [6, 7, 21, 22].

123 **CONCLUSION**

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

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