



Research article

SEROPREVALENCE OF HIV, HBV, HCV, SYPHILIS AMONG DONORS OF BLOOD AT THE NATIONAL CENTER OF BLOOD TRANSFUSION ANTANANARIVO IN 2014

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ABSTRACT

Introduction: Currently, routine screening for HIV, hepatitis B and C and syphilis is done in most blood banks in the world. **Methods:** We conducted a prospective descriptive study at the National Blood Transfusion Center (CNTS) Antananarivo for a period of 7 months from January to July 2014, which aims to assess the socio-clinical factors accompanying ineligibility of blood products and to determine the seroprevalence of HIV, hepatitis B, C and syphilis of the blood donors who have spent at CNTS HU - JRA Antananarivo during this period. All donors who have abnormal results of microbiological examinations were included. The parameters used and studied were age, sex, marital status, blood and results microbiological examinations for HIV, hepatitis B, C, and syphilis. The prevalence of blood donors who presented a serological abnormality is 3.95% with a predominance of donors with hepatitis B (72.93%) followed by syphilis (18.29%) of the hepatitis C (6.95%) and HIV (1.80%) and a predominance of young people. **Conclusion:** At the CNTS Antananarivo, the HBV is the main definitive reason for exclusion of these donors. This high prevalence is a real public health problem for the country's health authorities. The search for maximum safety in blood transfusion through firstly a better selection of blood donors by implementing a policy of strong loyalty and other early diagnosis of major diseases transmissible by blood and likely to infect the recipient.

KEYWORDS: Antananarivo, Blood donor, Microbiology, Seroprevalence.

INTRODUCTION

Blood safety is a public health problem extremely concern for health authorities. And, many efforts have been made in the development of measures to reduce the risk of transmission of infectious agents by blood transfusion^[1]. At present, screening the virus of human immunodeficiency (HIV), hepatitis B and C (HBV and HCV) and the pale of syphilis *Treponema* is performed in most blood banks in the world^[2]. In Madagascar as in most African countries, the main problems in blood transfusion are insufficient in blood bags^[3]. This study aims to establish epidemiological data on seroprevalence of HIV, HBV and HCV and syphilis to the CNTS (National Blood Transfusion Center) of the HU - JRA (University Joseph Ravoahangy Andrianaivalona hospital) Antananarivo our work is the study of data collected from blood donors during blood transfusion carried out at the National center of Transfusion of blood of the Joseph Ravoahangy Andrianaivalona (HU-JRA) of Antananarivo University Hospital.

MATERIALS & METHODS

Study design: It is a prospective and descriptive study.

Study location: Present study was carried out to the CNTS HU JRA Antananarivo.

Time frame: For a period of seven months from January to July 2014.

Ethical approval: The study was approved by the donors and the responsibility at the CNTS, no information revealing donors identity was present in this study.

Sample size and inclusion criteria: Our mode of sampling was of exhaustive type and we have included blood donors who donated to the CNTS of the HU - JRA Antananarivo during this period. All blood donors that microbiological test results are abnormal were included.

Methods: In the present study used a technique using the test of rapid diagnosis (TDR). For the virus of hepatitis B (HBV), TDR type Viruchek HBs Ag, for the virus of hepatitis C (HCV), TDR Anti - HCV Dipstich, for HIV, the TDR which is to detect the

antibodies to HIV 1 and HIV 2 by Determine® (Inverness Medical Japan) is used, and for the syphilis, TDR of the agglutination latex type RPR test kits BIO-RAD, France. Confirmation of the test with the TPHA test is not performed at the Center.

Selected and studied variables were age, gender, and the results of the search for markers direct or indirect of the virus of hepatitis B, hepatitis C, HIV and syphilis. Blood group donor privacy has been respected, as the anonymity of the donation requires it.

Statistical analysis: The analysis and management of data were made with the software epi info 6.04 with a level of significance of 0.05. For the comparison of the percentages, the Fisher χ^2 test was used.

RESULTS

During these 7 months, we have 9807 blood donors after medical selection we found anomalies microbiological at 388 donors or 3.95% of which 330 are male (M) and 58 (F) female, sex-ratio = 5.68, and is divided according to grouping ABO RH 161 (O +), 122 (B +), 74 (A +), 31 (+ AB) and one from Group A-. These 388 donors with microbiological abnormalities are divided as follows: hepatitis B was detected in 283 patients (72,93%), hepatitis C in 27 patients (6.95%), HIV in 7 patients (1.80%), and syphilis in 71 patients (18,29%) in all of the positive cases. We tracked 6 co-infections including 5 hepatitis B - syphilis and a hepatitis B - HIV cases (1.54%).

Compared to total donors, hepatitis B seroprevalence was 2.88%, hepatitis C of 0.27%, 0.07% HIV and syphilis by 0.78% to 0.06% co-infection.

Table 1. Distribution of positivity by age

Age (year)	HBV (n*)	HCV (n)	HIV(n)	SYPHILIS(n)
18- 20	11	0	0	4
20- 25	69	1	1	13
25- 30	60	1	2	15
30- 35	48	4	2	13
35- 40	41	2	2	8
40- 45	26	4	0	9
≥45	28	12	0	9
TOTAL	283	27	7	71

n* : number

Table 2. Distribution of serologic results according to the family situation

	Positive n (%)	Négative n (%)
Single	98 (25.26)	22 (5.67)
Married	185 (47.68)	82 (21.13)

Table 3. Distribution of gender anomalies

Parameters		Male	Female	P value
HBV	Positive	247 (63.7)	36 (9.3)	0.09
	Negative	83 (21.4)	21 (5.4)	
HCV	Positive	20 (5.2)	6 (1.6)	0.33
	Negative	310 (79.9)	51 (13.1)	
HIV	Positive	6 (1.8)	1 (0.3)	0.74
	Negative	323 (83.3)	56 (14.4)	
Syphilis	Positive	59 (15.2)	17 (4.4)	0.05
	Negative	271 (69.9)	40 (10.3)	

DISCUSSION

For the poor countries of Africa such as Madagascar to majority or resources are limited, and the very fragile healthcare system availability and safety of blood and blood products for transfusions continue to be of concern, especially with the existence of the prevalence in these populations of the infectious markers such as HIV/AIDS and other Infections such as hepatitis B hepatitis C and syphilis. Blood transfusion is a crucial component of modern health care. Ensure a suitable blood safety turns out being of undeniable necessity for her health the recipient especially in the circumstances or the prevalence of infectious agents transmissible by blood are high. This under defined a good knowledge of the epidemiology of these various markers followed their routine testing on all units of blood collected. Indeed, labile blood products must all be safe, effective clinical and in line with the desired quality. For this good transfusion policy relying on rigorous strategies must be put in place. This policy involves not only the creation of a national blood transfusion well-organized structure that coordinates national collections in from blood donors in populations at low risk; but as the routine screening on all blood donations (including: research infectious agents transmissible by transfusion, blood grouping, compatibility tests and appropriate clinical use of blood). Finally a good blood policy requires the development of a system of effective quality assurance which is able to guarantee traceability, from the recruitment and selection of donors until the distribution of labile blood products. This traceability takes into account not only the transfusion activities but also control and the proper use of the reagents and consumables used in routine. The quality policy must also be adapted structure, the needs and the possibilities of blood transfusion center as well as to the needs of hospitals and patients served ^[1].

1. Distribution of donors according to factors socio - clinical
Distribution of donors by gender is variable depending on the country. There was a male predominance in Madagascar, as in other countries like Burkina Faso, Tanzania, Eritrea, the Greece, the India of the North ^[2-6]. In other countries like Britain, they present a female ^[7]. This masculine trend can be explained by a typical African belief that men are healthier and

more robust than women^[8-9]. Factors obstetrical gynecologist, as menstrual cycles, pregnancy, breastfeeding can also influence this trend. The average age of donors is 35 years (Table 1), identical with other African countries like Tanzania, Ethiopia, Ghana, Albania including the average age of donors respectively 20-39 years, 35 years, 26-35 years old, is 40.1 years^[4,10-13]. This trend can be explained by the fact that awareness for blood donors was made especially for this age group or has been effective on this age group^[10].

It is mainly young people (20-29 years) sexually more active and potentially more exposed to infections which give their blood. Despite awareness campaigns on sexually transmitted infections among young people, it is not less that many of them by their socio-economic vulnerability continue to adopt high-risk behaviors. We also see that married donors (Table 2) are the most affected by microbiological anomalies. This result is significant with a p-value = 0.01. This result opens another avenue of study about the sexual behavior of married men. What is inconsistent with our usual belief that said that married men are loyal while the results here showed otherwise. National transfusion policy follows the recommendations of the WHO and is based on the recruitment of non-remunerated voluntary blood donors, mainly young people, of masculine gender that often represent the majority of regular donors. This blood donor recruitment policy advocated by WHO is a problem in Madagascar because obviously, it does not yet meet the strong demand for blood bags.

2. Distribution according to the results of laboratory tests

On 9807 donors included in the study, 3.95% (n = 388) had at least a positive serology among 4 sought pathogens. HIV seroprevalence is 0.07% with an average age of 29 years and a sex ratio of 5.68 without significant gender difference (p > 0.05). Seroprevalence of HBV is 2.88%, with an average age of 33 years and a sex ratio of 6.86 (p > 0.05). The seroprevalence of HCV is 0.27% with an average age of 40 years and a sex ratio of 3.33 without significant difference between the male and female gender (p > 0.05). Seroprevalence of T. Pallidum is 0.78%, with an average age of 34 years and a sex ratio of 3.47 (p > 0.05). The predominance of the male gender is not significant on the seroprevalence of these last 2 infections. We found 6 co-infections including 5 hepatitis B - syphilis and a hepatitis B - HIV cases. Seroprevalence for co-infection is 0.06%. Our results are different to those of the study conducted in 1993 and in 2010 Madagascar volunteer donors in which he had no cases of HIV positivity^[14]. Seroprevalence of HIV among blood donors had a tendency to increase over the years. However, the prevalence of HIV among donors is similar to some countries, such as Eritrea^[15] and the India of the North^[6] where the seroprevalence is 0.11 %, 0.24 % respectively, but it is high compared to that of some African countries, 2.21% for Burkina – Faso^[3], 2% for Tanzania^[4,10].

Our results are similar to those of a study conducted in Malawi where the lower prevalence has been observed among the age group of 15-19 years' blood donors and students^[11]. The low prevalence of HIV found in older donors of less than 25 years is the result of the awareness campaigns on HIV/AIDS started a few years back in the direction of these populations. Analysis of rate by gender indicates that male blood donors are more affected than female donors^[16]. For HBV, seroprevalence tended to diminish over the years. This may be due to the awareness of the Malagasy population for hepatitis B vaccination. The prevalence of HBV that we found in our study is so low compared to other African countries. She is 14.96% for Burkina Faso^[3], 7.2 percent for Tanzania^[4], however it is 2.47% for Eritrea² and 0.42% for Greece^[5]. Despite this, HBV is still the main reason for the definitive exclusion of these volunteer donors of blood to the CNTS. This tendency to reduction of seroprevalence over the years in volunteer donors are also noted for *T. pallidum*^[14]. This may be due to systematic screening of this infection in pregnant women. Thus, those who have a woman with a positive serology for syphilis during the prenatal consultation come more to give blood. These men are so self-screening^[10]. The majority of the incidental infections were found among men (63.66%), which constitutes the bulk of donor population in Madagascar as in Africa sub-Saharan¹⁶⁻¹⁹. Indeed, high prevalence of markers of hepatitis B and C were found respectively in blood donors in rural areas and in urban areas according to the literature^[10]. There are also donors of blood from the provinces, explanations would come from the way of life of these rural populations (ethnic tattoos, lifestyle community etc.)^[19]. Mobile collections from donors are young majority and the HBV shrinks between 20 and 30 years where a high prevalence of this marker^[20]. However, the high frequency of seroconversion to HBV among our donors imply that sexual transmission takes place in adults. In sub-Saharan Africa, the prevalences of the Ag HBs are generally high. Indeed, the Ag HBs is the main marker research for the diagnosis of HBV in blood donors. It is urgent to associate other markers of infection to add to the screening of the Ag HBs. Unlike the studies of Tsega et al.^[21], and Ryder et al. [22] who asked the question of the need screening of the Ag HBs in donors of blood in sub-Saharan Africa, this screening is more than necessary to do the high prevalences. However, the anti-HCV seroprevalences were higher than those described in other West African countries^[23-25]. Anti-HCV antibodies have been found mainly among donors over 30 years. The seroprevalence according to age shows that the under 20 age group is least affected (0%), and most affected is that of more than 45 years (50%). The prevalence of HCV in blood to the Antananarivo donors are higher than the values found in the U.S. to 0.07% and lower than those found in Europe (0.6%)^[26-27]. This prevalence is substantially lower than the reported

prevalence of 12.3% Nigeria^[28] blood donors. Indeed, in Antananarivo, intravenous drug use is still not widespread, the most likely explanation lies in use in rural areas of sharp objects that may be potentially infectious in circumcisions, ethnic tattoos, scarification, and recently the piercing of big cities like Antananarivo. youth the seroprevalence of HCV was a trend slightly increased over the years. A rise in the prevalence has been found from a study done in 2003 until 2009, because the selection of donors grew especially after the passage of the Red Cross of Belgium in 2007 ^[29]. The seroprevalence of HCV is high compared to other countries like Ethiopia, the Mexico where she is of 0.7% and 0.79% respectively ^[10]. The seroprevalence of syphilis in this study is lower than that found in donors of blood in Tanzania ^[30], also lower than that observed in Nigeria ^[31], 12.8% Ethiopia and Tanzania 12.7%^[32]. The difference between these very high prevalences and ours could not be elucidated, but could be attributed to geographical variations that probably affect the prevalence of syphilis ^[33]. This persistence of infectious markers in donors of blood to the Antananarivo population could justify an also high incidence of these infectious agents. Seroprevalence of *T. pallidum* was lower compared to that of Burkina Faso and Tanzania with 1.5 percent, 3.96 percent respectively as against it is 0,32% to Eritrea ^[10].

In view of the high frequencies of the HBV co-infection with one or several infectious diseases markers were present with HBV but with a rather high prevalence. The transmission of HCV is related to the direct contact with blood, while no association between HCV and HBV infection were found. However, the prevalence of co-infection between HBV, HIV, and syphilis was not similar to the prevalences of individual markers that explains the channels of infections are probably not the same. The predominance of the male gender (table III) in our results was not significant nor for HIV, HBV, HCV or *T. pallidum*, which is not the case for Ethiopia ^[33] where a female has been reported, the male for Burkina Faso^[3] and for the North, Ghana India, Brazil the predominance of the male is encountered in the four infections^[10]. These results show the heterogeneity of the tendency of these infectious agents in volunteer donors. The sensitivity of the kits used for screening for HIV in the CNTS, (100%) ^[34] and HBV (> 99.7%) correspond to the recommendation of the WHO for the donation of blood except for HCV which is between 97-99%. These tests allow to minimize the risk of transmission. Despite efforts to improve blood safety. There is always a residual risk of transmission of these agents infections during the window period ^[35], hence the need for another prospective study for the determination of the residual risk.

CONCLUSION

Research of infectious agents transmissible through blood to blood donors varies according to the epidemiological context,

but HIV, HBV, and HCV *t. pallidum* is searched systematically in all blood donors as recommended by WHO. At the CNTS Antananarivo, the HBV is the main definitive reason for exclusion of these donors. This high prevalence is a real public health problem for the country's health authorities. The search for maximum safety in blood transfusion through firstly a better selection of blood donors by implementing a policy of strong loyalty and other early diagnosis of major diseases transmissible by blood and likely to infect the recipient.

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