

Reasons for Rejection of Total Blood Pockets: Experience of the Blood Bank of Yaounde Central Hospital

Bernard Chetcha Chemegni^{1,2*}, Francoise Ngo Sack^{1,3}, Annick Ndoumba², Leonie Flore Kenmalong Mboula¹, Edgard Lontsi Sonkwa¹, Claude Bertrand Tayou Tagny², Dora Mbanya²

¹Department of Hematology and Medical Oncology, Central Hospital of Yaounde, Yaounde, Cameroon; ²Department of Medicine and Biomedical Sciences, University of Yaounde, Yaounde, Cameroon; ³Department of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon

ABSTRACT

Blood banks in sub-Saharan Africa regularly face shortages of blood products (PS). Several factors are responsible for this, including Transfusion-Transmissible Infections (ITT) and deficiencies in the transfusion system. The aim of this study is to determine the prevalence and the various reasons for rejection at the blood bank of the Central Hospital of Yaounde.

We conducted a prospective study at the blood bank of the Central Hospital of Yaoundé, Cameroon over 5 months, from August 2015 to December 2015. Five millilitres (05 ml) of venous blood were taken from each participant in a tube without anti-coagulant; patient samples were stored at -24°C. A rapid screening test and an ELISA test were used to screen for Human Immunodeficiency Virus (HIV), Viral Hepatitis C (HCV), Viral Hepatitis B (HVB) and syphilis on the samples taken.

Among the 705 people included in this survey, there were 95.74% men and 4.26% women. The average age of the participants was 30 years. There were a total of 185 bags of rejected blood. Infectious causes represented 22.55% (Hepatitis B and C, HIV and syphilis with a respective prevalence of 9.08%, 0.71%, 6, 95% and 5.82%) and non-infectious causes represented 3.68 % (clots, insufficient volume of whole blood bag, haemolysis and expiration with a respective prevalence of 1.84%, 0.71, 0.14% and 0.99%).

In addition, the association between rejection of blood bags and qualitative variables was assessed. There emerged a significant association between the risk of rejection of a blood bag and the type of donor, condom use, number of partners, and history of STIs.

At the Yaounde Central Hospital blood bank, the reasons for rejection of blood bags are divided into two categories: mainly infectious reasons, and non-infectious reasons. Also, certain risk variables such as not using a condom, multiple sexual partners and a history of Sexually Transmitted Infection (STIs) are risk factors that can promote rejection of blood bags.

Keywords: Blood bank; Central hospital of Yaounde; Infections; Blood bags; Blood transfusion

INTRODUCTION

Blood transfusion is an act of injecting blood or blood products from one subject to another subject, intravenously [1]. However, the problem of the shortage of blood and its derivatives has led to many studies on the crucial issue of blood donation worldwide [2]. This is why the system put in place to ensure health security in the area of blood transfusion has never ceased to strengthen, especially in the rich countries. On the other hand, in developing countries like Cameroon, this system is not well applied. Shortages

are common [3], largely due to the high rate of rejection of blood transfusion products (PST), the latter mainly resulting from infections transmissible by transfusion (ITT). In addition, the prevailing transfusion context and the organizational problems encountered by blood transfusion services may be the basis for the emergence of new reasons for rejection [4]. The present study consists in determining the prevalence of rejection and all the reasons for rejection of PST in the blood bank of the Central Hospital of Yaounde.

Correspondence to: Bernard Chetcha Chemegni, Department of Hematology and Medical Oncology, Central Hospital of Yaounde, Yaounde, Cameroon, E-mail: chetcha@yahoo.fr

Received: February 04, 2021, **Accepted:** February 19, 2021, **Published:** February 26, 2021

Citation: Chemegni BC, Sack FN, Ndoumba A, Mboula LFK, Sonkwa EL, Tagny CBT, et al. (2021) Reasons for Rejection of Total Blood Pockets: Experience of the Blood Bank of Yaounde Central Hospital. J Blood Disord Transfus. 12:003.

Copyright: © 2021 Chemegni BC, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

METHODOLOGY

Participants

We conducted a prospective, cross-sectional and descriptive study at the Blood Bank of the Central Hospital of Yaounde (BSHCY). We carried out an exhaustive consecutive sampling over a period of 5 months, going from August 2015 to December 2015. Any person selected as a candidate for blood donation at the Blood Bank of the Central Hospital of Yaounde (BSHSY) was included. People who did not complete their forms in full were excluded. Donor samples were collected during blood donation by correct puncture of a peripheral vein in dry tubes. The blood collected was transported directly using the appropriate racks in the various units for biological analyses. The various biological tests were carried out: rapid tests on strips (HIV, hepatitis B, hepatitis C, syphilis) and tests on the ELISA chain (ELISA HIV 1+2+0 FORTRESS DIAGNOSTIC BXE091A; ELISA HBsAg (HS) FORTRESS DIAGNOSTIC; ELISA [4th generation] ANTI-HCV FORTRESS DIAGNOSIS); the results were interpreted and recorded after quality control.

Data collection was carried out using a pre-established data collection questionnaire. The variables studied were socio-demographic, clinical and biological. The data were encoded and processed using Epi-Info 7 and Excel 2007 software. They were analyzed using SPSS 20 software. The quantitative variables were presented as mean and standard deviation (standard deviation) and the qualitative variables in numbers and percentages.

RESULTS

At the end of our study, 705 blood donors were selected. The age of the patients was between 18 and 58 years with an average age of 30 years. Over 80% of the sample was under the age of 39. The sex ratio was 22.5 with a male prevalence of 95.74%.

Family replacement donors were the most represented with a percentage of 99.46%, the great majority were single (81.62%) and high school students (47.28%). Table 1 below summarizes the socio-demographic data and the histories of the various blood donors.

Table 1: Socio-demographic characteristics and history of blood donors.

Variables	Numbers	Fréquences
Marital status		
Married	578	81,99%
Single	126	17,87%
Widower	1	0,14%
Level of study		
Secondary	290	41,19%
University	222	31,53%
None	2	0,28%
Type of donation		
Volunter	9	1,28%
Family	696	98,72%
Use of condoms		
Yes	132	18,72%
No	573	81,28%
Multiple partners		

Yes	481	68,23%
No	224	31,77%
History of STI treatment		
Yes	242	34,33%
No	463	65,67%

The 705 samples recruited were analyzed using rapid diagnostic tests and ELISA tests. 159 cases of transfusion-transmissible infections (ITT) were recorded (22.55%): hepatitis B and C, HIV and syphilis with a respective prevalence of 9.08%; 0.71%; 6.95% and 5.82% (Table 2).

Table 2: Summary of serological tests for detection of Transfusion-Transmissible Infections (ITT).

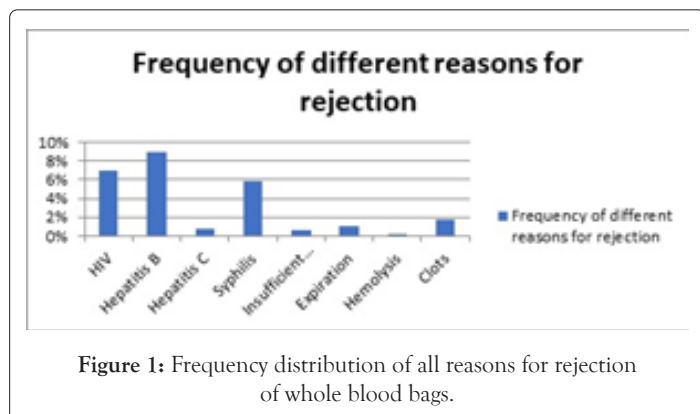
ITT	Work-force	Frequencies
HIV		
P	49	6,95%
N	656	93,05%
HBs		
P	64	9,08%
N	641	90,92%
HCV		
P	5	0,71%
N	700	99,29%
Syphilis		
P	41	5,82%
N	664	94,18%

In addition, rejections from non-infectious causes were also recorded. Four in numbers, they corresponded to 26 bags of whole blood (PST) or 3.68% of the sample: it was the insufficient volume of the blood bag, hemolysis, expiration and clots which were mainly represented (Table 3).

Table 3: Non-infectious causes of rejection on whole blood bags (PST).

Causes of non-infectious rejection	Numbers	Frequencies
In-sufficient PST volume		
P	5	0,71%
N	700	99,29%
Clots		
P	13	1,84%
N	692	98,16%
Hemolysis		
P	1	0,14%
N	704	
Expiration		
P	7	0,99%
N	698	99,01%

Co-infections have also been reported in 9 bags of whole blood. There were also cases where there were infectious and non-infectious causes responsible for the same rejection of the whole blood bag (PST), especially for the association of insufficient volume of PST and ITT. The rejection of PST for non-infectious causes concerned: the clot, insufficient volume of PST, hemolysis and expiration with a respective prevalence of 1.84%, 0.71%, 0.14% and 0.99% (Figure 1).



There was an association between the type of donor and the risk of rejection of a blood bag taken. Indeed, family replacement donors had a higher percentage of rejection of whole blood bags than voluntary donors (Table 3). Men were the main blood donors, but there was no association between sex and the risk of rejection of blood bags ($p=0.99$); variables such as marital status and educational level were not associated with the rejection rate of whole blood bags. On the other hand, variables such as: Not using a condom seemed to have an association with the risk of rejection of PST, as well as the variable multiple partners, treatment of Sexually Transmitted Infections (STI) and ailments (Table 4).

Table 4: Relationship between rejection of blood bags and donor characteristics.

Risk factors		No rejection	Rejection	P- value
Type of donation	Benevole	9	0	0,031
	Family	520	185	
Sex	Male	501	174	Non significative
	Female	19	11	
Age group	18-25 ans	177	66	Variable non liee, chi2 non valide
	26-38 ans	267	88	
	39-56 ans	75	31	
	<ou=58 ans	1	0	
Marital status	Single	427	151	Variable non liee, chi2 non valide
	Married	93	33	
	Widower	0	1	
Academic level	University	166	56	Variable non liee, Chi-square non valide
	Primary	150	40	
	Secondary	203	87	
	None	1	1	
Use of condoms	Yes	111	21	0,0010
	No	409	164	
Multiple partners	Yes	304	177	<0,001
	No	216	8	
STI treatment	Yes	170	139	<0,001
	No	350	46	
Affection	Yes	26	34	<0,001
	No	494	151	

DISCUSSION

Our study shows that Transfusion-Transmissible Infections (ITT) is the main reasons for rejection at the BSHCY. We agree with Batima. who reported that in addition to malaria, ITTs such as HIV/AIDS viruses, those of Hepatitis B (HBV) and C as well as syphilis are very widespread in the general population of sub-Saharan Africa [5]. In addition, Hepatitis B represents the ITT responsible for the highest rate of rejection of PST, which can be justified by the high prevalence of markers of the hepatitis B virus in Cameroon, found in approximately 10% of the population according to reports by Biwole [3]. However, the persistence of other non-infectious reasons for rejection was also observed (clots, hemolysis, expiration, insufficient volume, bacterial contamination, hyper-reactivity and polycythemia) which are signs of deterioration of a PST as designated by WHO in 2008 [6].

The prevalence of ITT-Hepatitis B and C, HIV and syphilis were respectively: 9.08%, 0.71%, 6.95% and 5.82%. Hepatitis B was the ITT with the highest rejection percentage. This result does not corroborate that of Eboumbou. who reported among blood donors of the Laquintinie hospital in Douala a respective prevalence of 1.3%; 1.8%; 3.5% and 8.1% for HCV, HIV, HBV and T. pallidum infection [7]. This difference may be due to the growth over time in the prevalence of hepatitis B infection in the general population.

Family replacement blood donors were at greater risk of having a positive serological result. This fact therefore demonstrates a significant association between the type of donor and the risk of rejection of a PST due to ITT. This result does not agree with the study by Mole who reported in the same blood bank after adjustment for the other socio-behavioral characteristics of blood donors in a logistic regression model, that there was no longer a significant difference for HIV serology between family replacement donors and volunteers [8]. For their part, Pereira in agreement with our results reported at the end of a study done on more than 2,226 blood donors in Barcelona despite the adjustment with the variables influencing the occurrence of seropositivity, that family donors had 2.5 times more risk of having a positive viral serology result [9]. Several studies done in separate geographic settings where family replacement donations are still accepted have found results similar to ours. This is the case of the study by Loua and et al. in Guinea Conakry in a context of relatively low HIV seroprevalence in the general population (2.8%) [10]. Naila and et al. reported that in Pakistan the risk of seroprevalence was higher among family replacement donors because in this category are poor people, paid secretly by the family and who hide information during the selection interview [11].

Sex was a non-significant variable in our study and this in accordance with the study by Mole et al. in the same blood bank [8]. This could be justified by the fact that male donors represented the majority of donors.

In our study there was no association between the school level variable and the rejection of PST. This does not corroborate with the studies of Sharma and et al. who reported, in India a reduction in the risk of transmission of viral diseases by transfusion only by young and educated voluntary donors [12]. Young Indian school children are said to be healthier than young school children in Cameroon. This could explain this difference.

However, in our study the variable non-condom use seemed to have a significant association with rejection of the whole blood bag, similarly, variables such as multiple partners and history of STIs also appeared to be associated with rejection of PST. This result agrees with those of Mole and al. who reported that the variables strongly associated with the HIV test result, regardless of the type of donation, were the number of sexual partners, previous HIV testing, history or treatment of STIs, non-use of condoms and reports homosexuals in men [8]. Admittedly, our study did not take into account the variables: homosexual relationship and previous HIV screening, but it included all ITT including HIV. In addition, all ITTs, as reported by Sarkodie and et al., have a main mechanism of transmission in Africa, which occurs mainly by sexual way [13].

The causes of non-infectious rejection were: clot, insufficient volume of PST, hemolysis and expiration with a respective prevalence of 1.84%, 0.71%, 0.14% and 0.99%. Insufficient volume was the main cause of non-infectious rejection in 2014. This corroborates with the study by Naila and al. who claimed that in Pakistan among family replacement donors there are in fact poor people, paid secretly by the family and who hide information during the selection interview [11].

On the other hand, in 2015 clots were the main non-infectious reason for rejection of PST; this could be explained by the fact that these blood bags were not well mixed with the anticoagulant during the collection; indeed the WHO (2008) justifies this type of deterioration of the blood product [6].

CONCLUSION

In view of this prospective work at the blood bank of the Central Hospital of Yaounde, it emerges that the problem of rejection of blood bags is serious and worrying in our context. The reasons for rejection are divided into two categories: infectious reasons, mainly and non-infectious reasons. Also, certain risk variables such as not using a condom, multiple sexual partners and a history of STIs are risk factors that can promote rejection of blood bags. Good prevention requires better organization of the transfusion system and greater awareness of the populations.

REFERENCES

1. Amat-kOZe JM. HIV/AIDS infection in sub-Saharan Africa. *Geographic*. 2003.
2. Barreto CC, Sabino EC, Gonzalez TT, Laycock ME, Pappalardo BL, Salles NA, et al. Prevalence, incidence, and residual risk of human immunodeficiency virus among community and replacement first-time blood donors in São Paulo, Brazil. *Transfusion*. 2005; 45(11):1709-1714.
3. Biwole Sida M, Jeatsa Gapdo C, Mbangue, M, Essola J, Leundji H, Dissongo J. Prevalence of Hbc antibody in Ag Hbs negative blood donors in douala. 2015.
4. Cruz JR, Pérez-Rosales MD. Availability, safety, and quality of blood for transfusion in the Americas. *RPSP*. 2003;13:103-110.
5. Doumbia, Z. Problem of the blood transfusion in the health center of reference de bougouni. 2009.
6. WHO. Manual of management, maintenance and use of the equipment of the diu frod chain for blood. 2008.
7. Moukoko CE, Sack FN, Same EG, Mbangue M, Lehman LG. HIV, HBV, HCV and T. pallidum infections among blood donors and transfusion-related complications among recipients at the laquintinie hospital in douala, Cameroon. *BMC hematology*. 2014;14(1):1-9.
8. Mole S, Onana E, Biholong D. HIV and risk factors for the blood donors at the central hospital of Yaounde, Cameroon. 2011; 104(3):226-231.
9. Mbanya DN, Takam D, Ndumbe PM. Serological findings amongst first-time blood donors in yaounde, cameroon: Is safe donation a reality or a myth? *Transfusion Med*. 2003;13(5): 267-273.
10. Ministry of Health National Reference Laboratory-Rwanda. Standard laboratory operating procedures for anti-retroviral treatment program in Rwanda. Rwanda. 2005.
11. Naila A. Seroprevalence of HBV, HCV and HIV infection among voluntary non remunerated and replacement donors in northern pakistan. *Pak J Med Sci*. 2004;20(1):24-28.
12. Noah Noah D, Njouom R, Bonny, A. HBs antigen prevalence in blood a WHO. Cameroon. 1999.
13. WHO. Security of the blood, strategy of the african region. *Swiss*. 2001.