

**SERO-EPIDEMIOLOGY TRANSMITTED INFECTIONS BY THE BLOOD
TRANSFUSION IN DONORS VOLUNTEERS IN THE RURAL EASTEN PART OF
THE DEMOCRATIC REPUBLIC OF THE CONGO (D.R.C).**

ABSTRACT

Introduction: Research works on Blood Safety in Sub-Saharan Africa are few, often limited to local initiatives with hardly representative conclusions of this region and this is a public health problem. The objective of this study was to evaluate transfusion practices in rural areas in the east of the Democratic Republic of Congo by identifying key Infections Transmitted by Transfusion.

Methodology: This was a retrospective study adopting an analytical approach, performed in a Eringeti reference health center during the period 1st January to 31th December 2017. The technique used in the laboratory was to detect and study antibodies corresponding to viral infections in serum samples of different donors.

Results: 139 donors were found with communicable infection through transfusion of a total of 961 donors or with a prevalence of 14.5%. The sex ratio was 1.6 for men and especially the very young population with average age of the respondents of 22 years (17-50 years). The majority was single, farmers without any level of study and resides in the village of Eringeti. Syphilis, Hepatitis B virus, Human Immunodeficiency Virus and the Hepatitis C virus were more represented respectively with 38.1%, 30.2%, 20.1% and 11.5 % followed by HIV-coinfection syphilis, syphilis, hepatitis B and syphilis -Hepatitis B and C in the same proportion is 0.7%. The former donors were no longer affected by the ITT with 55.4%.

Conclusion: Blood safety is a key health goal. And it is far from complete in the rural areas to the eastern part of the Democratic Republic of the Congo. Thus, improving the selection of donors on the one hand and on the other hand, progress in the development of more sensitive screening tools and the implementation of innovative screening measures and a bank modern blood with qualified staff at the Health Center of Reference Eringeti improved blood product administered to the necessary population and may well reduce accidents and transfusion risk in this rural area.

Keywords: Sero-Epidemiology, infection, transmitted, transfusion Eringeti, DRC.

INTRODUCTION

31 Blood transfusion is a procedure that can save lives and plays an essential role in the care of
32 patients in health systems; it also carries risks, particularly the transmission of bloodborne
33 pathogens [1]. Blood transfusion is one of the most sensitive activities in a health system,
34 because of the nature of the products used are products of human origin - blood and blood
35 products and the quality of the recipient, the patient [2]. It therefore concerns all stages of the
36 transfusion chain, from the collection of blood products to monitoring post-transfusion
37 recipients. It also includes the epidemiological monitoring of donors [3, 4, 5].

38 In the early 90, it was estimated that up to 10% of virus infections of Human
39 Immunodeficiency (HIV) could have been due to contaminated blood transfusions [6].
40 Currently, blood contaminated with HIV is responsible for about 5% of HIV infections in
41 Africa [6].

42 Globally, however, there are significant variations in the extent of testing performed in the
43 strategies adopted for this screening, as well as the overall quality and effectiveness of the
44 blood screening process. In many countries, therefore, recipients of blood and blood products
45 are exposed to an unacceptable risk of infections that can be lethal and could be easily
46 avoided [7].

47 Blood transfusion is a risk of acute or delayed complications and transmission of infections
48 [8].

49 According to the figures for blood safety indicators submitted in 2007 by the ministries of
50 health to the World Database of the World Health Organization (WHO) on Blood Safety
51 (GDBS), among the 155 countries reporting they practice HIV testing on 100% of blood
52 donations, only 71 realize a guaranteed quality screening [9]. According to WHO, 5 to 10%
53 of HIV infections worldwide are transmitted by transfusion of blood or blood products. An
54 even greater number of labile blood product recipients (PBUH) are contaminated with
55 hepatitis B and C, by the Treponema syphilis and other infectious agents [10].

56 More than 3 million blood donations are made each year in France. Permanent against
57 indications of blood donation are known as active infections transmitted through blood: viral
58 hepatitis, syphilis, HIV or the human lymphotropic Virus-T (HTLV) Chagga disease,
59 malaria [11].

60 Research works on Blood Safety in Sub-Saharan Africa are few, often limited to local
61 initiatives with hardly representative conclusions of this region. In recent years, local

62 scientific data remains generally fragmented, have notably revealed an insufficient blood
63 supply and further in plasma products, a high prevalence of transmissible agents through
64 transfusion, a predominance of family donors, insufficient efficacy transmissible agents
65 screening techniques by blood, a residual risk still high and often inappropriate clinical use of
66 blood and blood products [12,13].

67 In Morocco, blood safety is ensured by controlling all stages of the transfusion chain from the
68 collection of blood, preparation and biological qualification, until the completion of the
69 transfusion act, and even the monitoring of recipients in to collect and evaluate information
70 on the unintended or undesirable effects resulting from the therapeutic use of blood
71 components and prevent the appearance [2].

72 At the National Blood Transfusion Center (CNTS) in Bamako, all blood units are tested for
73 HIV, hepatitis B, hepatitis C and syphilis since 2004, the prevalence in 2007 were 2.6% ,
74 13.9%, 3.3% and 0.3% [14].

75 In the Democratic Republic of Congo (D.R.C), transfusion system is a colonial legacy,
76 hospital blood transfusion system types. Nevertheless, the political and socio-economic crisis
77 that the country has been experiencing for some decades has led to a profound disruption of
78 its socio-economic development, particularly its sanitary apparatus [15]. The transfusion
79 system in the DRC is in the implementation phase. In twelve years, that is to say from 2001
80 to 2012, there were 112,882 volunteer blood donors mobilized, more than 80% of safe blood
81 products and over 80% of needs covered. Furthermore, 89 688 HIV infections were averted.
82 During the same period, 8461 people have been trained in blood transfusion. With blood
83 safety practice, there has been a regression of viral markers. Thus, HIV prevalence rose from
84 4.7% to 2.1% between 2001 and 2012 while hepatitis B experienced a decline of 7.1% to
85 3.5% during the same period. For hepatitis C, the rate increased from 11.8% to 2.3% between
86 2004 and 2012 [16].

87 A study in Blood Transfusion Center of Kisangani showed that about 3390 blood donors, 159
88 (or 4.7%) had the risk of transmitting HIV, 182 (or 5.4%) hepatitis B and 126 (either 3.7 %)
89 syphilis 2007 [17].

90 Furthermore, a recent study among blood donors in Kalemie showed that of 13,500 donors
91 surveyed from January to December 2013, 293 (or 2.2%), 198 (or 1.5%) and 140 (1%) risk

92 respectively transmitting HIV virus, hepatitis B virus (HBV or HBV) and hepatitis C (HCV
93 or HCV) [18].

94 From the above, it appears that despite the measures implemented to improve blood safety,
95 blood transfusion remains a risk and therapy remains a major public health problem in our
96 communities where we do not benefit yet all the technological advances made to ensure
97 better blood safety.

98 In the village of Eringeti, in Democratic Republic of Congo, no study has been done on
99 infectious markers found in the blood produces blood donors. In addition, there is no
100 protocol, no administrative procedure of blood products. The haemovigilance program is also
101 non-existent. This exposes people to a risk of transmissible infections through transfusion.
102 Thus, the objective of this study was to evaluate transfusion practices in Reference Health
103 Center (CSR) Eringeti by determining transfusion transmissible infections found among
104 volunteer donors to contribute to the reduction of morbidity and mortality due to
105 communicable diseases by blood.

106 **MATERIAL AND METHODS**

107 **Study Middle**

108 Our study was conducted in the laboratory service of the Health Center of Reference Eringeti
109 located in the village of Eringeti. The latter is located North-Eastern part of Democratic
110 Republic of the Congo, in the North Kivu province in Beni territory. It is village which is 60
111 km North-East of the town of Beni, in the Oicha health area, on the border with the province
112 of Ituri.

113 The laboratory service of Health Center of Reference Eringeti consists of a single room, with
114 hematology and parasitology department. It has two electric microscopes, a centrifuge and a
115 freezer.

116 **Methods**

117 This was a retrospective study adopting an analytical approach, covering a period from 1st
118 January to 31th December 2017.

119 The population of this study consisted of 961 volunteer blood donors who have given their
120 blood for tests before transfusion at Health Center of Reference Eringeti during our study

period. Excluded from this study, all those who gave their blood but the reviews were conducted outside the Health Center of Reference Eringeti.

The sample consisted of 139 cases with at least one infectious markers were positive.

Information about each respondent was collected from laboratory records. Data collection was performed using a collection grid with the following variables: gender, age, address, marital status, occupation level of study and type of donation.

Testing was done using different markers. The technique was to identify antibodies against the pathogen sought using the strips. These were composed of two parts: the first to confirm the validity of the test and the second for the specific properties, the test. Thus, in case of positive test, a red thong should appear in the first and second zone. If negative, the red strap should only appear in the first zone.

Data entry and data analysis were performed using Epi Info version 3.5.4 software July 30, 2012. The calculations are those of the frequency to determine the prevalence of infectious markers.

Ethical standards have been met, all donors, volunteers, had informed consent. This study has guaranteed the confidentiality of donors by assigning a number instead of their name.

RESULTS

1. Prevalence of Transfusion Transmissible Infections (TTI) found among volunteer blood donors

During our study period, 139 donors were found with transmitted infections out of 961 donors or with a frequency of 14.5%.

2. Sociological Characteristics of volunteer blood donors.

The table below replied volunteer blood donors based on their socio-demographic characteristics

148 **Table I. Distribution of volunteer blood donors according to their socio-demographic**
 149 **characteristics**

Socio-demographic characteristics of volunteer blood donors.	Number	Percentage
Sex		
Female	54	38.9
Male	85	61.1
Age in years		
Less than 20 years	75	54
21-30	27	19.5
31-40	24	17.2
41-50	13	9.3
Profession		
Farmer	83	59.7
Student	34	24.5
Military	18	13
Teachers	4	2.8
Study level		
No level	65	46.7
Primary	44	31.6
Secondary	30	17.7
University	0	0
Marital status		
Married	27	19.4
Single	95	68.4
Divorced	17	12.2
Address		
Eringeti	103	74.1
Outside Eringeti	36	25.9

Total	139	100
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3. Distribution of volunteer blood donors according on infections found in their blood.

The table below replied volunteer blood donors based on transmissible infections through transfusion.

Table II. Transfusion Transmissible Infections found.

Transfusion Transmissible Infections found	Number	Percentage
Syphilis	53	38.1
Hepatitis B	42	30.2
HIV	28	20.1
Hepatitis C	16	11.5
Coinfection HIV-Syphilis	1	0.7
Coinfection Syphilis, Hepatitis B and C	1	0.7
Coinfection hepatitis C syphilis	1	0.7
Total	139	100

4. Distribution of volunteer blood donors according to the categories of donors

The table below replied volunteer blood donors according to their category.

Table III. Category of volunteer blood donors

Categories of volunteer blood donors	Effective	Percentage
Former	77	55.4
New	62	44.6
Total	139	100

162 **DISCUSSIONS**

163 From our work on 961 volunteer blood donors, 139 were transmitted infections through
164 transfusion in the frequency of 14.5%.

165 In Butembo, mainly in the Democratic Republic of Congo, about 2,984 blood bags collared
166 2016 to Blood Transfusion Center in Butembo, 59 (1.9%) were infected. This value is higher
167 than that found in a study conducted in Kisangani for voluntary donors in 2007 [19].
168 However, it is less than that found in a study conducted in Kinshasa on three infectious
169 markers: HIV, HBV and HCV 2013 [20].

170 It follows from several studies that the characteristics of the donor blood throughout
171 francophone sub-Saharan Africa; the supply of blood donations from low risk subjects is
172 insufficient and prevalence of transfusion transmissible infectious agents remains relatively
173 high in the donor population [21]. A study by Josiane Pillonel between 1992 and 2002, about
174 31 million collected donations, 23876 donors were carriers of transmissible infections
175 through transfusion a frequency of 0.08% [22]. The observed decrease in the number of
176 donors compared to our study and in parallel the number of donors is most likely
177 multifactorial. One factor is undoubtedly the reduced need for subsequent blood products to
178 changes in transfusion practices. The revision transfusion indications, the evolution of
179 surgical techniques in particular the development of endoscopic interventions and the
180 development of autologous transfusion are factors explaining the decline in need for blood
181 products [23].

182 Regarding the socio-demographic characteristics of volunteer blood donors, male
183 predominance was the most represented with TTI with a sex ratio of 1.6 for men and
184 especially the very young population with age means respondents of 22 years (17-50 years).
185 The majority was single, farmers without any level of study and resides in the village of
186 Eringeti. These results are explained by the fact that this population layer is actively sexual,
187 practicing unsafe sex and unprotected. The population of Eringeti is largely rural and left
188 ignorant of the practice of responsible sexuality. With the sale of agricultural products of
189 their culture with the people from neighboring regions,

190 59 bags of blood infected in Butembo by TTI, 43 were collected from single (in 76.8%); 10
191 married (17.9%); and 3 divorced (5.4%) [19].

192 Works on this theme were conducted in 2008 with the participation of seven countries [24]
193 and 2011 with that of 15 countries [25]. It thus appeared that in transfusion centers in sub-
194 Saharan Africa, the blood donor with ITT is usually young, with an average age of 26 years
195 (17-60 years). It is usually male, with a sex ratio of 3 to 5 men for every woman.

196 In America, a higher prevalence of ITT was found in men than in women in the age range of
197 30-39 years by EL Murphy and colleagues [26].

198 It is clear from this work that syphilis, Hepatitis B virus, Human Immunodeficiency Virus
199 and the Hepatitis C virus were over represented with respectively 38.1%, 30.2%, 20, 1% and
200 11.5% followed by HIV-coinfection syphilis, syphilis, hepatitis B and syphilis -Hepatitis B
201 and C in the same proportion is 0.7%.

202 In a study by Tagny and colleagues in francophone African countries, the average sero
203 prevalence of transfusion transmissible agents were 1.84% for the HIV antibody (HIV),
204 7.21% for surface antigen of hepatitis B virus (HBV), 1.99% for the antibodies of the
205 hepatitis C virus (HCV) and 1.60% for antibodies *Treponema pallidum* [25].

206 In France, incidence rates of HBV, HIV, HCV decreased significantly between 1992 and
207 2000 then stabilized except for HCV virus for which the incidence continues to decline over
208 the last period so that the HIV incidence was equal to or lower than that of HCV until 1997-
209 1999, it is now higher than that of HCV [22]. This decrease in the number of donors and in
210 parallel the number of donations in the last decade, the evolution of geo-demographic
211 characteristics of the donor, the low prevalence and incidence of HBV, HCV and HIV
212 compared to those observed in the population General and decrease between 1992 and 2002
213 are all indicators of the selection of donors and its improvement during the study period.

214 In Antilles-Guyane, the prevalence of HTLV (human T-Virus lymphotropic) among new
215 donors was, throughout the period, from 43/10 000 (339/78 000) or about 70 times higher
216 than in metropolitan France. At the Reunion Island, she was on the same period of 1.7/10 000
217 (9/52 000) [22].

218 In DRC, a study conducted from 2001 to 2012 found that of 112,882 volunteer blood donors
219 mobilized, 89,688 HIV infections have been avoided by the systematic qualification of blood
220 products. During the same period, 8461 people have been trained in blood transfusion and
221 there was a decline in viral markers. Thus, HIV prevalence rose from 4.7% to 2.1% between

2001 and 2012 while hepatitis B experienced a decline of 7.1% to 3.5% during the same period. For hepatitis C, the rate increased from 11.8% to 2.3% between 2004 and 2012 [16].

From this work, the old donors were no longer affected by the ITT with 55.4%. Several studies have proven that the prevalence among new donors is consistent with those found in other populations. Moreover, comparisons of prevalence and impact with countries with similar criteria to those of France (England, Canada, and USA) show that the differences between the rate of the population of blood donors of these four countries are also found at the general population in these countries. Finally, if the improvement of donor selection over time has undoubtedly played a key role in decreasing the prevalence and impact, this change resulted probably also the preventive measures taken in the general population to avoid including new infections [22]. With the constant improvement of donor selection firstly, and secondly, to progress in the development of more sensitive screening tools and in the development of innovative screening measures blood components today present a very low viral risk [22].

The voluntary donation by subjects from low-risk group is associated with a lower prevalence of transfusion transmissible agents, and even more so that they are regular donors (they constitute 24% of all donors). Despite notable progress, voluntary donors do not, in most countries, 15 to 50% of donors. These studies have confirmed the high prevalence of transfusion transmissible infectious agents in blood donors in sub-Saharan Africa, the prevalence of family gift, lack of regular donors and mobile clinics [25].

CONCLUSION

Communicable infections by transfusion have a major public health problem in Eringeti that deserves to be resolved in time. Safe blood is a key objective of health and all stages of the transfusion chain must be secured finally prevent the chain of disease transmission and infection from blood products.

The establishment of a blood bank, with full equipment recommended equipment and personnel is essential to qualify Eringeti Reference Health Center to improve and reduce the risk of transfusion at least in the correct sequence of the transfusion chain, from the collection of voluntary donors and volunteers to product transfusion in the patient.

Alongside concrete progress as efforts at the medical screening of blood donors or systematization of the biological screening of the major transfusion virus, the issue of blood

safety in the countries of Africa is essentially made of elements as an organization transfusion failure, a failure in the collection and the medical selection of healthy donors, a deficiency in the biological qualification of donations, some rational use of blood products by prescribers and insufficient implementation of a quality system including staff training.

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