

# Seroprevalence of Human Immunodeficiency Virus among Blood Donors in Republic of Congo

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**Abstract:** *Background:* Human Immunodeficiency Virus (HIV) is blood borne pathogens that can be transmitted through blood transfusion and could pose a huge major public health problem. The aim of this study was to determine the seroprevalence of HIV infection among blood donors. *Methods:* This was a nationwide retrospective study conducted at Congo Blood Transfusion Center, between January and December 2015. The HIV serology was determined by enzyme-linked immunosorbent assay. Written informed consent was obtained from each patient. Statistical analysis was performed using SPSS version 21 Software. A p value of <0.05 was considered statistically significant. *Results:* A total of 60137 blood donors were screened for HIV infection. They were 49899 males and 10238 females. Their ages ranged from 18 – 60 years. The prevalence of HIV was found to be 2.64%. HIV infection was statistically significantly higher among male donors than female donors ( $p < 0.01$ ). The prevalence was higher among family donors and those of the 31-45 years age group. *Conclusion:* These results indicate an endemicity of HIV infection in Republic of Congo. There is an urgent need to intensify HIV control programmes in order to reverse this dangerous trend in the prevalence of HIV infection among Congolese blood donors.

**Keywords:** Blood Donors, Seroprevalence, Human Immunodeficiency virus

## 1. Introduction

Human immunodeficiency virus (HIV) has continued to pose a great challenge to transfusion medicine, most especially in Africa [1, 2]. Sub-Saharan Africa which accounts for just a little above 10% of the world's population is however, the worst hit region in the world. The region also has a disproportionately high level of transfusion-associated HIV transmission, because of the high prevalence and incidence of HIV infection in the general population and the insufficiency of resources to fully implement effective prevention measures [3]. The current estimate of the number of cases of HIV infection among adults worldwide is approximately 33 million; two thirds of whom are in sub-Saharan Africa [4]. In Sub-Saharan Africa, blood transfusion accounts for 5-10% of HIV infections [5]. Similarly, 12.5% of patients who received blood transfusion are at risk of post-transfusion hepatitis [6]. The Republic of Congo is categorized as a country with generalized epidemic of HIV. The prevalence of HIV in the young adults is estimated at 3.2% since 2009 [7]. The risk of acquiring HIV is one of the most complex health problems of the 21<sup>st</sup> century and transfusion with HIV-positive blood has been estimated to be as high particularly in sub Saharan Africa [8]. Measures adopted to reduce the risk of HIV contamination in the blood supply of Congo include improvement on sensitivity of serologic predonation interviews to identify and defer from donation persons with risk factors for HIV. The serologic HIV antibody test offers the advantages of simplicity and cost effectiveness for verifying infection [9]. Therefore, the risk of transfusion of a unit of blood in the window phase of infection is unknown [10]. Few reports have been published on the prevalence of HIV among blood donors in Republic of Congo. The aim of

this study was to determine the prevalence of HIV infection among Congolese blood donors.

## 2. Methods

### 2.1 Study setting

This was a nationwide retrospective study conducted at Congo Blood Transfusion Center, between January and December 2015. All donors who donated blood and were apparently healthy adults of the age group 18-60 years, were included in this study. The donors were subjected to a pre-test counseling which was done by qualified staff trained to screen donors for blood donation. Donors who did not fulfill the general criteria for blood donation, paid and commercial donors and those with a history of high risk behavior were excluded.

A self-administered socio-demographic Questionnaire that had been validated was adapted for the study. Subjects were identified and interviewed according to routine blood banking procedures. Only blood donors who donate at the main blood center and mobile units of transfusion center were enrolled.

The blood donor samples were collected at the time of blood donation from the primary bag and tested for the presence of HIV. The blood was allowed to retract and their centrifuged at 1500 rpm. The sera were stored at -20°C until tested.

### 2.2 Serology

Serological screening for the presence of anti-HIV-1 antibodies was performed using the fourth generation enzyme linked immunosorbent assay (ELISA) kit (Genscreen

HIV1/2, Bio-Rad, USA) which detected the presence of HIV-1 P24 antigen and anti-HIV antibodies according to the manufacturer's protocol.

### 2.3. Ethical Aspects

Informed consent was routinely obtained from all blood donors visiting the blood transfusion unit. Prior to the administration of questionnaire, the purpose of the study was explained to the participants. The donors were free to decline participation in the study. Confidentiality was maintained by omitting their personally identifiable information such as names from the questionnaire.

### 2.4. Statistical analysis

Statistical analysis was performed using SPSS version 16 software (SPSS Inc., Chicago, Illinois, USA). Quantitative data were presented as mean and SD. Qualitative data were presented as number and percentage. They were compared using the  $\chi^2$ -test or Fischer's exact test, when appropriate. In all tests, a P value less than 0.05 was considered significant.

## 3. Results

In this present study, we investigated the prevalence of HIV among 60137 blood donors. Of them, 49899 (82.97%) donors were men and 10238 (17.03%) donors were women with a mean age of 28.5±4.3 years (range, 18-60 years). Regarding the types of the donation, the majority of the subjects donated blood on replacement basis (57.35%) than voluntarily basis (26.46%) and regular basis (16.19%).

The seroprevalence of HIV infection was found to be 2.64%, corresponding to 1589 seropositive patients out of 60137 blood donors included. The prevalence of HIV infection was significantly higher among male donors 1383 (2.77%) compared to females 206 (2.01%). Gender was associated with HIV infection in this sample ( $p = 0.001$ ). The age specific prevalence was highest among those in the age group 31-45 years (3.35%) followed by 18-30 years (2.38%) and the difference was not statistically significant ( $P > 0.05$ ).

Regarding to the type of donation, higher seroprevalence was seen among subjects who donated blood for replacement purpose for relatives and friends than those who donated on voluntary basis and the difference was statistically significant ( $p=0.01$ ). Table 1 presents the distribution of HIV infection among blood donors based on gender, age group and types of blood donors.

**Table 1:** Distribution of Human immunodeficiency virus serological marker among blood donors in Republic of Congo, January and December 2015 (N=60137)

Variable	HIV-Positive		HIV-Negative		OR (95% CI)	P
	n	%	n	%		
<b>Gender</b>						
Male	1383	2.77	48516	97.23	1.39 (1.19-1.61)	0.001
Female	206	2.01	10025	97.91	1	
<b>Age group</b>						
18-30	653	2.18	29326	97.82	0.91 (0.77-1.07)	0.268
31 - 45	754	3.35	21757	96.65	1.42 (1.20-1.67)	1.417

46 - 60	182	2.38	7441	97.61	1	
<b>Types of Donors</b>						
Regular	72	0.74	9662	99.26	1	
Family	1213	3.52	33276	96.48	4.89 (3.85-6.21)	0.001
Voluntary	304	1.91	15610	98.09	2.61 (2.02-3.38)	0.001

OR: Odds ratios, CI: confidence interval.

## 4. Discussion

The risk of HIV transmission by transfusion of blood and blood products is extraordinarily high in SSA compared to most developed countries of the world [3].

In this present study we observed that 2.64% of donors were HIV infection positive. Our finding is in agreement with previous report in the SSA which indicated high rates of HIV among blood donors. The study performed by, Batina *et al.*, 4,7% in Democratic Republic of Congo [11], 5.9% in Ethiopia by Sentjens *et al.*, [12], 4.67% in Nigeria by Osaro *et al.*, [13], 3.1% in Ghana by Ampofo *et al.*, [14] and 6.9% in Egypt by El-Gilany *et al.*, [15]. On the other hand, the low prevalence of HIV were found among blood donors, 0.149% in Brazil [16], 2,21% in Burkina-Faso [17], 2% in Tanzania [18] and 0.1% in Egypt [19]. The wide differences in the HIV infection rate among the blood donors in the different areas may be due to the differences in geographical locations, age range of donors, sample sizes, the period of time the studies were carried out. Access to healthcare services and the laboratory test reagent kits used may also be contributory factors [20].

The male donors showed a higher HIV prevalence compared to females donors. Our finding is consistent with previous report in South Sudan [21], Ethiopia [22] where blood donor which found a higher prevalence of HIV among men compared to women. The reason for this male gender-related predisposition to HIV is not known. However, the high number of male donors may be one reason. On the other hand, the significantly increased HIV seropositivity among female donors compared to male donors were observed in the studies performed by Kebede *et al.*, in Ethiopia [23] and Kanu *et al.*, in Nigeria [24]. The study performed by Bere *et al.*, report that, the significantly increased HIV seropositivity among female donors might be due to their increased vulnerability to HIV infection as a result of biological, social and economic disadvantages related to their gender [25].

The spread of HIV among the productive age group particularly young adults is a major public health concern in world [26]. In Sub-Saharan Africa, the ages between 15 and 24 years represent the highest at risk group for the infection of the virus. They account for over 40% of all new HIV infections among adults [27]. This is because, the young adults have an intense sexual activity, which is the predominance mode of transmission of HIV in sub-Saharan Africa, accounting for approximately 90% of all infections is by the heterosexual means.

In the study period, the majority of HIV infection cases were concentrated among family replacement donors compared to voluntary non-remunerated blood donors. Our finding is consistent with findings in the other countries which

observed a higher prevalence of HIV among commercial and family replacement donors [11, 28]. The study performed by Mole *et al.*, in Cameroun report that the family donors had the same risk of seropositivity of HIV than voluntary blood donors (aOR = 1.00) [29]. In general, voluntary donations are thought to be safer than replacement donations and to have a lower prevalence of infectious diseases, because replacement donors may feel compelled to donate and hence may not respond truthfully to screening questions designed to exclude donors at risk for infectious diseases transmitted by blood transfusion [30, 31].

## 5. Conclusion

The study showed high prevalence rate of HIV infections among blood donors and demonstrates a substantial risk of transfusion-transmissible HIV infections in Republic of Congo. These results show that efforts should be undertaken to recruit and retain low risk voluntary non-remunerated Donors. We recommend increasing public awareness and HIV prevention programs aimed at changing high-risk behaviors among young people.

## 6. Competing Interests

The authors declare that they have no competing interests.

## 7. Acknowledgements

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