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Original Research Article

Seroprevalence of Viral Markers and Syphilis among Blood Donors at Gabriel Touré Chu

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Abstract: Blood transfusion is a therapeutic act which consists of administering blood or one of its components (red blood cells, platelets and plasma), from one or more healthy subjects to a sick subject. Blood donation is a life-saving gesture that is highly encouraged but a source of pathologies which constitutes a real public health problem. ***Objective*:** To study the seroprevalence of viral markers among blood donors at the Gabriel Touré University Hospital in Mali. ***Method*:** Cross-sectional study from January 2020 to December 2021. This study was carried out at the CHU Gabriel Touré transfusion service in Mali on the results of blood donors. The donors were selected according to the criteria established by the National Blood Transfusion Center in Mali. ***Results*:** the prevalence of HIV, HBV, HCV and Syphilis were respectively 0.27%, 10.67%, 2.28% and 0.76% among all donors. The male gender dominated with a positive prevalence of 10.98% for HBV. The prevalence of HIV and Hepatitis B co-infection was the most represented with 0.27% collected. ***Conclusion*:** the prevalence of infectious agents among blood donors remains high in Bamako, Mali. This study suggests greater attention to raising awareness about testing for viral agents like HIV and hepatitis B.

Keywords: Seroprevalence, HIV, HBV, HCV, Syphilis, at CHU Gabriel TOURE.

INTRODUCTION

Blood transfusion (TS) is a therapeutic act which consists of administering blood or one of its components (red blood cells, platelets, plasma,) from one or more healthy subjects called "donors" to a sick subject called " recipient" [1]. It is of great importance because it helps restore health in certain pathological conditions, and saves countless lives, but also exposes the risk of transmission of infectious agents transmitted by blood to recipients despite the progress made in transfusion safety [2 ,3].

The World Health Organization (WHO) estimated that between 5 and 10% of HIV transmission worldwide occurs during blood transfusions. An even higher number of blood product recipients are contaminated with hepatitis B, C and other infectious agents [4]. The prevalence of HIV, HBV and HCV among blood donors in developed countries is lower; on the other hand, those of developing countries are higher [4]. This is why the WHO recommends systematic screening for infections on all blood donations before their use.

According to the WHO, around 50% of blood donations are collected in developing countries where at least 80% of the world's population lives [5].

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In Africa, in Congo the seroprevalence rate in blood donations was 8.01% for HBV followed by HIV and HCV respectively 2.67% and 2.67% [5].

In Bangui, the prevalence of infectious agents among blood donors was 23.95% with proportions of 5.98%; 8.89% and 4.72% respectively for HIV, HBV and HCV [6].

In Mali, in 2020, the seroprevalence of HBV, HCV and HIV among blood donors was 8.20%, 3.00% and 1.90% respectively [7]. Cissé reported the seroprevalence of HIV, hepatitis B, hepatitis C and Syphilis viruses, respectively 2.16%, 14.77%, 2.32% and 0.04% [8]. Given the frequency of blood donations in the structure, we therefore initiated this study in order to contribute to the improvement of transfusion safety, the quality of blood transfusion and the medical selection of blood donors at the University Hospital. GABRIEL TOURE.

METHODOLOGY

The CHU Gabriel TOURE is located in Bamako, capital of Mali, in commune III in the city's commercial center, Rue VAN VOLLENHOVEN. It is built on an area of 3.1 hectares. In 1959, the former Central Dispensary of Bamako was turned into a hospital. It will be named "Gabriel TOURE Hospital" in homage to the sacrifice of a young Sudanese trainee in the 4th year of medicine from Dakar (Senegal).

The Gabriel Touré hospital has an administration, 7 departments bringing together 26 medicotechnical services since decision no. 0386 / DGHGT of November 30, 2009 of the implementation of the establishment project which are among others.

- **The Medical Technical Services Department:** which includes the Medical Analysis Laboratory.
- **The Medical Biology Department:** having benefited from the support of the Center for Vaccine Development (CVD) in terms of renovation and equipment for bacteriology activities as part of a research project.

The viral load quantification room for HIV-positive patients Three rooms recently fitted out for bacteriology activities equipped with bacteriology equipment (3 BACTEC® 9050 blood culture machines, 2 hosts, freezers, refrigerators, microcomputers with Internet connection).

Activities are grouped by section:

- Biochemistry section equipped with three devices: Spectrophotometer, Kenza 240Tx, and ABX Pentra 400.
- Hematology section equipped with ABX Pentra XL 80 and cell-Dyn Ruby
- Parasitology section equipped with microscopes
- Bacteriology section for research
- Section for CD4 counts equipped with a BD FACS Count TM
- Viral load section equipped with the Abbott m2000rt thermal cycler
- Serology section equipped by Vidas
- Hemostasis section equipped with the Coagulometer Option 2 plus and an STA Satellite device

The Blood Bank

Part of the medical laboratory department, was financed by the United Nations Population Fund (UNFPA) and inaugurated on June 14, 2011

It is made up of three rooms:

- A reception room
- A collection and dispensing room
- A stock room

This was a retrospective descriptive cross-sectional study over a period of 24 months from January 2020 to December 2021.

Inclusion Criteria

All blood donors aged between 18 and 60 years, with a weight greater than or equal to 55kg, presenting themselves with a completely completed and usable analysis slip.

Non-Inclusion Criteria

- Donors whose analysis slips have not been found and/or those outside the period.
- Data analysis was done using Excel and SPSS 25.0 software.
- During collection, two tubes were used for each donor.
  - ***An EDTA*** (Ethylene-diamine-tetra-acetate) tube with purple cap for immunological qualification of the donation (ABO and Rh system blood grouping).
  - ***A Dry Tube*** (red cap): intended for HIV, HBV, HCV and syphilis screening tests for serological qualification of the donation. Each sample was identified according to the unique and specific identification number assigned to each donor. The samples will be packaged in containers with thermo-ices sent to the national blood transfusion center (CNTS) for testing.

Biological qualification at the CNTS level was done at two levels (immunological and serological).

- **Immunological Qualification:** It was carried out according to the methods of Beth-Vincent and Simonin-Michon for the grouping of the ABO/Rhesus system.

Serological Qualification

This qualification was carried out using two ELISA and ARCHITECTE PLUS i1000 machines. ELISA (Enzyme Linked ImmunoSorboent Assay) which is an immuno-enzymatic detection technique which makes it possible to visualize an antigen-antibody reaction thanks to a colored reaction produced by the action on a substrate of an enzyme attached to the antibody for detection of the three viral markers namely HIV, HBV, and HCV.

Operational Definition

- **Compensation Giver:** These are donors who give blood at the request of a member of the patient's family or community.
- **Voluntary Donor:** These are donors who come to give their blood voluntarily without remuneration.

RESULTS

During the study period, we collected 8198 out of 13158 analysis bulletins from blood donors, i.e. 62% of all bulletins.

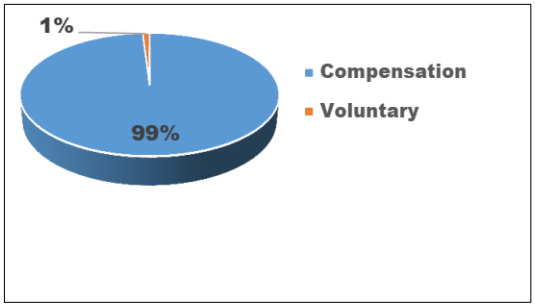

Fig. 1: Donor Type

The male gender was in the majority with 91.42% and the sex ratio of 10.66.

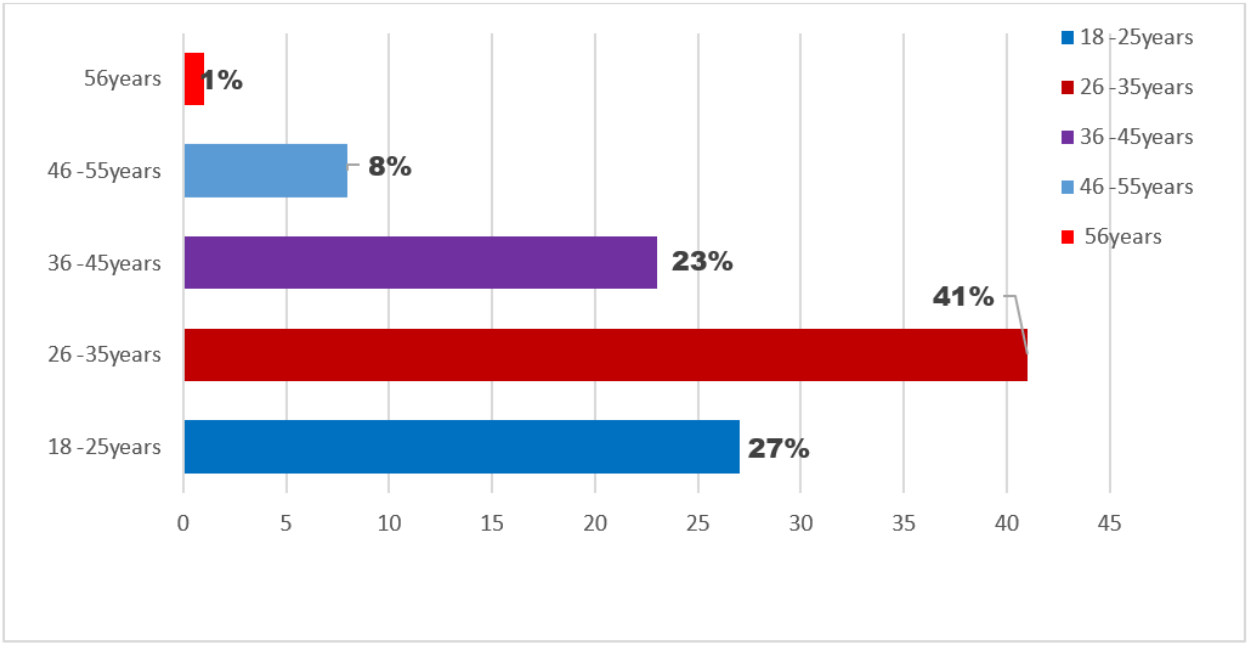

Fig. 2: According to age groups

Table I: According to the ABO Blood Group

BLOOD GROUP	frequency	PERCENTAGE
O	3277	39,97%
A	2057	25,09%
B	2340	28,54%
AB	524	6,39%
TOTAL	8198	100%

Blood group O was found in 39.97% of cases.

Table II: According to the ABO Blood Group

RHESUS	FREQUENCY	PERcentage
Positif	7716	94,12%
Négatif	482	5,88%
Total	8198	100%

Rh positive was noted in 94.12% of cases.

Table III: According to the type and results of HIV serology

Donor Type	HIV		
	Total	Positive	Prevalence
Compensation	8187	22	0,27 %
Voluntary	11	00	0 %
Total	8198	22	0,27 %

The prevalence of HIV infection was represented only among compensation donors with 0.27%.

Table IV: According to age groups and HIV serology results

Old	HIV		
	Total	Positive	Prevalence
18 – 25 years	2215	03	0,14%
26 – 35 years	3373	09	0,26%
36 – 45 years	1918	09	0,46%
46- 55 years	623	01	0,16%
56-60 years	69	00	0,00%
Total	8198	22	0,27%

The highest HIV prevalence was found among donors between [36-45] years old with 0.46%.

Table V: Distribution of donors according to donor type and HBV results

Donor type	HBV		
	Total	Positive	Prevalence
Compensation	8187	874	10,68%
Volontary	11	01	9,09%
Total	8198	875	10,67%

HBV seroprevalence was higher for compensation donors with 10.68%.

Table VI: Distribution of donors according to age and HBV serology results

Old	HBV		
	Total	Positive	Prevalence
18 – 25 years	2215	215	9,71
26 – 35 years	3373	358	10,61
36 – 45 years	1918	235	12,25
46- 55 years	623	60	9,63
Total	8198	875	10,67

The prevalence of HBV was found higher in donors aged 36 to 45 years with 12.25%.

Table VII: Distribution of donors according to types of donations and HCV serology results

Donor Type	HCV		
	Total	Positive	Prevalence
Compensation	8187	179	2,19%
Volontary	11	00	0%
Total	8198	179	2,18%

The prevalence of HCV was more marked among compensation donors with 2.19%.

Table VIII: Distribution of donors according to age and HCV serology results

Old	HCV		
	Total	Positif	Prévalence
18 – 25 years	2215	46	2,08%
26 – 35 years	3373	63	1,87%
36 – 45 years	1819	50	2,60%
46- 55 years	623	18	2,89%
56 -60 years	69	02	2,90%
Total	8198	179	2,18%

The highest prevalence of HCV was found in donors aged 56 to 60 with 2.90%.

Table IX: Distribution of donors according to donor type and syphilis serology results

Donor Type	Syphilis		
	Total	Positive	Prevalence
Compensation	8187	62	0,76%
Volontary	11	00	0%
Total	8198	62	0,76%

The prevalence of syphilis was higher among compensation donors with 0.76%.

Table X: Distribution of donors according to age and syphilis serology results

Old	Syphilis		
	Total	Positive	Prevalence
18 – 25 years	2215	09	0,41%
26 – 35 years	3373	24	0,71%
36 – 45 years	1819	24	1,25%
46- 55 years	623	04	0,64%
56 -60 years	69	01	1,45%
Total	8198	62	0,76%

The prevalence of syphilis was higher for the 56-60 age groups with 1.45%.

Table XI: Distribution of donors according to the prevalence of co-infections.

Co-infection	FREQUENCY	Percentage
Co-infection HIV+HBV	**22**	**0,27%**
Co-infection HIV+HCV	02	0,02%
Co-infection HIV+BW	02	0,02%
Co-infection HBV+HCV	20	0,24%
Co-infection HBV+BW	13	0,16%
Co-infection HCV+BW	08	0,10%
Co-infection HIV+HBV+HCV	02	0,02%

The seroprevalence of co-infection between HIV and Hepatitis B was the most represented with 0.27%.

DISCUSSION

In our study, the male gender was in the majority comparable to that of Ballo, Dembélé, Nambei and Mulubwa [9-12], who respectively found a male gender at 72.6%, 16.76%, 21.04 % and 16.8% without statistical difference. P > 0.05. In women, there are certain factors that could limit blood donation, notably pregnancy, childbirth, abortion, breastfeeding and menstruation.

The majority of our donors were young; This result is similar to that of Ballo and Pamatika who respectively found for the same age groups 43.1% and 38.9% [9-13]. P > 0.05 In a predominantly young population like ours, the impact of awareness on blood donation, including donor selection criteria, demonstrates the results obtained.

In our study, HIV prevalence among donors was 0.42%. This is statistically lower than that of Dembélé, Traore and Nzaji [10-15], who respectively found 1.9%, 2% and 2.9%. P < 0.05.

On the other hand, our prevalence was statistically higher than those of Uwingabiye, Babokh, Sarr [16-18], who reported 0.15% and 0% and 0.38% respectively. Our rate lower than the national prevalence could be explained by the size of the sample [19].

The prevalence of hepatitis B slightly elevated compared to HIV in our study, is statistically lower than that of Ballo, Traoré and Nzaji [9-15], who reported respectively 18.0%, 18.1%, 16 .6%. P < 0.05.

The prevalence of hepatitis C was 2.28% in our study. This result is comparable to that of Dembélé (3%) and Addis (3.90%) **[**10-20], without statistical difference. P > 0.05. On the other hand, it is statistically higher than that of Niangaly [21], who found a prevalence of 0.4% and lower than that of Nagalo who found 8.69% [22]. P < 0.05. This difference could be explained by sample size. Syphilis is a cosmopolitan contagious disease. Its prevalence is diverse in the literature [10-24]. This is consistent with our study.

Associations have been reported in the literature. The seroprevalence of co-infection between HIV and Hepatitis B was the most represented with 0.27% followed by HBV+HCV co-infection (0.02%) and HBV+BW co-infection (0.16%). Our results are comparable to those of Dembélé AK who found HIV-HBV, HIV-HCV and HBV-HCV co-infections in 0.15% respectively; 0.04% and 0.22% [10]. P > 0.05. This is consistent with Ballo's studies (3.0%); Cisse (0.49%) [9-25]. P>0.05.

CONCLUSION

The management of blood safety remains a major problem in Mali; co-infection with HIV and hepatotropic viruses persists despite awareness campaigns.

It is necessary to accentuate and develop a policy to combat these infections by implementing safe and effective means of protection, in particular anti-HBV vaccination. Encourage and retain donors in order to guarantee a good supply of blood of quality and quantity.

Conflicts of Interest: The authors declare no conflicts of interest.

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