

# Prevalence of human immunodeficiency virus, hepatitis b,c, and syphilis among healthy donors attending blood bank unit at kosti teaching hospital, white Nile state, august - October 2022

## Abstract

This descriptive observation study design was carried out in Blood Bank unit in Kosti Teaching Hospital, during the period of August first through 30 October 2022; included 600 donor all are male aged was ranged between 19-48 years were enrolled in this study. Our study aimed to evaluate the prevalence of routine screening tests [human immunodeficiency virus (HIV), hepatitis B, C, and syphilis], among blood donors. Venous blood samples were collected from each donor tested by immune- Chromatography Test [ICT], the data were analyzed using statistical packed for social sciences [SPSS] software version 26.

Our results showed that [0.17%] of samples collected was HIV positive [+ve], HBsAg, [07.17%], HCV [2%], and syphilis [06.44%]. The frequency of HIV, HBs Ag, HCV, and Syphilis in donors, according to donation time [87%] for the first, [12%], second, and [1%] for the third time, HIV, HBs Ag, HCV, and Syphilis in donor's positive case [+ve] according to ABO blood group type, one donor group [AB+ve], HBs Ag equal [43%] donors, [26%] group [O+ve], 14 [A+ve], 2 [B+ve], and one donor group [AB+ve], HCV [12%], group, 9 [O+ve], 2 [A+ve] and one donor [B+ve], and Syphilis, 41 donors, 29 group [O+ve], 10 [A+ve] and 2 donors [B+ve].

The blood transfusion services based on the voluntary non-paid donation; besides, the effective central to promote, protect the health of blood donors, and the recipients of blood or blood products.

**Keywords:** blood donor, human immunodeficiency virus, hepatitis B surface antigen, hepatitis C, syphilis, blood bank unit

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## Introduction

Blood transfusion is essential for lifesaving interventions. The needs for blood and blood products is rising worldwide.<sup>1,2</sup> Globally around 15 % of child mortality in Africa was attributed to obstetric bleeding and anemia.<sup>3</sup> Blood donation rates in Africa is estimated to be 5/1000 populations in relation to developed countries which is 47/1000 population in USA.<sup>4</sup> The lowest levels of availability are found in low- and middle-income countries, particularly in Africa.<sup>2</sup>

The standing of voluntary blood donation has widespread been recognized on the global health program at the highest political level, and has become a serious health problem, in 1975 the WHO is promotion the development blood services based on the voluntary non-paid donation.<sup>5</sup> The Federal Ministry of Health in Nigeria in 2007 reported that the country's National blood transfusion service is creation an effort to recall its voluntary donors by giving free blood tests and giving gift such as certificates, T-shirts, hematinic, drinks, and badges.<sup>3,6</sup> Blood transfusion is high risk for transfusion - transmissible communicable agents such as HIV, hepatitis B, hepatitis C, and Trypanoma pallidum.<sup>7,8</sup> Voluntary blood donation helps to assist persons in needs of blood, accident mortalities, cancer patients, sickle cell anemias patients and pregnant women in Labour.<sup>9</sup>

Blood transfusion play significant role in therapeutic process as well as live saving human.<sup>10</sup> Blood units must be serologically tests to avoid the transmission of infections agents due to increase the discharge of blood unit in 2012.<sup>11-13</sup> According to WHO report

the frequency of HCV in Africans have the highest ratio than in Europeans.<sup>14</sup>

The incidence of mortality rate with chronic hepatitis C and hepatitis B is increases since infections related to hepatitis C which is blood-borne have been linked with chronic hepatitis, cirrhosis, and hepatocellular carcinoma.<sup>14,15</sup> HCV Worldwide rabidly increases in the Eastern Mediterranean County particularly in Egypt.<sup>16-19</sup> Numerous studies have reported that HCV is endemic status, 0.30% in Bahrain, 0.41% in Oman, 1.06% in Qatar, 1.45% in Kuwait, 1.63% in Saudi Arabia, 1.64% in the United Arab Emirates, and 1.7% and 2.7% Yemen.<sup>20-22</sup> Recently, the prevalence of hepatitis C infections of among blood donors has been 1.0% to 1.6 %.<sup>23,24</sup> HIV is substantial socioeconomic effect 1.7 million cases of HIV is lowest number since 1990, down by 23% from the peak in 2010, and increases the incidence in 2020.<sup>25</sup> Annually *T. pallidum* effected People aged 15-49 presented 17.1 million.<sup>26</sup>

In Sudan since 2011 blood safety are commonly governmentally funded 80% provided through either hospital-based or stand alone centers, voluntary donations, total of about 450,000 units of blood are collected annually and all screened for syphilis, HBV and HCV.<sup>27</sup> The first HIV case diagnosed in Sudanese children at Khartoum Teaching Hospital is hemophiliac boy in November 1987, 5-10% of HIV/AIDS cases developed from infected blood transfusions.<sup>28,29</sup> Effectiveness of collected blood and blood components used in transfusion medicine, as therapeutic is provided by blood service to safe blood components as needed.<sup>30</sup>

## Physiological criteria

Donated blood is voluntaries activity that is actually is good, learning neighboring blood, The donor criteria should be healthy “Health defined as ability to adapt and manage physical, mental and social challenges throughout life “not only absence of illness,<sup>30-32</sup> above 18 years old, 50 kg weigh or more, have a normal blood pressure, heart rate should be 70 -100 beats per minute, hemoglobin concentration 12.5 g/L for women and 13.5 g/L for men.

## Materials and methods

### Methods

Blood donors who attending the Blood Bank unit in Kosti Teaching Hospital, were screened for HIV, hepatitis B, hepatitis C, and syphilis.

### Inclusion criteria

Total of 600 donors male aged was ranged between 19-48 years and who agreement to participate during the study period.

### Exclusion criteria

All volunteers’ donors who did not pass the physical examination, having history of chronic disease like hypertension, cardiac disease, and diabetes HCV, donor less than 18 and more than 60 year, and who refused to participate in the study were excluded.

### Ethical consideration

The ethical clearance was obtained from the Ethics Committee of the Faculty of medical Laboratory Sciences, White Nile University, department of hematology and Immune-hematology [No. HDP2022].

### Ethical permission

The study agreement received ethical permission from the Ministry of Health. Written informed consent was obtained from all participants prior to enrolment in the study. Sampling Five milliter [5ml] of venous blood samples were collected from all donors in plain container, then centrifugation at 3000 rpm for five minutes.

### Data collection

Data was collected by using a questionnaire which includes personal, clinical information, and laboratory investigation.

### Data analysis

Data was exported into the statistical package for social sciences (SPSS) software, version 26 [Chicago, IL, USA] from Microsoft Excel 7. The P. value of < 0.05 was considered statistically significant.

## Material

### Principle of HIV

Based on immune affinity for the detection of antibodies in serum, or plasma react with a protein coated, the present of red line color indicated a positive [+ve] result, while the absent indicated negative results.

### Method for HIV

Let the test device, specimen buffer spend in room temperature for 15-30 second prior to, place the test device in clean and level surface, add 0.05 ml of serum, added buffer for the test, then read the result after 15 minutes.<sup>31</sup>

## HBs rapid test

### Principle

The hepatitis HBsAg detected through the visual interpretation of color devilmont on the internal strip anti- HBsAg antibodies are immobilized on the test region of the membrane. The presence of colored band indicated positive results.<sup>32</sup>

### Method for HBs rapid test

Remove the test device sealed and use as soon as possible to room temperature, spend a buffer in for 15-30 °C, place the test device in clean and level surface labeled with deification number, add 0.05 ml of serum, added buffer for the test, then read the result after 15 minutes.<sup>32,33</sup>

### HCV rapid test, Principle

The hepatitis HCV detected through the visual interpretation of color devilmont on the internal strip anti- HCV antibodies are immobilized on the test region of the membrane. The presence of colored band indicated positive results.<sup>34</sup>

### Method

Remove the test device sealed and use as soon as possible to room temperature, spend a buffer in for 15-30 °C, place the test device in clean and level surface labeled with deification number, add 25µl ml of serum, added buffer for the test , then read the result after 10 minutes.<sup>34</sup>

## Syphilis Rapid Test

### Principle

Syphilis rapid test detects to T. palladium through visual interpretation developed on internal strip of color recombinant antigen representing epitopes of T. palladium are immobilized on the test region of the membrane. The presence of colored band indicated positive results.<sup>33</sup>

### Method

Remove the test device sealed and use as soon as possible to room temperature, spend a buffer in for 15-30 °C, place the test device in clean and level surface labeled with deification number, add 405µl ml of serum, added buffer for the test , then read the result after 10 minutes.<sup>32,35</sup>

## Results

Total of 600 volunteer’s donors male attending a blood bank unit in Kosti Teaching Hospital during the period of August to October mean aged range 19-48 years hemoglobin [Hb] concentration in gram per disliter [14.46±1.85] and packed cell volume [PCV] 45.51±3.80 (Table 1).

**Table 1** Frequency of HIV, HBs Ag, HCV, and Syphilis in donors (no= 600), admitted to blood unit at Kosti Teaching Hospital

Variables	Positive	Negative	P. value
HIV	1 [0.17%]	599 [99.67%]	0.001
HBs Ag	43 [07.17%]	557[92.83%]	0.001
HCV	12 [02 %]	588 [98%]	0.001
Syphilis	41 [06.83%]	559[93.17%]	0.001

HIV, human immunodeficiency virus; HBs Ag, hepatitis b surface antigen; HCV, hepatitis c virus

no: number

\*P. value consider statistically significant = < 0.05

## Discussion

Blood transfusion is play critical role in therapeutic, and live saving human life .this study was conducted to assess the prevalence of HIV, HBV, HCV, and syphilis in blood bank unit at Kosti teaching hospital. Total of 600 hundred donors all were male aged range was 19-48 years were studied. Our result revealed that HIV positive [+ve] donors were only one 1 [0.17%], and 599 donors were HIV negative [-ve] [99.67%] p. value = 0. 001. This result is comparable with study done in Nigeria reported by Olokoba A.B<sup>36</sup>

Our study age group 19-48 years agreement with results from North-central, Nigeria were in the age range 21 to 50 years according to Egah et al.<sup>37</sup> And other study reported by Khan et al et al in 2002.<sup>38</sup> Although is near the study done in India reported by Makroo R.N. et al.<sup>39</sup> This study was reported that HCV was significantly lower than HBV and syphilis Table 1,2 the results of the current study showed similar to the prevalence in in Brazil.<sup>40</sup>

**Table 2** Frequency of HIV, HBs Ag, HCV, and Syphilis in donor's positive case [+ve] according to blood groups type

Variables/ [no]	Group Type			
	O+ve	A+ve	B+ve	AB+ve
HIV = 1	-	-	-	1 [0.17%]
HBs Ag = 43	26 [60.47%]	14[32.56%]	2[4.65%]	1[2.33%]
HCV=12	9 [75%]	2 [16.67%]	1[8.34%]	-
Syphilis= 41	29[70.73%]	10[24.39%]	2[4.88%]	-

HIV, human immunodeficiency virus, HBs Ag: hepatitis b surface antigen, HCV: hepatitis c virus

no: number.

+ve: positive.

**Table 3** Frequency of HIV, HBs Ag, HCV, and Syphilis in donors (no= 600), according to the Frequency of Donation

Frequency of donation	First time	Second time	Third time
HIV			
HBs Ag	522 [87%]	72 [12%]	6[1 %]
HCV			
Syphilis			

HIV, human immunodeficiency virus; HBs Ag, hepatitis b surface antigen; HCV, hepatitis c virus

no: number

The prevalence of HIV, HBs Ag, HCV, and Syphilis in donors, according to the frequency of donation for the first, second, and third are 87%, 12%, and 1% respectively. Prevalence of HIV, HBs Ag, HCV, and Syphilis in donor's positive case [+ve] according to group type Table 3 HIV = [1] group AB, [0.17%], HBs Ag = 43, group [O+ve] = 26 [60.47%], A+ve =14[32.56%], B+ve = 2[4.65%], and AB+ve = 1[2.33%]. HCV= 12, group [O+ve] = 9 [75%], A+ve =2[16.57%], B+ve =1[8.34%]. Syphilis= 41, [O + ve ] = 29 [60.47%], A+ve = 10 [24.39%], B+ve =2[4.88%].These results explain by results done by Elham Elamin et al 2022 due to the distribution design of the ABO blood antigen varies among different populations in the world. As predictable, blood group O was the predominant ABO blood group in the present study which agrees with the predictable findings of these studies.<sup>41-45</sup>

Result reported by our study for Syphilis is 6.83% as compared to the other studies; Saghir et is lower, in Ethiopia (0.73%) and Bengal, 0.72%.<sup>41</sup> the majority of patients that were diagnosed with HCV infection in this study highlighting the need of implement strategies to

improve the diagnostic and therapeutic approach. The results of this study revealed that the majority of the blood donors were replacement donor, who was relation to the blood recipient living nearly Kosti Teaching hospital which is located in Kosti city.

In conclusion the prevalence of HIV, HBsAg, HC, and syphilis among blood donors in blood Kosti teaching was 0.17% %, 07.17%, 2 %, and 06.437%, respectively. The prevalence of HIV, HBs Ag, HCV, and Syphilis in donors, according to the frequency of donation 87%for the first, second12%, and 1% for the third time, HIV, HBs Ag, HCV, and Syphilis in donor's positive case [+ve] according to ABO blood group, one donor group [AB+ve], HBs Ag equal [43], 26 group [O+ve], 14 [A+ve], 2 [B+ve], and one donor group [AB+ve], HCV [12], group. 9 [O+ve], 2 [A+ve] and one donor [ B+ve], and Syphilis, 41, 29 group [O+ve], 10 [A+ve and 2 donors [B+ve]. Blood transfusion services improved the contribution to help situation safe blood transfusion in Kosti teaching hospital. Limitation of this study ELISA test to confirm HIV positive case, and viral load test it must be importance.

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## Conflicts of interest

The author declares that there is no conflict of interest.

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