

Frequency of Syphilis among Blood Donors Attending Khartoum Teaching Hospital Blood Bank

AYMAN MOHAMMED BABIKER ALADANI

MSc. Student

Faculty of Medical laboratory Science

AL-Neelain University, Sudan

WAFI IBRAHIM ELHAG

Associate Professor

Department of Microbiology

Faculty of Medical Laboratory Science

AL-Neelain University, Sudan

ZUHAL AHMED ELTAYEB

MSc, Faculty of Medical laboratory Science

AL-Neelain University, Sudan

Abstract:

Background: *Syphilis is one of the mandatory transfusion transmissible infections to be tested for in any unit of blood for transfusion. It is a highly contagious disease spread primarily by sexual activity, including oral and anal sex.*

Objective: *The aim of this study was to detect serofrequency of syphilis among blood donors attending Khartoum Teaching Hospital blood bank.*

Methods: *All tested sera were tested for antibody using RPR Kit. Reactive results were tested for IgM antibodies using ELISA Kit.*

The results: *Anti-syphilis rate among blood donors in Khartoum Teaching Hospital was 17% (17/100) by RPR. Furthermore, 7% were confirmed by ELISA. The highest seroprevalence (7%) with RPR was observed among blood donors of 36 – 40 years age.*

Conclusion: *This study indicated that syphilis is prevalent among healthy blood donors.*

Key words: Syphilis, blood donors, Khartoum Teaching Hospital Blood Bank

Syphilis is a chronic infectious disease caused by the spirochete bacterium *Treponema pallidum* (*T. pallidum*) and is characterized by alternating symptomatic and asymptomatic periods and possibly long latency periods⁽¹⁾. Although its treatment is accessible, its incidence remains a serious public health problem⁽²⁾. According to the World Health Organization (WHO), approximately 340 million new cases of curable sexually transmitted diseases emerged worldwide in recent years, including 12 million syphilis cases⁽³⁾. Syphilis transmission can occur through sexual intercourse, blood transfusion and vertical transmission⁽⁴⁾. Cases of infection through blood transfusions are rare due to the serological screening of blood donation candidates and because of the limited survival of *T. pallidum* in collected blood, whereby it is rapidly destroyed within a few minutes of exposure to drying, heat or air. Further, *T. pallidum* loses its viability after approximately seven days of storage at refrigerated temperatures⁽⁵⁾. Serological screening for syphilis and other infectious diseases is an important blood safety measure to avoid transfusion-transmitted infections. However, this procedure does not guarantee complete elimination of transmission risk because of the difficulty in detecting serologic markers in the early infection phase. Further, to reduce the risk of infection, a donor selection that effectively screens for behavioral risks is also necessary⁽⁶⁾. Serological syphilis screening can be accomplished with high-sensitivity treponemal and non-treponemal tests. The Venereal Disease Research Laboratory (VDRL) test is the most common non-treponemal test used in blood bank routines, followed by a subsequent treponemal test, such as the fluorescent treponemal antibody-absorption (FTA-ABS), treponemal protein hemagglutination

test (TPHA) or enzyme immunoassay (EIA) test⁽⁷⁾. The aim of this study is was to detect serofrequency of Syphilis among blood donors attending Khartoum Teaching Hospital Blood Bank.

Materials and Methods

The current descriptive, cross-sectional study carried out between January and March 2015. Hundred blood donors attended Khartoum Teaching Hospital Blood bank, Sudan were recruited in this study. This study was approved by Al-Neelain University ethical committee board and an informed consent was obtained from each patient before collecting the demographic and clinical data. Venous blood samples (5ml) in anticoagulant free container was be taken and sera was separated and kept frozen at -20°C. All tested sera were tested for antibody using RPR Kit in accordance with the manufacturer instructions. (Fortress-diagnostics limited, United Kingdom). 50 µL of serum or plasma was placed onto a 18-mm circle of the RPR test card using a safety pipetting device, the serum or plasma was spreaded to fill the entire circle, the antigen dispensing bottle was shaken gently to resuspend the particles, exactly 1 free-falling drop (17 µL) of antigen suspension was added to each circle containing serum or plasma, (3,2)the card was placed on the mechanical rotator under a humidifying cover, the card was rotated for 8 minutes at 100 ± 2 rpm, the card was removed from the rotator; the card was tilt by hand (three or four to-and-fro motions) to aid in differentiating nonreactive from minimally reactive results, perform the quantitative test on serum specimens showing any degree of reactivity (clumping) or “roughness the results were scored as reactive or non-reactive according to the standard procedures recommended by the manufacturer. Reactive result will be tested for IgM antibodies using ELISA Kit. The type of ELISA used was sandwich ELISA (Fortress-diagnostics limited,

United Kingdom). All reagents were brought to room temperature before assaying, fifty micro liter negative control, positive control and samples were dispensed into their respective wells, then 100 μ of diluted enzyme tracer (conjugate) were dispensed into all wells, except for the blank well, then the card board sealer was applied on to microtitters wells to prevent evaporation, and incubated for 3 hours at 37 $^{\circ}$ c. The chromogen/ substrate was prepared just before the end of incubation, and when incubation was completed, the card board was discarded, and the strips were washed by using automatic washer, after that the strips mouth were turned down on to blotting paper to remove any liquid residue, hundred microliter of chromogen/ substrate solution was dispensed in to all wells and incubated for 30 minutes at room temperature away from intense light, then 100 μ of blocking reagent was dispensed into all wells in the same order and at the same rate as for chromogen/ substrate, the absorbance of specimens were measured with photometer at 450/630 nm within one hour of adding the blocking reagent.

Measuring the absorbance:

The plate reader was calibrated with blank well and the absorbance was read with micro well reader at 450 nm, the results were calculated by relating each sample optical density (OD) value to the Cut off value of plate.

Calculation of Cut off (C.O) value: $C.O = *Nc *2.1$

*Nc = the mean absorbance value for the three negative controls.

Interpretation of results:

Negative results: samples giving absorbance less than Cut-off value are negative for this assay.

Positive results: samples giving absorbance equal to or greater than Cut-off value considered initially reactive.

Borderline: samples with absorbance $O.D. \leq \text{Cut-off} * 2$ are considered borderline and retesting of those samples in duplicates is recommended.

The presence of anti-syphilis antibody was considered as the evidence for prior exposure to syphilis. All collected data were analyzed using SPSS. *P. values* < 0.05 were considered statistically significant.

Results

A total of 100 blood donors who attended to Khartoum Teaching Hospital blood bank were enrolled in the current study. All of the patients were found to be healthy on routine medical examinations. Overall anti-syphilis rate among blood donors in was 17% (17/100). These results were confirmed using ELISA anti-syphilis IgM test and 7% were positive (Table 1). The age distribution of blood donors ranged from 25 – 40 years, all of them were males. The seroprevalence with RPR was highest 7% among blood donors of 36 – 40 years age, followed by 6% in 31 – 35 years, (Table 2). The seroprevalence of syphilis among the married donors (52.9%) was higher than the unmarried (47.1%), also the seroprevalence of syphilis among the donors without history of STDs (18.5%) was higher than the donors with history of STDs (10.5%). There was statistically significant difference in prevalence among age group. Nevertheless, there was no significant difference in marital status and past history of STDs.

Table 1: Frequency of syphilis among blood donors (n=100)

Anti-syphilis antibodies using RPR		
Reactive	17	17%
Non-reactive	83	83%
Total	100	100%
Anti-syphilis IgM antibodies by ELISA		
Positive	7	7%
Negative	93	93%
Total	100	100%

Table 2: Frequency of syphilis among blood donors (n=100) according to their age

Age group	Reactive		Non-reactive		Total
	No.	%	No.	%	
25 – 30 years	4	7.3%	51	92.7%	55
31 – 35 years	6	20.7%	23	79.3%	29
36 – 40 years	7	43.7%	9	56.3%	16
Total	17		83		100

Discussion

Syphilis is a Sexually Transmitted Disease (STD) that represents a major public health problem, spreading Worldwide in developing countries, the prevalence of the disease is very high in African countries⁽⁸⁾, such as Sudan because it is surrounded by nine countries and has marked movement of population across its borders. The overall frequency of antisiphilis antibodies was 17% positive by RPR. Our study was aimed at determining the serofrequency of syphilis among voluntary blood donors. From this study, the age range of blood donors was 25 to 40 years. The finding of 17% of syphilis among blood donors in this study was higher than the 15.0% found by Elfaki *et al* (2008) among Sudanese donors⁽⁸⁾, and less than that showed by Elagib and Abdalmagid 23.5% in Southern Kordofan, Sudan⁽⁸⁾. Moreover, 3.6% found by Chikwem *et al* (1997) in Maiduguri, North-eastern Nigeria; and 7.5% found by Adjei *et al* (2003) in Ghanaian donors; the 12.7% found by Matee *et al* (1999) among Tanzanian donors⁽⁹⁾. In Ethiopia, the

seroprevalence of antibody to syphilis among blood donors was 12.8 %⁽¹⁰⁾.

Conclusion and recommendation

We recommend the screening of all prospective blood donors for all transfusion transmissible infections. Blood that is positive for syphilis should be discarded, and the affected donor treated appropriately. Strict selection criteria for blood donors to exclude those with multiple sexual partners and that blood transfusion should be restricted.

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