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# Seroprevalence of Treponema Palladium Infection among Blood Donors in Darfur Region, Western Sudan 2017

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## ABSTRACT

**Background:** Treponema palladium (T.P) is a pathogenic bacteria induces syphilis, a systemic disease spread by sexual contact, blood transfusions.

Objective: To recognize Treponema palladium seropositive blood donors and to explore the association between syphilis serological evidence and age as well as demographic information.

**Methods:** In Darfur, Western Sudan, a retrospective analysis of sequential blood donation results from January to December 2017 was conducted. Percentages were used to measure the descriptive numbers. The p-value was used to assess the statistical significance of the measure, and the Chi-square was used to test trends.

**Results:** A total of 4527 people volunteered to donate blood. They were all men between the ages of 17 and 49. A total of 493 (10.9 %) donors tested positive for syphilis, while 4034 (89.1 %) tested negative. study showed insignificant correlation between residence and serological evidence of syphilis (P = 0.23). Age was shown to be a strong indicator of transfusion-transmissible infections (P = 0.02). As compared to the other age classes, the frequency of (21-25) and (26-30) years was higher (51/428) 10.6% and (141/971) 12.7 %, respectively.

**Conclusions:** In North Darfur, a high prevalence of Treponema palladium infection has been documented among blood donors. There was no statistically significant association between syphilis and occupancy, although there was a strong prevalence in a particular age demographic with a statistically significant correlation.

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## Introduction

Blood donation is a life-saving process that saves millions of lives per year all around the world. Blood transfusions, on the other hand, are associated with a number of hazards that can result in negative implications. It has the ability to inflict immediate or delayed effects, as well as the likelihood of infection transmission. Average annual, approximately 81 million units of blood are donated globally [1].

There is no true substitute for blood transfusion, but it is a medicinal intervention. However, an infected blood transfusion will disperse infectious diseases and be devastating rather than saving lives. [2]. Documents on the prevalence of transfusion transmissible infections (TTIs) along with HIV, HBV, HCV, and syphilis antibodies within blood and plasma donors can be used to assess the occurrence of infections in the blood donation population and, as a result, the efficacy of the donated blood. It also offers an understanding of the epidemiology of these diseases in the population. Transfusion-related disorders are another significant cause of concern [3].

Bacterial, viral, and parasitic infections are the three forms of transfusion transmissible infections. Viruses are the most common form of transfusion infection. In certain cases, the human immunodeficiency virus (HIV), hepatitis B, and C

viruses have all been contributed to post-transfusion diseases [4]. The prevalence of HBV infection varies greatly widely across countries. The World Health Organization (WHO) divides HBV prevalence into three categories: extreme endemicity (>8%), medium (2–7%), and lower endemicity (just under 2%) [5]. Hepatitis B virus (HBV) virus infects about 350 million people globally, and hepatitis C virus (HCV) infection affects about 125 million, rendering viral HBV and HCV infection among the world 's most important infectious diseases. As a consequence, these illnesses are prime targets for public health interventions designed to prevent, able to diagnose, and handling them early [6].

The invention of (TTIs) has created a new paradigm of blood transfusion medicine all over the world, with a focusing on two highest priorities: safety and human life health. In Ethiopia, blood safety is still a major issue in transfusion medicine [7]. Estimating the prevalence of TTIs, along with HBV, HCV, HIV, and syphilis antibodies or antigens, in blood donors will illustrate the dilemma of undisclosed infections in even the most healthy people, and also provide information that can be used to establish techniques to enhance blood supply management. Furthermore, it provide us with a rough estimate of the magnitude of such sexual transmitted infections [8,9].

Treponema pallidum (T.P) induces syphilis, a systemic disease spread by sexual contact, blood transfusions, and vertical transmission [10]. Syphilis is really a significant public health problem in Sub-Saharan Africa. Along with its exposure to an escalated risk of HIV infection, syphilis has created a greater possibility for adverse outcomes [11].

## Materials and Methods

### Study Design

A cross-sectional retrospective hospital-based research was performed in 2017 among Elfashir central blood bank donors.

### Study Area

The study was conducted out in Elfashir City, the capital of North Darfur State (situated between longitudes 31.5-34 east and latitude 15-16 north), which occupies an area of at least 28.165 square kilometers.

### Study Population

Almost all blood donors were either volunteers or relatives or acquaintances of beneficiaries who came to the Elfashir central blood bank during the study time. They were required to fill out a structured questionnaires that included socio-demographic data (age, gender, and residence), previous illness and chronic disease, background of blood transfusion, and jaundice. Those that seem to be in good health, their ages vary from18 and 60 year are qualified for blood donation.

### Study variable

The syphilis test result was the dependent variable in this study, whereas the independent variables were residency and age.

### Sample Size and Data Collection

Five milliliters of blood were withdrawn from each subject, sera were extracted, and syphilis non-specific antibodies (VDRL) were examined using a rapidly Dip-strip procedure (manufactured in the UK by fortress diagnostic LTD). Blood was gathered from 4527 blood doors in free anticoagulant clear tubes, and data such as age and ethnicity of all participants were collected using a structured interview questionnaire. The study's aims were explained to all patients, and their authorization was earned.

### Ethical Approve

The ethical approval again from Ministry of Health. Until being included in the study, all participants were asked to give their consent. This study required all participants to provide documentation.

### Data Analysis

For data entry and analysis of the patients' demographic characteristics, the Statistical Package for Social Sciences program (SPSS Inc., Chicago, IL, USA) version 20 was used; basic descriptive statistics were used to assess the VDRL test results and demographic data. To evaluate each pair of variables, the Chi-square test was used. A statistically meaningful p value less than 0.05 was being used.

## Results

The study involved 4527 male blood donors from diverse Elfashir neighborhoods. The participants' ages ranged from 17 to 49 years (mean 29.2 years). The prevalence of VDRL positivity was noticed to be 10.9 % (493/4527). The authors showed a statistically important association between syphilis and age (P = 0.02), but the proportion of positive serological evidence of syphilis in individuals aged (21-25) and (26-30) years (51/428) 10.6 %, and (141/971) 12.7 %, respectively. The association between syphilis serological data and residence was negligible (P = 0.23).

**Table 1: Distribution of VDRL test**

| Syphilis | Frequency | Percent |
|---|---|---|
| Positive | 493 | 10.9 % |
| Negative | 4034 | 89.1 % |
| Total | 4527 | 100.0 % |

**Table 2: Correlation between syphilis and age group**

| Age group | Frequency | Percent | P- value |
|---|---|---|---|
| 15 - 20 | 479 | 10.5 | 0.02 |
| 21 - 25 | 1226 | 27.1 | |
| 26 - 30 | 1112 | 24.6 | |
| 31 - 35 | 828 | 18.3 | |
| 36-40 | 503 | 11.1 | |
| More than 40 | 379 | 8.4 | |
| Total | 452 | 100.0 | |

**Table 3: Correlation between syphilis and residence**

| Residence | | Syphilis | | Total | P- value |
|---|---|---|---|---|---|
| | | Positive | Negative | | |
| Almalha | Count | 7 | 19 | 26 | 0.001 |
| | % within Residence | 26.9% | 73.1% | 100.0% | |
| | % within Syphilis | 1.4% | 0.5% | 0.6% | |
| Camp | Count | 31 | 237 | 268 | |
| | % within Residence | 11.6% | 88.4% | 100.0% | |
| | % within Syphilis | 6.3% | 5.9.% | 5.9.% | |
| Elfashir | Count | 418 | 3370 | 3788 | |
| | % within Residence | 11.0% | 89.0% | 100.0% | |
| | % within Syphilis | 84.8% | 83.5% | 83.7% | |
| Alkoma | Count | 8 | 28 | 36 | |
| | % within Residence | 22.2% | 77.8% | 100.0% | |
| | % within Syphilis | 1.6% | 0.7% | 0.8% | |
| Others | Count | 29 | 380 | 409 | |
| | % within Residence | 7.0% | 93.0% | 100.0% | |
| | % within Syphilis | 5.9% | 9.4% | 9.0% | |
| Total | Count | 493 | 4034 | 4527 | |
| | % within Residence | 13.0% | 87.0% | 100.0% | |
| | % within Syphilis | 100.0% | 100.0% | 100.0% | |

## Discussion

Treponema palladium seropositivity was 10.9 percent, which is greater than the study stated by According to a new survey, 6.8 percent of blood donors positively identified for syphilis serological evidence in Eastern Ethiopia where prevalence was (0.1%) This distinction can be regarded with caution because our research was done in a region with a lack of health education about prevention measures of sexually transmitted diseases, while the comparable areas used effective preventive methods [12,13].

The highest syphilis seroprevalence was shown in the age categories between (21 and 25) and (26 and 30) years old, with a clear association (P = 0.02). This conclusion ignored a report issued in that reported a high prevalence of infection among individuals aged 20 to 40 [12]. This age group is considered particularly reproductive age, and high seropositivity may be due to the unavailability of health facilities regarding prevention measures of sexually transmitted infection, or it may be due to a screening program for sexually transmitted infections subsequent to blood donation, as demonstrated by [10].

The study found an insignificant statistical association between Treponema palladium infection and residence (P = 0.23). This result opposed another research cited by. Yusuf eatal How was the correlation of syphilis seroprevalence and a lack of health education correlated with rural residence registered, and how our study areas share the same situation in terms of health infrastructures and facilities [13].

## Conflicts of Interest

According to the authors, there are no conflicts of interest regarding this article.

## Authors' contributions

The authors contributed equally to the design of the study and the preparation of the manuscript. The final version of the manuscript was read and authorized by all authors.

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