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## HIV and Syphilis among Blood Donors in Sana'a, Yemen

**Background:** The implementation of effective quality systems in national blood transfusion service, including quality management and effective documentation for transfusion – transmissible diseases is a core component of every national blood programme. In Yemen, such a programme is not in effect and there is an absence of clear and efficient policy framework that will provide and implement internationally recognized guidelines for donor screening, blood testing, and recording, which includes sexually transmissible diseases. As a result, the recipients of blood and blood products remain at unacceptable risk of acquiring life – threatening infections that could be easily prevented. Hospital-based studies should be conducted to help in addressing such issue.

**Aim:** This study aims to conduct screening tests for human immunodeficiency virus (HIV) and syphilis in volunteer blood donors at blood bank unit in the University of Science and Technology Hospital (USTH), Sana'a, Yemen.

**Methodology:** A total of 3602 healthy males individuals (18-50, mean 26.3 years old) donated blood at USTH between 1<sup>st</sup> July 2008 and 30<sup>th</sup> June 2010 were included in this study. Donors were screened for the presence of HIV and syphilis using Microparticle Enzyme Immunoassay (MEIA).

**Results:** Out of 3602 blood donors tested, the frequency rates of HIV and syphilis were 0.39% and 0.75% respectively. A slightly increase in the rate of HIV and syphilis infections was also observed in the second year compared with the first year of the study.

**Conclusion:** The seroprevalence of HIV and syphilis was low among blood donors in Yemen. Stringent criteria and well-organized framework should be applied to get better control of the donation process for selection and screening of voluntary blood donors to ensure safety of blood for recipients.

**Keywords:** blood donors, HIV, syphilis, screening

### INTRODUCTION

Blood transfusion is a life-saving intervention that has an essential role in patient management within health care systems. The assessment of data of the prevalence of sexually transmitted infections such as human immunodeficiency virus (HIV) and syphilis in blood donors is necessary for monitoring blood supply safety and donor screening efficiency {1}. Furthermore, surveillance the incidence of transfusion transmitted infections (TTIs) in blood donors is of paramount importance for estimating the risk of transfusion and putting in place optimal donor enrollment strategies to reduce the transmission of infections {1}. It also gives an idea about the epidemiology of these infections in the community {2}.

Blood transfusion safety is of great concern in transfusion medicine in Yemen, due to sub-optimal planning and shortage in the blood transfusion services. In addition, the absence of clear and internationally recommended policies and guidelines, as well as lack of communications, personnel training and financial supports {3}.

Acquired immunodeficiency syndrome (AIDS) is the leading universal health problem of considerable socioeconomic impact. In 2005, the United Nations Program reported that 40.3 million people living

with AIDS, of which 7.4 millions in East and Southeast Asia {4}. However, some countries reported low levels of HIV epidemic such as in Afghanistan, Egypt, Iraq, Jordan, Lebanon, Libya, Morocco, Palestine, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates and Yemen. However, limited biological supervision of HIV infection may not reflect the true prevalence among the populations in these countries {5}.

In 2007, the epidemic of AIDS was decreased resulting in a reduction of HIV prevalence and it is reported that the seroprevalence of HIV has been leveling off in many countries and is decreasing in Sub-Saharan Africa {6}. HIV is a disease which spreads horizontally through sexual relationship, organ transplantation and vertically from mother to offspring {7-11}. Syphilis is a sexually transmitted infection (STI) caused by the *Treponema pallidum* spirochete. Sexual contact is the most important route of transmission of syphilis. The disease can also be transmitted through transfusion of blood and blood products, intravenous drug abuse and from mother to child (congenital syphilis) {12}.

Severe effects could be found as a result of untreated syphilis cases such as damage to the aorta, brain, eyes, and bones. In severe cases, syphilis can lead to death.

Association of syphilis with increased risk for HIV infection raised a new prospective for morbidity and mortality [6].

In this study, we aimed to estimate the frequency of the HIV and syphilis infections in two consecutive years among blood donors at the blood bank unit - University of Science and Technology Hospital.

## MATERIAL AND METHODS

**Donors and samples:** Blood samples were collected from blood donors in the period from 1<sup>st</sup> July 2008 to 30<sup>th</sup> June 2010 and processed for serum separation.

In this retrospective study, data of 3602 blood donors were collected from the records of blood bank unit at USTH which includes the screening test results for HIV and Syphilis. This study was approved by the Ethics and Research Committee in the Ministry of Public Health and Population, Yemen.

**Inclusion Criteria:** Healthy individuals attending for blood donation at blood bank unit in USTH.

**Exclusion Criteria:** Age < 18 years, anemic or recent history of jaundice, fever or presence of chronic disease, and weight < 50 Kg.

**Procedures:** A third generation of Microparticle Enzyme Immunoassay (MEIA) (AxSYM Abott) was used for detection of HIV-1, HIV-2, recombinant derived antigens corresponding to 4 viral proteins HIV-1 group M and O envelope, core HIV-1 and HIV-2 envelope were used for detection of HIV antibodies Following the supplied protocol.

Qualitative, membrane based immune chromatographic assay (Acon U.S.A Reagent) was used for the detection of syphilis antibody in the serum samples. Samples found reactive in two consecutive tests were considered positive for HIV and those, which proved repeatedly reactive, by immunochromatography assay, were considered positive for syphilis.

### Statistical analysis:-

To determine the changes of HIV and syphilis infections in the two consecutive years, data were analyzed via SPSS version 17, using chi-square test with 95% confidence intervals. *P-value* less than 0.05 considered statistically significant.

## RESULTS

A total of 3602 healthy blood donors were screened for HIV and syphilis. Fourteen donors (0.39%) were HIV positive whereas 27 (0.75%) were syphilis positive. All donors were male; the mean age was 26.3 years with age range (18-50) years. Out of 1638 blood samples investigated during the first year, 6 (0.37%) were positive for HIV, 12 (0.73%) were positive for syphilis. Out of 1964 blood samples investigated during the second year, 8 (0.41%) were

positive for HIV and 15 (0.76%) were positive for Syphilis.

The data showed that there is a slight increase in the rate of infection of HIV from 0.37% in the first year to 0.41% in the second year. For syphilis, the infection rate increased from 0.73% in the first year to 0.76% in the second year as shown in (table 1). The findings also illustrated that the syphilis infection was higher than HIV infection (figure 1).

## DISCUSSION

Screening of blood donors, early diagnosis and treatment of HIV, and syphilis infections in asymptomatic subjects are essential procedures needed for public benefits. In the current study, the mean age was 26.3 years (18-50 years), which is different from that, reported by Muktar *et al.*, [13] in Zaria, North-western, Nigeria in which the mean age of donors was 33 years (19 - 42 years). The frequency rate of syphilis among blood donors was 0.75% using chromatography assay which is similar to the 0.75% reported by Bhatti *et al.*, [14] in Pakistan and the 0.85% estimated by Gupta *et al.*, [15] in India. However, it is consider higher than the 0.1% reported by Ejele *et al.*, [16] in Port Harcourt, South-Nigeria and lower than the 1.2% estimated by Abdalla *et al.*, [17] in their study in Kenya. Higher rates were also reported by Chikwem *et al.*, [18] in Maiduguri, Northeastern Nigeria and Adjei *et al.*, [19] in Ghanaian donors (3.6% and 7.5% respectively). Gupta *et al.*, [15] and Abdalla *et al.*, [17] used venereal disease research laboratory (VDRL) in their research to determine the presence of syphilis marker while Elfaki *et al.*, [20] used immunochromatographic assay to identify syphilis infection in the serum.

Frequency of HIV in this study was 0.39 %, which is lower than that reported in East Delhi 0.80% [21], 0.96% in Nigeria [22], and 1.5% in rural India [23]. Nevertheless, it is considered higher than zero in Islamabad [24]. In the present study, the frequency of syphilis and HIV is shown to be low and the change in the rate of HIV and syphilis infections from the first year to the second year was not statistically significant ( $P=0.84$ ,  $P =0.86$ ) respectively.

The large differences in the infection rate of syphilis and HIV among the blood donors in the different countries might be due to the differences in geographical locations, mean age of blood donors, religious level, sample sizes, the periodic time of studies and the type of procedures used. Further studies are required in order to better define the epidemic of syphilis and HIV infections and a sensitive marker of sexual risk behavior should be applied. We recommend the application of strict selection criteria for blood donors, donors recalling

system should be introduced and the affected donors should be treated properly.

## CONCLUSION

We conclude that there was a mild increase in the frequency of HIV and Syphilis infections in blood donors over the two consecutive years. Generally, the frequency of HIV and syphilis is low among voluntary blood donors at USTH Sana'a. Serious concerns should be taken regarding the safety of the blood supply in our community.

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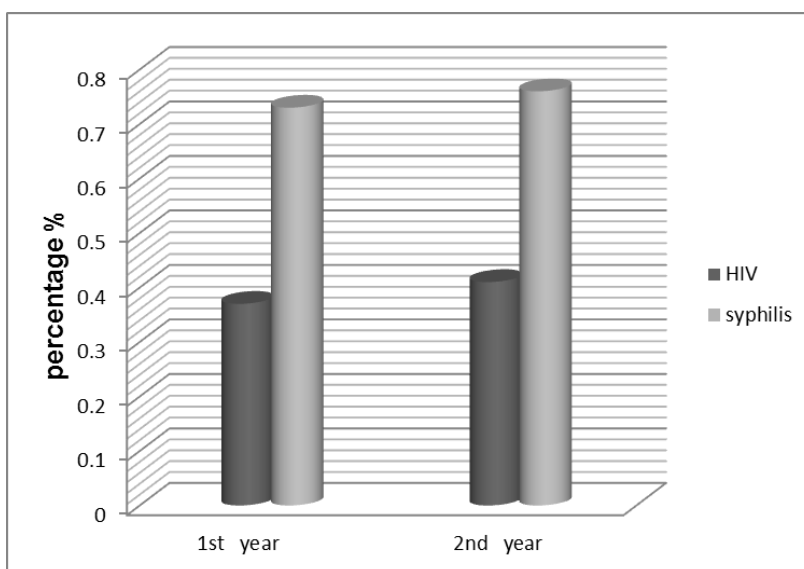
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**Table 1:** Frequency of syphilis and HIV infections among blood donors

Type	Year	Total blood donors	Positive samples <i>n</i>	(%)	Total number of samples <i>n</i>	(%)	( <i>p</i> -value) <sup>a</sup>
HIV	1 <sup>st</sup> year	1638	6	0.37	14	0.39	0.84
	2 <sup>nd</sup> year	1964	8	0.41			
Syphilis	1 <sup>st</sup> year	1638	12	0.73	27	0.75	0.91
	2 <sup>nd</sup> year	1964	15	0.76			

<sup>a</sup> Chi-square test



**Figure1:** Frequency of HIV and syphilis infection markers among blood donors