

Seroprevalence of HIV and Syphilis among Blood Donors in Kathmandu Valley, Nepal

¹Bishnu Raj Tiwari, ²Prakash Ghimire, ²Ashish Chandra Shrestha, ²Komal Raj Rijal, ³Bimala Sharma

¹School of Health and Allied Sciences, Pokhara University, Kaski, Nepal.

²Central Department of Microbiology, Tribhuvan University, Kathmandu, Nepal.

³Shree Medical and Technical College, Chitwan, Nepal.

ABSTRACT

Transmission of HIV and other viral infections continues to be a threat to safe blood transfusion. Detection of specific antibodies to *Treponema pallidum* in serum is associated with present or past Syphilis infection. Syphilis itself is not a major hazard in modern transfusion service however its association with human immunodeficiency virus (HIV) makes the antibodies against *T. pallidum* as an important seromarker to screen the blood for the risk of transfusion transmitted infections. A cross-sectional research based at Nepal Red Cross Society (NRCS), Central Blood Transfusion Service (CBTS), Kathmandu, was carried out during March - September 2008 with the objective to investigate HIV and syphilis among blood donors in relation to age and sex in blood donors. A total of 21,716 units of blood were tested for the presence of anti HIV 1 and HIV2 IgG/IgM, and anti- *Treponema pallidum* IgG/IgM/IgA using the commercial kits following standard protocols. The overall seroprevalence of HIV was 0.12%— and syphilis was 0.49 with significantly higher prevalence (0.17%) in the age group of 31-40. Studies revealing the seroepidemiology of HIV and syphilis in blood donors might prove valuable to make plans and policy for improving safe blood supply.

Key words: HIV, Syphilis, Seroprevalence, Blood donors, Kathmandu, Nepal.

Corresponding author: Dr. Bishnu Raj Tiwari, School of Health and Allied Sciences, Pokhara University. E-mail: bishnurajtiwari@gmail.com

INTRODUCTION

Human Immunodeficiency Virus (HIV) has been of global concern since it has infected millions of people worldwide. In 1982, the first cases of acquired immunodeficiency syndrome (AIDS) obtained from blood or blood components were reported, but the aetiology of the infections was not known at that time). HIV transmission through blood transfusion may occur during the window period (i.e. a short viraemic period in which the donor is infected with HIV at a very early stage and often tested negative in a donor screening test), from HIV-antibody negative chronic carriers, HIV mutant infection, and laboratory error. The estimated risk for HIV transmission is between 0.14 – 1.1 per millions units transfused.¹

Syphilis increases the risk of acquiring HIV infection.² Transmission of syphilis by blood transfusion has become extremely rare after implementation of the serologic test for antibodies to *T. pallidum*. It is not the transmission of syphilis that is worrisome, being a sexually transmitted disease, its presence points towards donor's indulgence in "high risk" behaviour and consequently higher risk of exposure to infections like HIV and hepatitis.³

HIV seroprevalence among blood donors in different regions of Nepal and Kathmandu Valley has been reported to range from 0.019% to 0.41%.^{4,5,6} Very little information is available on the prevalence of Syphilis in general population, although one of the focussed Joshi and Ghimire has reported it as 0.6% among Nepalese males.⁷

Syphilis being a sexually transmitted disease can serve the marker for risk of HIV. Hence, study of Syphilis coinfections with the HIV can be useful to know the possible associations. Overall data on prevalence can reveal the magnitude of problem of respective infections in healthy looking part of general population.

It is not reasonable to study a large population to know such data at extra cost of investigation. However, blood banks besides meeting the requirements of blood supply are important centres for surveillance of some infections that are of concern to general public.

MATERIAL AND METHODS

The study is a descriptive cross-sectional study, from March 2008 to September 2008 at NRCS, CBTS. During the study period a total number of 21,716 serum samples from blood donors were subjected to serological tests for anti-HIV, HBsAg, anti-HCV and anti-*Treponema pallidum* (Syphilis) test. Serum samples were tested for Anti-HIV antibodies were detected using the commercial assay for screening by ELISA (HIV- Enzygnost® anti-HIV 1/2, Dade Behring, Germany) and specific antibodies against Treponemal pallidum by Enzyme linked Immunosorbent Assay (ELISA) in an automated ELISA processor (BEP III, Dade Behring, Germany). ELISA performed as per the instructions of the manufacturer and result was interpreted as reactive or non-reactive. The data was entered in Microsoft excel spreadsheet

collecting the information from Blood donor's form and was analyzed by the statistical software "SPSS ver 11.5". Chi-square test was used for test of association. A p-value of <0.05 was considered statistically significant.

RESULTS

During the study period from March 2008 to September 2008 at NRCS, CBTS, a total number of 21,716 serum samples from blood donors were subjected to serological tests for anti-HIV, and anti-*Treponema pallidum* (Syphilis) test. Of these, numbers of male donors were 18,434 (84.9%) and the numbers of female donors were 3,282 (15.1%).

Distribution of HIV Seropositive Blood Donors

Among the total samples, 0.12% were found positive to HIV antibodies. Higher seroprevalence was observed in the male blood donors in comparison to female blood donors. However, the difference was statistically not significant. Highest seroprevalence of 0.17 % was observed in donors of age group 31 to 40 years, with prevalence of 0.18% among males and 0.10 % among females.

Table 1: Distribution of HIV Seropositive among the Blood Donors

| Age Group (Years) | No. of Donors | Male | | | | Female | | | | Total Prevalence (%) |
|-------------------|---------------|-----------|--------------|------|-----------|--------------|------|------|--|----------------------|
| | | Total No. | HIV positive | | Total No. | HIV positive | | | | |
| | | | No. | % | | No. | % | | | |
| ≤ 20 | 3,310 | 2,623 | 2 | 0.07 | 687 | 0 | 0.00 | 0.06 | | |
| 21- 30 | 9,818 | 8,565 | 11 | 0.12 | 1,253 | 1 | 0.08 | 0.12 | | |
| 31- 40 | 5,763 | 4,845 | 9 | 0.18 | 918 | 1 | 0.10 | 0.17 | | |
| 41- 50 | 2,433 | 2,045 | 3 | 0.14 | 388 | 0 | 0.00 | 0.12 | | |
| 51- 60 | 392 | 356 | 0 | 0.00 | 36 | 0 | 0.00 | 0.00 | | |
| Total | 21,716 | 18,434 | 25 | 0.13 | 3,282 | 2 | 0.06 | 0.12 | | |

Distribution of Syphilis Seropositive among the Blood Donors

Among the total samples, 0.49% were found reactive for anti-*Treponema pallidum* antibodies. Difference observed in the prevalence of syphilis in male and female donors was statistically not significant. Study of syphilis seroprevalence among donors of different age groups showed high prevalence (4.08%) among donors of age group 51 to 60 years. Seroprevalence of Syphilis observed in age groups 51 to 60 was statistically significant compared to prevalence of other age groups.

Table 2: Distribution of Syphilis Seropositive among the Blood Donors

| Age Group (Years) | No. of Donors | Male | | | | Female | | | | Total Prevalence (%) |
|-------------------|---------------|--------|-------------------|------|-------|-------------------|------|------|--|----------------------|
| | | No. | Syphilis positive | | No. | Syphilis positive | | | | |
| | | | No. | % | | No. | % | | | |
| ≤ 20 | 3,310 | 2,623 | 7 | 0.26 | 687 | 3 | 0.43 | 0.30 | | |
| 21- 30 | 9,818 | 8,565 | 15 | 0.17 | 1,253 | 4 | 0.31 | 0.19 | | |
| 31- 40 | 5,763 | 4,845 | 32 | 0.66 | 918 | 5 | 0.54 | 0.64 | | |
| 41- 50 | 2,433 | 2,045 | 21 | 1.02 | 388 | 3 | 0.77 | 0.98 | | |
| 51- 60 | 392 | 356 | 15 | 4.21 | 36 | 1 | 2.77 | 4.08 | | |
| Total | 21,716 | 18,434 | 90 | 0.48 | 3,282 | 16 | 0.48 | 0.49 | | |

DISCUSSION

During the study period HIV seroprevalence was found to be 0.12% with higher prevalence of 0.13% among males compared to 0.06% among females, indicating high risk behaviours of males. Overall seroprevalence of HIV was relatively higher among donors of age group 31 to 40 years (Table 1). Prevalence among males and females was also higher in the same age group with 0.18% and 0.1% respectively. Higher prevalence indicates the higher risk behaviours in this age group.

HIV seroprevalence observed (0.12%) was lower than that reported as 0.19% in Kathmandu Valley.⁶ Prevalence was similar to the findings in Bhairahawa, Nepal (0.13%), but higher than in Morang (0.019%), Banke (0.095%), and Kaski (0.05%) in 2008.^{4,5} The lower prevalence may be due to stringent donor selection criteria, self exclusion of high risk associated groups from blood donation and increased public awareness.

The present study findings is lower than the similar other studies carried out in rest of the world i.e., in Ethiopia (4.5%), Tanzania (8.7%), Nigeria (0.87%), Thailand (0.69%), Uganda (3.9%).^{8,9,10,11,12} However, in the present study HIV seroprevalence was higher than that reported by Gupta *et al.*, in Ludhiana, India (0.084%), Yumiko *et al.*, in Phillipines (0.006%), Ayala *et al.*, in Mexico (0.02%), Rahaman *et al.*, in Pakistan (0.001%), Tserenpuntsag *et al.*, in Mongolia with none of the seropositive donors.^{13,14,15}

Differences in seroprevalence do occur and is obvious. These can be attributed to lifestyle of general population, donor selection criteria, sensitivity and specificity of test kits used along with preference of diagnostic algorithms.

Overall seroprevalence of syphilis was observed to be 0.49% in both male and female. Similar prevalence was observed among male and female donors. Seroprevalence of syphilis among donors increased with the age. A prevalence of 4.08% was among the donors of age group 51 to 60 years (Table 2). As the detection was both IgG and IgM antibodies specific to *Treponema Pallidum*, even the treated cases, with the past infection beside the primary stage cases could have been detected.

Syphilis seroprevalence observed in the present study (0.49%) was lower than reported in in Tanzania (12.7%), Ludhiana, India (0.85%), Mongolia (2%) and in India (Calcutta), (0.62%).^{9,13,17,18} Finding was comparable to the investigations in Bhairahawa (0.39%). The difference may be attributed to test kit, geography, inclusion criteria etc.⁴

Blood donors of higher age groups revealed higher seroprevalence rate. The most prevalent infection was Syphilis then HIV but there were none blood donors seropositive to both HIV and Syphilis. Hence, co-infection of HIV and Syphilis was not observed any during the study. So further comprehensive studies are needed to unravel the associated factors.

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