Serological Abnormalities in Voluntary Donors

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ABSTRACT

BACKGROUND
Despite reduction in the risk of transfusion transmitted infections during the past three decades, they still remain a serious complication of transfusion worldwide. The aim of the study was to determine the seroprevalence for the past seven years among voluntary blood donors.

METHODS
This was a retrospective cross sectional study, which was carried out in blood bank of Saveetha Medical College and Hospital, Chennai, between January 2011 and December 2018. A total of 13345 blood donors were studied to determine the seroprevalence of Human Immunodeficiency Virus (HIV), Hepatitis C Virus (HCV), Hepatitis B surface antigen (HBsAg), Malaria and Syphilis.

RESULTS
The present study showed the seroprevalence of HIV, HBV, HCV, Syphilis and Malaria was 0.14% (20/13345), 1.55% (207/13345), 0.26% (36/13345), 0.03% (5/13345), 0% respectively. The total seroprevalence was 2% (268/13345). There was a declining trend for syphilis and increasing trend for HBV, which was statistically significant while there was no significant change in the trend of seroprevalence of HIV, HBV, HBC and malaria.

CONCLUSIONS
The current infections disease pattern and trends in donor population can help in planning of future blood transfusion related health challenges. There is a need for improvement and implementation of strict donor selection and sensitive screening tests which can minimise the risk of transfusion transmitted infections.

KEYWORDS
Hepatitis, Syphilis, Malaria, HIV, Transfusion Transmitted Infections, Seroprevalence, HCV, HBV
BACKGROUND

Despite reduction in the risk of transfusion transmitted infections during the past three decades, they still remain a serious complication of blood transfusion worldwide. Blood donors can transmit an infection during its asymptomatic phase, so transfusions can contribute to an ever widening pool of infections in the population. High prevalence of infectious disease in donors not only carries the risk to the recipients, but also increases the overall cost of the transfusion product. Depending upon the difference in disease epidemiology and financial resources between different countries, the WHO strategy for laboratory screening of blood recommends HIV, HBV, and syphilis screening of all donated blood and when appropriate, screening of HCV and malaria. The choice of screening assays by the blood bank or laboratory depends upon not only on region’s infectious disease epidemiology, but also on the quality and types of assays available. Transfusion transmitted infectious agents are greatest treats to blood safety for transfusion recipients and poses a serious public health problem. The aim of the study was to access the seroprevalence in voluntary donors. In India tests for HIV, HBV, HBC, malaria, syphilis are mandatory under Drugs and Cosmetic Act 1940.

METHODS

This was a retrospective cross sectional study, which was carried out in blood bank of Saveetha Medical College and Hospital, Chennai between January 2011 and December 2018. Exclusion criteria included: current history of medication and those with history of operation, serious illness, jaundice, blood transfusion, radiotherapy or any form of cancer therapy. These selection procedures are done routinely in the blood banks as per the standard operating procedures. A total of 13345 blood donors were studied to determine the seroprevalence of Human immunodeficiency virus (HIV), Hepatitis C virus (HCV), Hepatitis B surface antigen (HBsAg), Malaria and Syphilis. All blood donors’ samples were screened for HIV, hepatitis B surface antigen (HBsAg), HCV, and syphilis. Blood bank donor cards were used as a source of information. HIV, HBsAg, HCV tests were done by enzyme-linked immunosorbent assay (ELISA) procedure using the third generation kits. Syphilis was diagnosed by performing the venereal disease research laboratory (VDRL) test. Malaria testing was done by slide method using Leishman’s staining. Blood donors were selected if they fulfilled all the criteria to be eligible for donation as described by the standard operating procedure of our blood bank.

Blood Sampling

Venous blood was collected in plain vacutainer tubes which was allowed to clot naturally at room temperature. The clotted blood sample in plain vacutainer tubes was then spun in a centrifuge machine at 2500 rpm for 5 min to separate the serum which was further used for serological analysis. Haemoglobin determination was done by the traditional CuSO4 method. Tests on donor blood were carried out according to manufacturer’s instructions with positive and negative controls. Before drawing the blood, each donor was requested to fill blood donor’s card. Blood samples were tested, and reactive sera were confirmed by repeat testing using another kit manufactured by the different company. Confidentiality of reports was maintained as per standard guidelines.

Human Immunodeficiency Virus Serology

MICROLISA HIV kits were used for detection of antibodies to HIV-1 (including subgroups O and C) and HIV-2. The MICROLISA HIV test is an in-vitro qualitative enzyme immunoassay for the detection of antibodies to HIV-1 and HIV-2 in human serum or plasma. It is intended for screening of blood donors or individuals at risk of HIV-1 or HIV-2 infection and for clinical diagnostic testing.

Hepatitis B Surface Antigen Serology

Microscreen HBsAg ELISA test kits (Span Diagnostic Ltd.,) were used for detection of HBsAg. The test is based on solid phase microplate direct ELISA (Sandwich ELISA) technique.

Hepatitis C Virus Serology

SD HCV ELISA 3.0 (SD Bio-standard diagnostic Pvt. Ltd.,) were used which is indirect sandwich ELISA for the qualitative detection of antibodies against HCV. It contains a microplate, which is precoated with recombinant HCV antigens (Core, NS3, NS4, and NS5) on the well. The amount of conjugate bound and hence colour, in the wells, is directly related to the concentration of antibody in the sample.

Syphilis Serology

Syphilis was diagnosed using Accucare™ rapid plasma reagin (RPR) syphilis screening test (Lab-care Diagnostic Pvt., Ltd.). The RPR syphilis screening test is macroscopic nontreponemal flocculation card test for detection and to quantify reagin, an antibody-like substrate present in serum or plasma and spinal fluid from syphilitic persons.

Quality Control

Internal and external quality controls were carried out.

RESULTS

In the retrospective cross sectional study, which was carried out in blood bank of Saveetha Medical College and Hospital, Chennai between January 2011 and December 2018, the seroprevalence of HIV, HBV, HCV, Syphilis and Malaria was 0.1% (20/13345), 1.5% (207/13345), 0.2% (36/13345), 0.03% (5/13345), 0% respectively. In the year 2011, a total of 11 seropositive cases were recorded out of which, 5 was HBV Positive and 6 HCV Positive. In the year 2012, there was a total of 15 seropositive cases out of which there was 1 HIV positive, 11 HBV Positive, 1
HCV Positive and 2 syphilis positive. In the year 2013, there was a total of 17 seropositive cases, out of which, 2 was HIV Positive, 11 HBV Positive, 1 HCV Positive and 1 syphilis Positive. In the year 2014, there was a total of 24 seropositive cases, out of which there was 1 HIV positive, 19 HBV Positive, 3 HCV Positive, and 1 syphilis positive. In the year 2015, there was a total of 38 seropositive cases, out of which there was 26 HBV positive, 11 HCV Positive and 1 Syphilis positive. In the year 2015, there was a total of 55 seropositive cases, out of which there was 4 HIV positive, 43 HBV Positive and 8 HCV positive. In the year 2016, there was a total of 58 seropositive cases, out of which there was 4 HIV positive, 43 HBV Positive and 8 HCV positive. In the year 2017, there was a total of 58 seropositive cases, out of which there was 7 HIV positive and 51 HBV positive. In the year 2018, there was a total of 50 seropositive cases, out of which there was 5 HIV positive, 41 HBV positive and 4 HCV positive. These values are tabulated in Table 1.

The present study showed the seroprevalence of HIV, HBV, HCV, Syphilis and Malaria was 0.1% (20/13345), 1.5% (207/13345), 0.2% (36/13345), 0.03% (5/13345), 0% respectively. The total seroprevalence was 2% (268/13345). Globally, between 130-150 million people have chronic hepatitis C infection and there is currently no vaccine for hepatitis C. In comparison to the trends in seroprevalence of HIV, HBC, HCV, malaria, syphilis, there was a declining trend for syphilis shown in Graph 2 and an increasing trend of HBV shown in Graph 1, which was statistically significant while there was no significant change in the trend of seroprevalence of HIV, HBC AND malaria infection. In the present study, the seroprevalence of HIV was found to be 0.1% among the donors which is similar to the findings of Yusuf Mohammed et al,1 Pawan Singh et al2 and Dr. Nirali Shah et al.3 The present study revealed that the seroprevalence of HBV was found to be 1.5% among the donors which is similar to the findings of Gopi H Dobariya et al4 and Karmakar PR et al.5 In the present study, the prevalence of HCV among the donors revealed to be 0.2% which is similar to the Nirali shah et al3 and Karmakar PR et al.5 The present study also reveals the seroprevalence of syphilis to be 0.03% which is similar to the Yusuf Mohammed et al1 and Gopi H Dobariya et al.4 Seroprevalence of HIV, HBV, HCV, syphilis and malaria in different studies are shown in table 2. In the present study, almost similar values have been found as compared to other studies.

### CONCLUSIONS

The current infectious disease pattern and trends in donor population can help in planning future blood transfusion related health challenges. Encouraging voluntary blood donors will increase the number of donors and safe donor pool. There is need for look back phenomenon, donor notification and donor counselling to prevent further transmissions of infections. Though the prevalence of syphilis is decreasing, there is need for improvement and implementation of strict donor selection and sensitive screening tests which can minimise the risk of acquiring transfusion transmitted infections.
REFERENCES


