Seroprevalence of Transfusion Transmitted Infections among Blood Donors Attending a Tertiary Care Hospital of Western Odisha

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ABSTRACT

BACKGROUND
Blood transfusion is an important lifesaving intervention, but it poses the risk of transmission of different infections like hepatitis B, hepatitis C, human immunodeficiency virus (HIV), Treponema pallidum (causing syphilis) and Plasmodium spp. (causing malaria) to the recipient. Seroprevalence of different transfusion transmitted infection (TTI) among blood donors is an indirect measure of these infections in the community. This study was conducted to assess the seroprevalence of different TTI in blood donors attending blood bank of a tertiary care hospital of Western Odisha.

METHODS
12,241 samples over 8 years from both voluntary and replacement donors were processed for HBsAg, HCV, HIV by ELISA method and for syphilis by RPR test, for malaria by rapid card test. Positive samples were confirmed by PCR method for HBsAg, HCV, HIV and by TPHA test for Syphilis and by peripheral smear study for malaria. All the positive samples were rejected for transfusion and the seroreactive blood donors were sent to appropriate department for treatment.

RESULTS
Among 12241 samples 0.96% (118/12241) samples were positive for TTI. 2.70% (328/12241) were voluntary donors and 1.87% (229/12241) were female donors. Seroprevalence of hepatitis B, hepatitis C, HIV, Syphilis and malaria were 0.62, 0.044%, 0.073%, 0.1% and 0.12% respectively. Hepatitis B showed significant decrease of annual prevalence over 8 years.

CONCLUSIONS
Seroprevalence of TTI was lower compared to other studies of India. Highest seroprevalence was seen in hepatitis B. Awareness about hepatitis B vaccination should be increased in that area. Voluntary blood donation and female participation should be encouraged in that area.

KEY WORDS
Seroprevalence, TTI (Transfusion Transmitted Infections), Blood Donors, Trends
BACKGROUND

Blood transfusion is a lifesaving intervention in an accident, in case of anaemia and other haematological diseases. It was discovered by Dr James Bundell in 1810.1 Like all other medical interventions, it also has different adverse effects and risks. Most important risk is chances of acquiring transfusion transmitted infections. There is 1% chance of adverse effects including TTI with every unit of blood.2 Screening of blood donors was first started in 1947.3 Government of India has started screening of blood for hepatitis B virus since 1971; HIV since 1989; hepatitis C virus since 2001.4 In spite of screening we cannot detect these diseases in their Window Period. Risk of getting blood within Window period of different diseases are 1 in 493000 in case of HIV; 1 in 103000 in case of hepatitis C virus and 1 in 63000 in case of hepatitis B virus.6 India lies in an intermediate zone of HBV endemcity with prevalence of 2% to 8% in general population and 1% to 2% in blood Donors.7,8 There are about 50 million hepatitis B virus carriers and that makes India the second largest pool of chronic hepatitis B virus carrier in the world.7

Seroprevalence of hepatitis C virus in blood donors in India is 0.12% to 2.5% and in general population it is less than 2%.9,10 HCV prevalence is 3% in the world with 170 million people at risk.11 Global seroprevalence of HCV in blood donors is 0.4% to 19.2%. The human immunodeficiency virus (HIV) is a retrovirus, an enveloped RNA virus, which is transmitted through parenteral and sexual route. It is found in blood and other body fluids. Target cell of HIV is lymphocyte where it replicates. The RNA of HIV integrates into the host cell DNA. HIV virus is classified into different groups and subtypes (Clades) that have significant antigenic differences; HIV-1 and HIV-2 are the two major distinct virus types and there is significant cross-reactivity between them. HIV-1 is endemic in many parts of the world including India. HIV-1 group M is responsible for most of the infections worldwide. The prevalence of HIV-2 is mainly restricted to West African region and India. Additionally, a few infections with HIV group O and group N have been observed in Africa.12 Seroprevalence of HIV in adult population is 0.26% in 2015 with 2.39 million people living with HIV or AIDS.13 There is about 1% chance of getting HIV during blood transfusion. Seroprevalence of malaria and syphilis in blood donors are variable in different geographical area.

Transfusion transmitted infection not only cause morbidity, mortality in recipient but also it is a threat to his/her family and community as most of the TTI except malaria are sexually transmitted diseases. Estimation of TTI in blood donors is indirect indicator of disease burden in community as blood donors are asymptomatic individuals from community. Considering paucity of data about TTI in blood donors in Western Odisha we have conducted research to find out seroprevalence of different TTI in blood donors attending blood bank of a tertiary care hospital of Western Odisha.

METHODS

This prospective observational study was conducted in the blood bank of Hitech Medical College, Rourkela, in collaboration with Microbiology Department over a period of 8 years from Jan 2012 to Dec 2019 among replacement and voluntary blood donors. 2 ml of blood was collected from all blood donors and serum was separated.

Inclusion Criteria
1. Healthy men and non-pregnant non lactating women.
2. Age 18 to 60 years,
3. Weight at least 45 kg,
4. Haemoglobin levels at least 12.5 g/dL (females) and 13.5 g/dL (males)
5. No history of hepatitis B, hepatitis C, HIV, syphilis and malaria in patient.
6. No history of STD in sexual partners.

Exclusion Criteria
1. Professional donor.
2. Current history of taking any antibiotic, antiviral or anti-malarial or antiretroviral therapy.
3. History of major surgery.
4. Blood transfusion within 1 years.
5. Radiotherapy or Chemotherapy (recent or past).

Investigations
1. Anti-HIV 1 & 2 antibody ELISA (ERBA Lisa HIV Gen. 3)
2. HBsAg by ELISA (ERBA Lisa SEN HBsAg )
3. HCV Antibody ELISA (ERBA Lisa HCV Gen 3)
4. Syphilis RPR card test (Transasia).

Malaria card test (SD bio line) and positive samples were confirmed by peripheral smear method (Giemsa stain). All reactive samples for HIV, HBsAg, HCV were sent to PCR lab for confirmation. Syphilis was confirmed by TPHA test and malaria was confirmed by Peripheral smear study. All seropositive blood donors were sent to appropriate departments for treatment and they were rejected for blood donation.

Data Analysis
Data analysis was done by SPSS software version 21.

RESULTS

12241 samples were processed over 8 years period. Voluntary and Replacement blood donor's distribution was showed in Fig 1. Male and female distribution in different types of donors was showed in Fig 2. Prevalence of different TTI over 8 years was showed in Fig 3. Trends of different TTI over 8 years with annual prevalence was showed in Fig 4. Positivity of Different TTI according to age group was showed in Table 1.
DISCUSSION

Every blood transfusion poses risk for transmissible disease; thereby it is important to check every unit of blood before transfusion. Most common TTI in India are HBV, HCV, HIV, Syphilis and malaria. Chagas disease, HTLV and Cytomegalovirus can be transmitted through blood, but these are not common in India. We had excluded donors below 18 years and above 60 years and most of the donors were male, still our study reflected the disease burden in community of Western Odisha.

In our study most of the samples were from replacement donors (97.3%) only 2.7% were from voluntary donors. Voluntary blood donation (%) in our study was very much smaller than study done by Bhaumik et al (91.8%), Bhawani et al (41.64%), Fernandes H et al (61.2%), Kaur et al (45%). This area needed more no of blood donation campaign to increase voluntary blood donation. In our study 98.12% were male donors and 1.87% were female donors. This finding was comparable with study done by Qureshi et al (2.2% female), Gopi et al (2.84% female), Biswal et al (0.92% female) Ray et al (0.22% female) but not consistent with the study done by Karmakar et al (15% female) and Panda et al (8.3% female). However, in voluntary blood donation female participation was more (26%) compared to replacement blood donation (1.80%). This finding was consistent with the study done by Biswal et al. In our study most of the donors were in age group of 21-30 (43%) followed by age group of 31-40 (34%) like another study by Gopi et al, Qureshi et al, Panda et al, Ray et al, Karmakar et al. Seroprevalence of TTI in our study was 0.96% which was higher than Agarwal et al (0.87%) but lower than Ray et al (3.22%), Karmakar et al (2.73%), Gopi et al (1.34%), Leena et al (1.35%), Amrutha et al (2.81%), Kotwal et al (3.02%) and Kumar et al (4.57%).

HBV seroprevalence was highest in our study compared to another TTI and it was consistent with most of the study worldwide. hepatitis B virus (HBV) is a member of the hepadnavirus group and is an enveloped DNA virus. HBV is transmitted through parenteral route and may be found in blood and other body fluids like semen and vaginal fluid. From the blood stream the virus travels to the liver as site of replication. HBV is endemic globally and hyper-endemic in many parts of the world. While HBV is present in the bloodstream, the levels of the virus itself are variable. In recently infected individuals, viral DNA is normally present, although not always at high levels. Chronically infected individuals may either be infectious (DNA present) or non-infectious (viral DNA absent) and viremia would generally be expected to be very low or absent entirely.

HBV seroprevalence was 0.62% in our study which was almost similar to study done by Singh et al (0.62%), Gupta et al (0.66%) and Leena MS et al (0.71%). It was higher than Biswal et al (0.394%), Qureshi et al (0.48%), Gopi et al (0.998%), Shrestha et al (0.12%) but lower than study done by Amrutha Kumar (1.77%), Kumar R et al (3.03%), Panda et al (1.13%), Srikrishna et al (1.86%), Sastry et al (1.23%), Bhattacharya et al (1.66%), Bhaumik et al (1.2%), Karmakar et al (2.41%), Garg et al (3.44%), Fahuja et al (2.23%), Chandra et al (1.96%), Arora et al (1.7%), Buseri.
Fl et al. (8.1%), Terenpuntaq B et al. (8.1%), Ray et al. (1.36%), Giril et al. (1.09%).

Hepatitis C virus (HCV) is a member of the flavivirus group and is an enveloped RNA virus. It is transmitted through parenteral route and may be found in blood and other body fluids like vaginal fluid or semen. From the bloodstream, the virus travels to the liver where it replicates in hepatocytes, resulting in a similar picture to that seen with HBV infection. In our study hepatitis C prevalence was 0.044% which was lower than study done by Leena et al. (0.14%), Amrutha et al. (0.13%), Kumar et al. (1.5%), Panda et al. (1.98%), Sririkshina et al. (0.102%), Sastry et al. (0.41%), Gopi et al. (0.081%), Pallavi et al. (0.23%), Gupta et al. (0.109%), Pahuja et al. (0.66%), Chandra T et al. (0.85%), Arora et al. (1%), Bhattacharya et al. (0.31%), Karmakar et al. (0.59%), Shrestha et al. (0.64%), Buseri Fletal (3.6%), Terenpuntaq B et al. (8.7%).

In our study HIV prevalence was 0.073% which was almost similar to Giril et al. (0.07%) and Gupta et al. (0.084%). But it was lower than study done by Leena MS et al. (0.27%), Ray et al. (0.56%), Kumar et al. (0.26%), Panda et al. (0.35%), Sririkshina et al. (0.44%), Sastry et al. (0.28%), Gopi et al. (0.16%), Pallavi et al. (0.44%), Pahuja et al. (0.56%), Chandra T et al. (0.23%), Arora et al. (0.3%), Bhattacharya et al. (0.28%), Karmakar et al. (0.6%), Biswal et al. (0.12%), Shrestha et al. (0.12%), Buseri Fletal (3.1%) and Amrutha Kumar (0.63%). In our study Syphils prevalence was 0.01% which was similar to Leena MS et al. (0.129%). It was lower than Fernades H et al. (2%), Kumar et al. (1.74%), Sririkshina et al. (1.6%), Gupta et al. (0.85%), Arora et al. (0.9%), Bhattacharya et al. (0.72%), Karmakar et al. (0.23%), Biswal et al. (0.706%), Buseri Fletal (1.1%), Amrutha Kumar (0.28%). It was higher than Sastry et al. (0.008%), Gopi et al. (0.024%) and Chandra T et al. (0.01%). In our study malaria prevalence was 0.12% which was higher than Kumar et al. (0.006%), Sastry et al. (0.0%), Fernades H et al. (0.01%) but it was lower than Leena MS et al. (0.129%), Biswal et al. (0.113%), Buseri et al. (30.2%), Ali et al. (16.5%).

About trend analysis gradual fall of annual prevalence was noted in case of hepatitis B but not in another TTI like Hepatitis C and HIV. This gradual decrease in prevalence of HBV was also showed by Bhaumik et al., Ray et al. and Karmakar et al. Gopi et al. had reported no significant changes of prevalence of HBV over years. Qureshi et al had reported decrease of both HBV and HCV prevalence over years. Karmakar et al. had showed by Hepatitis C and HIV. This gradual decrease in prevalen

Prevalence of TTI in our study (0.96%) was lower compared to other studies of India. It might be due to good health status of blood donors as compared to general population, better lifestyle and effective impact of government program (like NACO for HIV). HBV was the most prevalent TTI in our study. So, there is need for initiating efforts for health programmes for HBV in addition to boosting universal immunization programs with HBV which was started in 2007 with more focus on youth population who are not vaccinated yet. Also, there is a need for organizing more number of blood donation camps to increase voluntary blood donation and female participation in blood donation should be encouraged.

REFERENCES


