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Original Research Article

Seroprevalence and Trends of Major Blood Transfusion Transmissible Infections among the Blood Donor at a Tertiary Care Teaching Hospital

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Abstract

Introduction: Blood is an essential therapeutic need, as there is no genuine substitution. Blood transfusion saves many lives in cases of emergency, and is of more concern to transfuse safe blood to avoid further complications mainly transfusion-transmissible infections transfusion-transmissible infections (TTI's). In existence of World Health Organization (WHO) approved national hemovigilance protocols in different regions, blood transfusion carries a high risk for both patients and healthcare workers. ***Materials and Methods:*** This is a retrospective study was carried at Tertiary Care Teaching hospital on consecutive blood donors' records covering the period between September 2019 and August 2020. This blood bank is the center where an effective blood banking system is catering for all the blood needs of patients in the hospitals of this region. Blood samples were collected aseptically by venipuncture from the donors. The samples were analyzed for blood group, HIV-1 & 2, HBV, HCV, VDRL and Malaria following standard procedures. ***Result:*** In this study, of the 983 samples, 964 were males and 19 females, which correspond to 98.1% of male and the rest female. The maximum number of patients were in the age group of 18-30 years which were 69.8% (n =687) of total followed by age group 31–50 years having 30.0% (n = 30) in this group and 0.10% were 51-70 years. In this study, the most of donors had 'O' Blood Group 48.7% (n =479) and least were AB Blood Group 6.5% (n = 64) in this study. The seroprevalence of HIV positive cases were 0.81%, HBV positive cases were 0.91%, HCV positive cases were 0.30%, VDRL positive cases were 0.71% and Malarial Parasite 2.3%. ***Conclusion:*** The low prevalence of HIV, HBV, HCV, VDRL and Malaria observed in present study may be due to awareness of donors, strict donor selection criteria and affective screening of the donors.

Keywords: DV Dengue Virus, DF Dengue Fever, DHF Dengue Haemorrhagic Fever, IgM Immunoglobulin M.

INTRODUCTION

Blood transfusion is an important therapeutic intervention that has a critical role in patient management [1]. Nonetheless, availability of safe blood products is still a significant public health concern in India. This phenomenon is driven by a range of overarching factors, including endemicity of infections associated with anemia, high prevalence of sickle cell anemia, blood loss linked to accidents, surgical and/or obstetrical emergencies and malnutrition, among others [2]. Despite the existence of World Health Organization (WHO) approved national hemovigilance protocols in most countries in the region, blood transfusion continues to carry a certain margin of risk for both patients and healthcare workers [3]. Hypersensitivity reactions and direct or residual risk associated with a spectrum of transfusion-transmissible infections (TTI), including Human Immunodeficiency virus (HIV), Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Syphilis-causing *Treponema palladium* (*T. pallidum*), are the major concerns. [4]

According to some studies, acquiring TTIs in the region has been attributed to several challenges, including poor quality test kits and/or unreliable supply of test kits, sub-optimal quality assurance (QA) systems in many centers, shortages of trained laboratory staff, inability to detect recently infected subjects, absence of physical or chemical treatment of blood products [5]. The preponderance of replacement donors (RD) - family members or friends of the patient; as opposed to voluntary non-remunerated blood donors (VNRBD) and the high prevalence of blood-borne infections in the general population in the region has also been linked to the observed TTI associated risk [6].

Globally, 36.7 million people were living with HIV at the end of 2016. An estimated 0.8% of adults

aged 15–45 years worldwide are living with HIV, although the burden of the epidemic continues to vary considerably between countries and regions. Sub-Saharan Africa remains the most severely affected with nearly 1 in every 25 adults (4.2%) living with HIV and accounting for nearly two-third of people living with HIV worldwide [7].

The 2015 global prevalence of HBV infection in general population as reported by World Health Organization [8] was 3.5% accounting for about 257 million persons. Prevalence was highest in Western Pacific (6.2%) and Africa (6.1%). Eastern Mediterranean region, South East Asia region, European region, and Regions of Americas had 3.3, 2.0, 1.6 and 0.7% prevalence, respectively [9]. More so, the Polaris Observatory Collaborators in a survey using 128 countries reported mean global HBV prevalence of 4.9% with China, India, Nigeria, Indonesia, and the Philippines accounting for more than 57% of all the HBsAg positive cases [10].

The 2015 global prevalence of HCV as reported by WHO estimated that 71 million persons were living with HCV infection in the world accounting for 1% of the population. Of these, the highest prevalence was recorded in the Eastern Mediterranean region (2.3%) and European region (1.5%). African region, Regions of Americas, Western Pacific region and South-East Asia region had 1.0, 0.7, 0.7 and 0.5% prevalence, respectively [11].

The global incidence of syphilis was 25.1 case per 100,000 adult population among the 55 countries that reported in the GARPR (Global Aids Response Progress Reports) in 2014 [12]. Each year, there are about 5.6 million people living with syphilis [13].

Assessment of data on the prevalence of transfusion transmissible infections among blood donors permits evaluation of the occurrence of infections in the blood donor population and consequently, the safety of the collected donations. It also gives an idea of the epidemiology of the transfusion-transmissible infections in the study community.

MATERIALS AND METHODS

This is a retrospective study was carried at Tertiary Care Teaching hospital on consecutive blood donors' records covering the period between September 2019 and August 2020. This blood bank is the center where an effective blood banking system is catering for all the blood needs of patients in the hospitals of this region. Blood samples were collected aseptically by venipuncture from the donors. The samples were analyzed for blood group, HIV-1 & 2, HBV, HCV, VDRL and Malaria following standard procedures.

Laboratory Diagnosis for HIV-1 and 2: Each donor's serum sample was screened for HIV-1 and HIV-2. The detection of HIV-1 and HIV-2 in the blood was done by Tri-dot method.

Laboratory Diagnosis for HBsAg and HCV Antibodies: Sera were checked for the presence of hepatitis B surface antigen (HBsAg) using ELISA. This is a fairly reliable test having more than 99.9% sensitivity and specificity. Similarly, IgG antibodies to HCV were detected using an ELISA technique according to the manufacturer's instructions.

Laboratory Diagnosis for VDRL: Serum for all donors was tested for the presence of antibodies using rapid plasma regain test (RPR).

Laboratory Diagnosis for malaria: Whole blood sample tested for malaria antigen using rapid visual card method.

RESULTS:

A total of 983 patients who fulfilled the selection criteria during the study were enrolled. The data were analysed, and the final observations were tabulated as below.

Table 1: Distribution of Gender blood donors

Sex	Donor	Percentage
Male	**964**	**98.1**
Female	**19**	**1.9**
Total	**983**	**100**

In table 1, of the 983 samples, 964 were males and 19 females, which correspond to 98.1% of male and the rest female in table 1.

Table 2: Distribution of the number of blood donors according to age group

Age group	Donor	Percentage
18-30 years	**687**	**69.8**
31-50 years	**295**	**30.0**
51-70 years	**1**	**0.10**
Total	**983**	**100**

In this study, the maximum number of donors were in the age group of 18-30 years which were 69.8% (n =687) of total followed by age group 31–50 years having 30.0% (n = 30) in this group and 0.10% were 51-70 years in table 2.

Table 3: Distribution of the Blood Group of blood donors

Blood Group	Donor	Percentage
A	234	23.8
B	206	20.9
AB	64	6.5
O	479	48.7
Total	983	100

In this study, the most of donors had 'O' Blood Group 48.7% (n =479) and least were AB Blood Group 6.5% (n = 64) in this study in table 3.

Table 4: Distribution of the Rh Type of blood donors

Rh Type	Donor	Percentage
Positive	879	89.4
Negative	104	10.6
Total	983	100

Table 5: Trends of seroprevalence of HIV, HBV, HCV, VDRL and Malaria among blood donors at blood bank

Screened	Donor	Percentage
HIV Positive	8	0.81
HBV Positive	9	0.91
HCV Positive	3	0.30
VDRL Positive	7	0.71
Malaria Parasite	23	2.3
Total	983	100

The seroprevalence of HIV positive cases were 0.81%, HBV positive cases were 0.91%, HCV positive cases were 0.30%, VDRL positive cases were 0.71% and Malarial Parasite 2.3% in table 5.

DISCUSSION

Blood is an essential therapeutic need, as there is no genuine substitution. Blood transfusion saves many lives in cases of emergency, and is of more concern to transfuse safe blood to avoid further complications mainly TTI's. [14] In existence of WHO approved national hemovigilance protocols in different regions, blood transfusion carries a high risk for both patients and healthcare workers. [15] Its important to understand the magnitude of a disease transmission in the community for its control and prevention, thus the assessment and study of TTI's prevalence is crucial. Therefore, evaluation and monitoring trends of TTI's in donor groups remain a valuable indicator for evaluating effectiveness of donor selection and screening procedures.

It is a well-known fact that HIV, HBV and HCV are global infectious pathogens contributing to mortality and morbidity in all ages. [16] In this study, a total of the 983, seroprevalence of HIV positive cases were 0.81%, HBV positive cases were 0.91%, HCV positive cases were 0.30%, VDRL positive cases were 0.71% and Malarial Parasite 2.3% in table 5.

The diseases studied are fairly age-specific and behavior-dependent. People of ages 20-40 years have been found to be more sexually and economically the most active group and HIV is at high prevalence in those groups. [17] In our study, HIV prevalence has been found highest in the age group of 26-35 compared to the age group of 35-46 which contradicts earlier reports. [18] This variation in prevalence between two groups may be attributed to the variation in duration and opportunity for risk exposure, the continuous sharing of sharps and use of unsterilized materials such as barbing clippers. The fact that these subjects are proposing donors does not exclude them from being potential sources or carriers of transfusion transmissible infections (TTI's), especially HIV. In this study, the prevalence of HIV was 0.13% which is in line with the earlier reports. [19] However, it is less than the report according to Lavanya V 7.54%. [20] This variation may be due to the small sample size they used.

The seroprevalence of HBV 53 (1.0%) in our study is lower than the previous reports of 10.4% by Nada HA. [21] and 6.2% by Lavanya V [20]; but it is higher than the earlier report in Singh R with 9.7%. [22] Our finding is in agreement with the report of 5.2% by Quadri SA. [23] Most countries in Africa, including Ethiopia, have high endemicity for hepatitis B. This clearly explains the reason behind the high seroprevalence obtained in our study.

The prevalence of hepatitis C (0.01%) identified in this study is less than the reports by Saghir SA et al. [24] with the age group 20-29 more infected and the reports of 5.71% by Nada HA et al. [21] However, according to Lavanya V it is slightly similar with the prevalence of antibody to HCV in healthy adult Indian blood donors of 3.4%. [20] Nevertheless, the prevalence of HIV, HBV and HCV could be higher in commercial sex workers, their clients and intravenous

drug users, since they are involved in high risk behaviors.

However, the prevalence of VDRL (0.05%) in this study is less than that of the above reports; but in agreement with the earlier reports by Bhawani YR. [25] Prevalence of active VDRL infection according to Nada HA was 12.8% [21] According to Lavanya V et al 7.9%. [20] A study conducted to assess the prevalence of infection with HIV, VDRL and HBV among Indian blood donors in 2002 showed that the seroprevalences of HIV-1, HBV, HCV and VDRL were 16.7%, 12.8%, 7.8% and 14.4%, respectively. [26] A major limitation of our study is the fact that our sample size was small. A study done on 98 subjects alone cannot provide overall prevalence of HIV, HBsAg, HCV and VDRL status in the country as a whole.

In this study, significantly declining trends of HIV, HBV, HCV and VDRL seroprevalences were observed among blood donors over the study period. This finding is consistent with the observed declining trends of HIV, HCV and VDRL in the report by Kaur P. and with the observed declining trends of HIV seroprevalence in the general population of India, as well as the declining trends of HIV and VDRL infection among pregnant women in India. [27] The subsequent declining in HIV seroprevalence may be due to the effect of the prevention programs that have been instituted in recent years. [28]

CONCLUSION

The low prevalence of HIV, HBV, HCV, VDRL and Malaria observed in present study may be due to awareness of donors, strict donor selection criteria and affective screening of the donors. Further investigations are needed to assess the distribution and determinants of these infections in the community to support the development of effective prevention and control strategies and to protect the community from potential risks.

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