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SEROPREVALENCE OF TRANSFUSION TRANSMISSIBLE INFECTIONS AMONG BLOOD DONORS IN A TERTIARY CARE HOSPITAL IN SOUTH INDIA: A CROSS-SECTIONAL STUDY

Transfusion Medicine

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ABSTRACT

Introduction: Blood transfusions save millions of lives every year. In certain critical conditions, blood transfusion is the only lifesaving procedure. However, this procedure is not risk-free and may involve transmitting infections. Human immunodeficiency virus (HIV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), Syphilis, and Malaria are a few pathogens that account for transfusion transmissible infections (TTI). This study determined the prevalence of TTIs among blood donors from rural areas of coastal Karnataka, India. **Materials and Methods:** A hospital-based cross-sectional study was conducted from January 2020 to January 2021 at Yenepoya Medical College Hospital Blood Centre, Mangalore. The blood units were screened for HIV, HBV, HCV, Syphilis, and Malaria. Chemiluminescence immune assay (CLIA) to test HIV, HBV, and HCV, Venereal Disease Research Laboratory (VDRL) test for Syphilis, and rapid card test to detect Malaria parasites (MP). **Results:** Out of 3042 donors studied, 41 were affected, with a serological prevalence of 1.35% for TTI. HCV (0.42%) was the most prevalent, followed by HBV (0.31%), HIV (0.31%), VDRL (0.20%), and MP (0.07%). All the TTI-affected donors were males (100%). **Conclusion:** The study emphasizes the importance of screening blood donors for TTI to ensure safe blood transfusion. Also, increasing people's awareness about blood-borne illnesses and their spread can lower the incidence of these infections.

KEYWORDS

Transfusion transmissible infection, Blood transfusion, Prevalence

INTRODUCTION

Blood transfusion is a lifesaving therapeutic intervention that saves millions of lives each year worldwide. However, access to safe blood and blood products remains a significant challenge globally, especially in developing countries. The high risk of contracting transfusion transmissible infections (TTIs) poses a serious challenge to healthcare providers. The diseases transmitted by blood transfusion are Human immunodeficiency virus (HIV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), Syphilis, Malaria, and CMV. In the last two decades, appropriate donor selection and blood screening have reduced the transmission of these TTIs [1]. Every unit of blood has a 1% chance of TTIs. [2]

Screening for TTIs in every donated blood unit has been made mandatory by the government of India. Every unit must be screened for HIV, HBV, HCV, Malaria, and Syphilis. Despite strict donor screening, the difficulties of the 'window period,' false-negative results, frequency of asymptomatic carriers, genetic variability in viral strains, and technical errors remain the areas of concern [3]. Although the accuracy of serological tests has increased significantly in recent years, there is still a risk of TTIs. The serological window, or the time between infection and when a serological test can accurately detect a disease, is mainly responsible for this residual risk. Despite the efforts to improve donor screening and testing in India, there is a high burden of TTIs. Also, regional disparities highlight that there is a need for continuous vigilance. Monitoring TTIs can provide insights into the epidemiology of these infections and help develop public health strategies [4]. The present study determined the Prevalence of TTIs among blood donors at our blood centre.

MATERIALS AND METHODS

A hospital-based cross-sectional study was conducted over 12 months from January 2020 to January 2021 at Yenepoya Medical College Hospital Blood Centre, Mangalore, Karnataka, India. Ethical approval was obtained from the Institutional Ethics Committee (Reference Letter No: YEC2/268). We reviewed the data collected from all donors during the study period and analyzed the Prevalence of TTIs. Serum samples were screened for HBV surface antigen, antibodies to HCV, and HIV 1 and 2 using CLIA, screening for Syphilis by VDRL and Malaria by rapid card test. Blood centre records were scanned and the data gathered were recorded in a Microsoft Excel spreadsheet. Data was analysed using Statistical Package for the Social Sciences (SPSS) version 20.0.

RESULTS

Among 3,042 healthy blood donors studied during the one year, 2983 (98%) were males, and 65(2%) were females. All were voluntary blood donors. The majority of the donors were in the age group of 21-30 years (52.6%), and the least was in the age group >50 years (1.97%) with a Mean ± SD age of 28.5 ± 7.35 years. Around 2513 donors (82.6%) have a history of previous donations, while 535 donors (17.4%) were first-time donors. The total number of seropositive cases (n) was 41 (1.35%). A high male preponderance was observed among the infected donors, accounting for 100%. The highest Prevalence of TTI was observed in the 21-30 age group, accounting for 48.7% of the cases. The seropositivity for various TTIs was found to be 0.46% for HCV, 0.31% for HBV, 0.31% for HIV, 0.20% for Syphilis, and 0.07% for MP [Figure 1]. A maximum number of Seropositive donors (HCV, HBV, HIV, VDRL) belonged to the third decade, while MP-positive donors were in the second decade [Table 1].

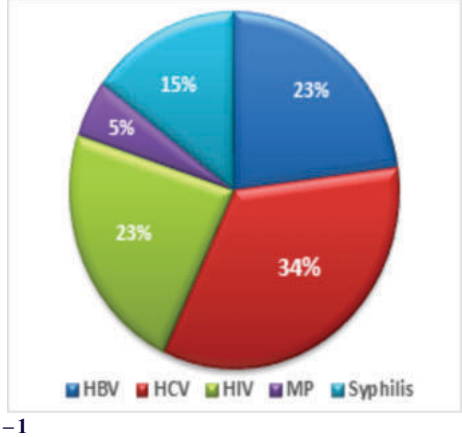

Figure – 1

Table – 1

Type of infection	<20 years	21-30 years	31-40 years	41-50 years	Total
HIV	01	03	04	01	10
HBV	-	06	03	-	09
HCV	02	08	03	01	14
Syphilis	01	03	02	-	06
Malaria	02	-	-	-	02
Total	06	20	12	02	41

DISCUSSION

The clinical demand for blood has increased recently, owing to healthcare improvements. The ineffective implementation of blood screening policies in several countries is why blood safety remains a concern.[5] Although Blood transfusion is a lifesaving procedure, it also bears the risk of TTIs like HBV, HCV, HIV, Syphilis, and, less commonly, Malaria.[2] The WHO recommends voluntary non-remunerated blood donation because this type of donation is thought to have a lower risk of harbouring TTIs.[1]. The assessment of data on the prevalence of TTIs among blood donors allows for the precise estimation of TTI risk, which aids in designing long-term policies to promote public health and prevent disease spread in the community.[6]

Due to economic constraints, developing countries like India face more threats due to TTI than developed countries. Viral infections like HBV, HIV, and HCV are the leading cause of morbidity and mortality in blood recipients. The prevalence of TTI varies from state to state, depending on the population from which blood units are collected. The seroprevalence of TTIs found in this study was 1.35%. This was similar to studies done by Leena MS et al. (2012) -1.35% [7] and Biswas DA et al. (2019) -1.32% [2]. A similar study conducted by Barla M et al. (2018) at Mangalore showed a lesser prevalence of TTI - 0.42% than ours [8]. In this study, we found that the highest number of blood donors had seropositivity for Hepatitis C (0.42%), followed by Hepatitis B (0.31%), HIV (0.31%), Syphilis (0.20%), and Malaria (0.07%).

Most of the donors in this study were males, constituting 98% of the total donor population. This finding is similar to other studies by Deshmukh S et al. 98 % [4] and Niazi SK et al. 98.5 % [9]. The preponderance of males over females may be because Indian females are mostly anemic and medically unfit for blood donation. We had many deferrals of female donors vowing to low hemoglobin. This study observed the highest percentage of total TTI in the age group 21-30 years (48.7%). The percentage of total TTI declined with advancing age groups. The pinnacle of rates of TTI in adulthood is related to the acquisition of infection in sexually active age groups and may include a population with high-risk behavioural activities. On analysing the individual TTIs, it was observed that HCV (57%), HBV (66%), and Syphilis (50%) were more prevalent in the 21-30 years age group, HIV (40%) in the 31-40 years age group and Malaria (100%) in the < 20 years age group. The difference in the Prevalence of transfusion-transmitted diseases among different age groups was statistically insignificant (p=0.1691). The findings were discordant in contrast to the study done in Maharashtra, in which they observed the Prevalence of HBV in <20 years (100%), HCV in the 31-40 years age group (43.9%), syphilis in the 41-50 years age group (16.7%) and HIV in 21-30 years age group (6.3%). [10]

The global seroprevalence of HCV among blood donors varies from 0.4 to 19.2%, and the estimated risk for HCV transmission is 0.10 to 2.33 per million units transfused [11]. HCV seroprevalence was 0.42% in our study, consistent with studies done by Shrivastava M et al. (2023) and Rahman S et al. (2016). Both had an HCV prevalence of 0.42% [12][13]. WHO estimates that approximately 2 billion people have serological evidence of past or present HBV infection. More than 350 million are chronic carriers of HBV. The HBV prevalence rate is 2-8 %, with an approximate carrier pool of 40 million. [14]. The seroprevalence of Hepatitis B was 0.31% in this study, consistent with a study done by Dowerah S et al. (2017) - 0.39% [15]. The adult (15-49 years) HIV prevalence in India was estimated as 0.20% (0.17-0.25%) in 2023, with 0.22% of males being HIV positive. Karnataka had an estimated adult HIV prevalence of 0.42%, with a range of 0.36% - 0.48% [16]. The HIV Prevalence in our study was 0.31%, which was more than the national Prevalence but lesser than the HIV prevalence in Karnataka [16]. A study done by Anitha A et al. (2023) showed a prevalence of 0.31%, which is in concordance with our research [17].

The seropositivity of Syphilis at the NACO-supported blood Centres for the year 2020-21 was 0.25% [18]. However, it showed that Sero-positivity for Syphilis appears to have a rising trend. The seroprevalence of Syphilis was 0.20% in this study, which is similar to studies done by Patel SK et al. (2024) - 0.20% and Singh et al. (2022) - 0.17% [19] [3]. The Prevalence of Malaria in blood donors in India varies between 0.02% and 0.07% [20]. The seroprevalence of Malaria was 0.07% in our study; similar findings were observed in studies done by Arshad A et al. (0.07%) [21] and Anitha M et al. (0.04%) [17]. Malaria, while rare in transfusions, poses a risk in endemic regions, especially when blood donors come from areas with high malaria transmission rates. Though the present study showed a low prevalence of Malaria, it is a high-risk condition as Mangalore is endemic to Malaria. Thus, screening for malarial parasites is essential. In the present study, co-infection prevalence was very low (0.03%). One case of HCV with Syphilis was present. This is in contrast to the study by Nagalo MB et al. (2011), where HCV-Syphilis co-infection prevalence was 0.32% [22].

Limitation(s) Of The Study

Our study's donor pool was mainly male, so the prevalence cannot be generalized to the female population.

CONCLUSION

The Prevalence of TTIs among blood donors in the current study suggests that these infections continue to pose serious risks, necessitating vigilant screening. The Prevalence of TTIs can fluctuate depending on geographic, social, and environmental factors. HCV is the most seroprevalent TTI in our study, followed by HBV and HIV. Most donors were male youths below the age of 35. The above findings highlighted the need for periodic surveillance and more effective public health initiatives to reduce the spread of TTIs through Blood transfusion. Implementing appropriate screening procedures and advocation voluntary blood donation is essential for ensuring safe blood practices.

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