Original Research Article

An Observational Study on Seroprevalence of Toxoplasmosis among Voluntary Blood Donors

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Received: 29-11-2021 / Revised: 26-12-2021 / Accepted: 01-01-2022

Abstract

Introduction: Like bacterial and viral diseases, many parasitic diseases are also known to be more risk of transmitting by blood transfusion. Of great concern, toxoplasmosis also contributes to similar risk like other infectious diseases in different geographical regions. **Materials and Methods:** A cross sectional study was performed by screening the presence of antibodies against T. gondii in all blood donors received in a tertiary care teaching hospital and also obtained from medical camps. All blood samples from blood donors were routinely screened for HIV, hepatitis B virus surface antigen (HBsAg), hepatitis C virus (HCV) and syphilis. A total of 150 blood samples from healthy blood donors were collected from January 2021 to June 2021.The volunteer donors were healthy adults, screened routinely by physical examination with no history of infections in the recent past, according to the guidelines of Drugs and Cosmetics Rules, Government of India. This work was approved by the Institutional Ethics committee. Written informed consent was obtained from all participants before blood sampling. All the serum samples were tested for IgG and IgM anti-T. Gondii antibodies separately using commercially available enzyme linked immunosorbent assay (ELISA) kit and the results were interpreted by following the instructions of the manufacturer. Data were calculated with respect to donor variables and entered in SPSS and cross tabulated for descriptive and analytic statistics. The discrete variables were expressed as percentages and a p value of<0.05 was considered significant. **Results:** Out of the 150 donors, 36 were seropositive to IgG antibody to T. gondii, making a prevalence rate of 24%. Among the 36 sero-positive samples, 18 are O positive, 11 are B, 6 are A and 1 sample supported AB positive blood groups. None of the samples showed Rh negative in this study. Serological screening of co-infections was not done in this study. **Conclusion:** Consequently, because of the high seropositivity of T. gondii, the health authorities should be alerted and preventive measures should be taken.

Key Words: Toxoplasmosis, Voluntary Blood Donors

Introduction

Like bacterial and viral diseases, many parasitic diseases are also known to be more risk of transmitting by blood transfusion. Of great concern, toxoplasmosis also contributes to similar risk like other infectious diseases in different geographical regions[1]. Toxoplasma gondii infection in blood donors could represent a risk for transmission in the patient show received blood in various medical emergencies. The epidemiology of T. gondii infection in blood donors in Tiruchirapalli is scarce[2]. The highest frequency in antibody titres of T. gondii might be due to differences in climatic conditions, culinary habits and exposure to the sources of infection[3]. Of great relevance to the society is the danger of transmission of T. gondii infection by transfusion of blood from asymptomatic, apparently healthy individuals exposed to the infection[4]. With the availability of facilities for bone marrow, renal and hepatic transplantation, cardiac surgery with extracorporeal circulation and neurosurgical procedures for resection of vascular tumours and aneurysms, multiple units of blood from different donors are used regularly[1,5].

Transfusion transmitted T. gondii can result in significant clinical consequences in immunocompromised and multiply transfused patients, pregnant women etc, where the reflection of IgM specific antibodies leads to the risk of transfusion transmission[6]. Every unit of blood transfusion there is a 1% chance of transfusion related complications, including transfusion transmitted infections[7].

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An increase in transfusion related infection has been reported in India. India is already carrying a burden of 50 million of HBV carriers and 2,027 million HIV cases. Keeping in mind the grave consequences of these infections and to restrain the transmission to a minimum, it is very important to remain vigilant about the possible spread of these diseases through blood transfusion[8]. T. gondii is usually transmitted to humans, orally (by ingesting food or water, contaminated with oocytes from infected cat feces or tissue cysts in meat). However, blood or leukocyte infusion, organ transplantation and transmitted via the placenta are other possible routes of infection[9]. The infection can result in severe consequences, including encephalitis, chorioretinitis and myocarditis in immunocompromised individuals, like transplant recipients and HIV-positive patients[10]. It has been demonstrated that Toxoplasma infection can be transmitted through blood transfusion. Since T. gondii organism may stay alive in citrated blood, at 5°C, for up to 50 days and the buffy coat, it is likely that toxoplasmosis could be acquired via blood or leukocyte transfusions, especially if parasitized leukocytes are transfused in a high concentration[1]. Multiple blood units from different donors are regularly administered to children with thalassemia, sickle cell anemia and aplastic anemia who need regular, frequent and multiple transfusions for survival[11,12].

Many studies have shown a high prevalence of T. gondii antibodies in healthy volunteer blood donors, while pre-transfusion T. gondii screening has not been considered yet[2,12]. No studies have been conducted on the epidemiology of T. gondii infection in these region blood donors. Healthy seropositive blood donors, especially those who are in the acute phase of the infection, may have a major role in this scenario[5,13]. The rate of Toxoplasma infection in healthy blood donors varies in different areas of the world and this mainly depends on the rate of infection in the community. Screening for Toxoplasma

in blood and blood product is not mandatory in India. This poses a great risk to the recipients of blood and blood products, especially large columns at multiple sittings[14,15].

Materials and Methods

A cross sectional study was performed by screening the presence of antibodies against T. gondii in all blood donors received in a tertiary care teaching hospital and also obtained from medical camps. All blood samples from blood donors were routinely screened for HIV, hepatitis B virus surface antigen (HBsAg), hepatitis C virus (HCV) and syphilis.

Inclusion criteria

Voluntary blood donors, individual's age of 18 and above, agreed to participate, and tested negative for HIV, HCV, HBsAg and syphilis.

Exclusion criteria were

History of febrile or debilitating illness, weight loss, jaundice, hepatic or cardiovascular or pulmonary derangement, malignancy, epilepsy, bleeding diathesis, past blood transfusion, recent blood donation, consumption of prohibited drugs, surgical intervention, age under 18 or over 60 years, pregnancy or lactation[16]. This work was approved by the Institutional Ethics committee. Written informed consent was obtained from all participants before blood sampling.

A total of 150 blood samples from healthy blood donors were collected from January 2021 to June 2021.The volunteer donors were healthy adults, screened routinely by physical examination with no history of infections in the recent past, according to the guidelines of Drugs and Cosmetics Rules, Government of India (Sundar et al., 2007). Sera were separated and stored at -20oC until further testing. All the serum samples were tested for IgG and IgM anti-T. Gondii antibodies separately using commercially available enzyme linked immunosorbent assay (ELISA) kit and the results were interpreted by following the instructions of the manufacturer.

The demographic details including age, sex, habitats, dietary habits (vegetarian/non vegetarian) were recorded and the seroprevalence of IgG and IgM anti-T. gondii. Data were calculated with respect to donor variables and entered in SPSS and cross tabulated for descriptive and analytic statistics. The discrete variables were expressed as percentages and a p value of<0.05 was considered significant.

Results

Out of the 150 donors, 36 were seropositive to IgG antibody to T. gondii, making a prevalence rate of 24%. The titres ranged from 29 to 302 IU/ml.The mean age of the donars was 42.1 with a SD of 15.7 and a male preponderance. The age and gender wise distribution of cases with their serology has been given in table 1. Among the 36 seropositive donors, 26 were from urban area. Among the 36 donors positive for T. gondii IgG, 7 were vegetarians and others were non vegetarians. The comparativeness of serologically positive toxoplasmosis with blood groups was also documented in this study. Among the 36 sero-positive samples, 18 are O positive, 11 are B, 6 are A and 1 sample supported AB positive blood groups. None of the samples showed Rh negative in this study. Serological screening of co-infections was not done in this study.

Table 1: Age and gender wise distribution of cases and their serology

	Total participants	Positive serology to toxoplasmosis
Age group		
Up to 18 years	8	5
18-30 years	26	8
31-40 years	48	10
41-50 years	52	12
51-60 years	4	1
More than 60 years	2	0
Gender		
Male	103	28
Female	47	8

Discussion

The seroprevalence of toxoplasmosis in this study was 24%. The seroprevalence of toxoplasmosis varies widely among different regions of the globe[1]. The geographical distribution of toxoplasma IgG seroprevalence in general population in India also varies from state to state, including New Delhi (57%)[17]; Chandigarh (4.66%)[18]; Jodhpur (17.2%)[19]; Mumbai (30.9%)[14] and Bangalore (20.3%)[1]. The variations found among various regions could be related to socio-cultural habits, geographic factors, environmental factors, general hygiene in the society, transmission mode and diagnostic methods employed[12]. It is also observed that seroprevalence rates in females are low, though this may not be a true reflection of the situation in society, as female blood donors are less frequent in the blood donation camps. The prevalence in females in the society examined with 180 pregnant women in the first four months of pregnancy showed 45% for Toxoplasma IgG seropositive and among them only 3.3% were positive for IgM with low avidity antibodies indicating recent infection[15]. In this study of including healthy blood donors, the comparativeness of Toxoplama seropositivity cannot be done due to absence of previous studies. This could be explained that the prevalence of toxoplasmosis in this study subjects is subject to understand the need of proper guidelines and management in preventing the impending incidence of toxoplasmosis in the future years. It is also suggested to take considering that once healthy persons turn to be immunocompromized, Toxoplasmosis is definitely not an easy task to deal with, particularly in the clinical presentations which is mimicking with other diseases of central nervous system. The age distribution in this present study showed the highest prevalence among the age group of 21-40 which also presented in other studies [12] but declined in the prevalence when the individual's age increased. This age group is more vulnerable in the life style to acquire Toxoplasma infections rather than other age groups. Further studies required to include a larger sample size for the clarification of appropriate interpretation of the data.

Conclusion

Toxoplasmosis is the most life threatening opportunistic parasitic disease and a major health problem worldwide exclusively in immunocompromised. This study was emphasized on the overall of toxoplasmosis as well as its characteristics which will be seen more frequently in this study area. Consequently, because of the high seropositivity of T. gondii, the health authorities should be alerted and preventive measures should be taken.

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Conflict of Interest: Nil Source of support: Nil