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Seroprevalence of IgG Antibodies of Toxoplasma in Healthy Voluntary Blood Donors in a Tertiary Care Hospital

Sundararajan Thangavel[1], Gomathi Manian[2]* and Neelaveni Duraisamy[3]

Department of Microbiology, Government Mohan Kumaramangalam, Medical College, Salem, Tamil Nadu, India

**Corresponding author*

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A B S T R A C T

Many parasitic diseases can be transmitted by blood transfusion. Among the protozoal diseases transmitted by blood transfusion in India, the most important is malaria followed by toxoplasmosis. Screening for malaria is mandatory in India. Seroprevalence rates in the general population in India vary from a low of 1% to a high of 57 %. Aim of the study is to estimate the prevalence of *Toxoplasma gondii* IgG antibodies in healthy voluntary blood donors in a tertiary care hospital in and around Salem. This Cross-sectional study was conducted in the Department of Microbiology over a period of 3 months (March-May 18). Healthy voluntary blood donors from blood donation camps conducted at different centres in and around Salem, TamilNadu. The samples which were collected from healthy donors screened for Toxoplasma specific IgG antibodies by ELISA using commercially available kits (Merilisa, Meril Diagnostics). In the total of 180 samples which were tested for Toxoplasma IgG antibodies, the total number of serum positive samples were 40 (22.2%) by ELISA. which is more common in the age group 31-40yrs. 12 (27.3%) followed by 21-30 yrs 14 (23.3%)). In the present study, most of the participants were living in Uran areas (75%), blood group A&O (30%) followed by B (25%) and most of them were non-vegetarians (75%). Toxoplasma is one of the most important congenitally transmitted infection. To ensure availability of toxoplasma seronegative blood for transfusion, a national policy of screening of blood and blood products for toxoplasma may need to be included along with other mandatory screening tests.

Introduction

Many parasitic diseases can be transmitted by blood transfusion. Among the protozoal diseases transmitted by blood transfusion in India, the most important is malaria followed by toxoplasmosis. Screening for malaria is mandatory in India. Although toxoplasmosis occurs worldwide, seropositivity levels vary widely among different regions of the globe (from a low of 4.1% in Thailand [(1)] to 75% in Brazil [(2)]). Seroprevalence rates in the general population in India vary from a low of 1%[(6)] to a high of 57 %[(7)]. *Toxoplasma gondii* completes its life cycle in 2hosts.Cats and other felines are the definitive host. Man and

other mammals are the intermediate hosts in which *T.gondiii* has 2 types of life cycles:- Enteric cycle and Exoenteric cycle. *Toxoplasma gondii* is an obligate intracellular protozoal parasite, causes toxoplasmosis. *Toxoplasma gondii*, which can multiply in any nucleated cell of human body. The infection can remain dormant for many years and by activation to cause clinical symptoms. Transmission of infection occurs by more than one route. Food borne transmission (consuming undercooked contaminated meat), animal to human transmission (ingesting oocyst shed in the faeces of infected cats) and vertical transmission from mother to fetus through the placenta during delivery. *T.gondii*i can also be transmitted via blood transfusion or organ transplantation from infected donors.

The danger of transmission of *T.gondii*i infection to recipients is more by transfusing blood from asymptomatic, apparently healthy donors. Screening for toxoplasma in blood and blood product is not mandatory in India. This could pose a great risk to the recipients of blood and blood products. Studying blood donor population is a valuable approach to determine epidemiological characteristics in adults of a community and might provide findings that could be found in the general adult populations of the same community. The overall seropositive of *T.gondii* antigen by IgG ELISA was 13.14% in and around Tirunelveli district in Tamil Nadu[(15)]. The toxoplasma seroprevalence rate of 20.3% was seen in healthy voluntary blood donors from Karnataka[(11)].This study is aimed to assess the seroprevalence of *T.gondiii* infection in the blood collected from healthy voluntary donors from Urban areas of Tamil Nadu.

To estimate the prevalence of *Toxoplasma gondii* IgG antibodies in healthy voluntary blood donors in a tertiary care hospital in and around Salem.

Materials and Methods

This Cross-sectional study was conducted in the Department of Microbiology over a period of 3 months (March-May 18). A total of 180 samples were collected in and around Salem. Healthy voluntary blood donors from blood donation camps conducted at different centres in and around Salem, Tamil Nadu. The donors are healthy adults, screened routinely by physical examination with no history of infections in the recent past. Inclusion criteria included were: The healthy adult donors (>18 yrs) without any history of recent infections. Serum samples for healthy blood donors were taken. Exclusion criteria include: The donor samples which were hepatitis and HIV serum positive were excluded from the study.

The donors were healthy adults screened routinely by physical examination with no history of infection in the recent past. The samples which were collected from healthy donors screened for Toxoplasma specific IgG antibodies by ELISA using commercially available kits (Merilisa, Meril Diagnostics).

MERIL TOXO IgG ELISA is based on indirect ELISA reactios. The wells were precoated with *T.gondiii* antigen, once the sample was added, anti-Toxo (IgG) if present, binds to pre-coated antigens.

After incubation and wash procedures, Enzyme conjugate was added and the anti-human IgG inside binds to anti-Toxo (IgG) attached to the solid phase in the previous step. After another incubation and wash procedures, add Substrate A and Substrate B to initiate a chromogenic reaction. Once the colour development was completed, the stop solution was added and then the absorbance of each sample was read. The colour intensity is directly proportional to anti-Toxo (IgG) concentration.

Samples with cutoff value >0.18 were considered as positive and others as negative. The results were interpreted as positive or negative as per manufacturer's instruction. The demographic details noted were age, sex, domicile, dietary habits and blood group. The discrete variables were expressed as percentage.

Results and Discussion

In the total of 180 samples which were tested for Toxoplasma IgG antibodies, the total number of serum positive samples were 40 (22.2%) by ELISA. which is more common in the age group 31-40yrs. 12 (27.3%) followed by 21-30 yrs 14 (23.3%), up to 20 yrs 12(20%) and 41-50yrs 2(16.7%).

In the present study, a total of 180 blood donors were included, out of which 40 were found to be positive for toxoplasma IgG antibodies. Most of the participants were, aged 31-40yrs (27.3%), living in Uran areas (75%), blood group A&O (30%) followed by B (25%) and most of them were non-vegetarians (75%). In our study, the toxoplasma seroprevalence rate in healthy voluntary donors from the Salem district was 22.2%.Sreoprevalence rates in the general population in India vary from a low of 1%[(6)] to a high of 57 %[(7)]. Study done at Thirunelveli district was 13.4%.[(15)] Sundar *et al.*, from Karnataka reported the seroprevalence rate of IgG 20.3% [(11)] which is similar to the present study. In this present study, the seroprevalence rate in urban area was 75% and in rural 25%. In contrast, the seroprevalence rate reported from urban and rural areas from Chandigarh was 4.7%[(8)] and hospital based study from Jodhpur in Rajasthan was 17.2%[(9)] which was low when compared to the present study.[(8)] Meisheri *et al.*, from Mumbai reported much higher seroprevalence (30.9%) in general population.[(10)] These variations could be related to socio-cultural habits, geographic and environmental factors, the state of general hygiene in the society and the routes of transmission. The risk factors associated with anti *T.gondiii* antibodies were age, gender, residence, dietary habits and blood group (Table 1–3).[(15)]

Table.1 Overall percentage of Toxoplasma IgG antibodies (n=180)

Number		Percentage
Positive	40	22.2
Negative	140	77.8
Total	180	100

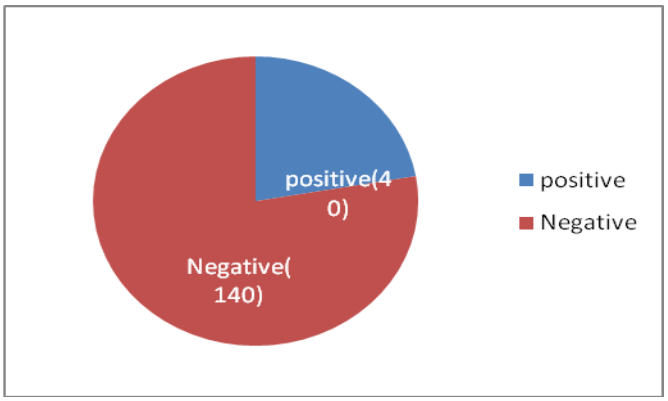

Table.2 Toxoplasma seroprevalence in different age groups (n=180)

Age group	Total	Positive		Negative	
years	Number	Number	Percentage(%)	Number	Percentage(%)
upto 20	60	12	20	48	80
21-30	60	14	23.3	46	76.7
31-40	44	12	27.3	32	72.7
41-50	12	2	16.7	10	83.3
51-60	4	-	-	4	100
Total	180	40	22.2	140	77.8

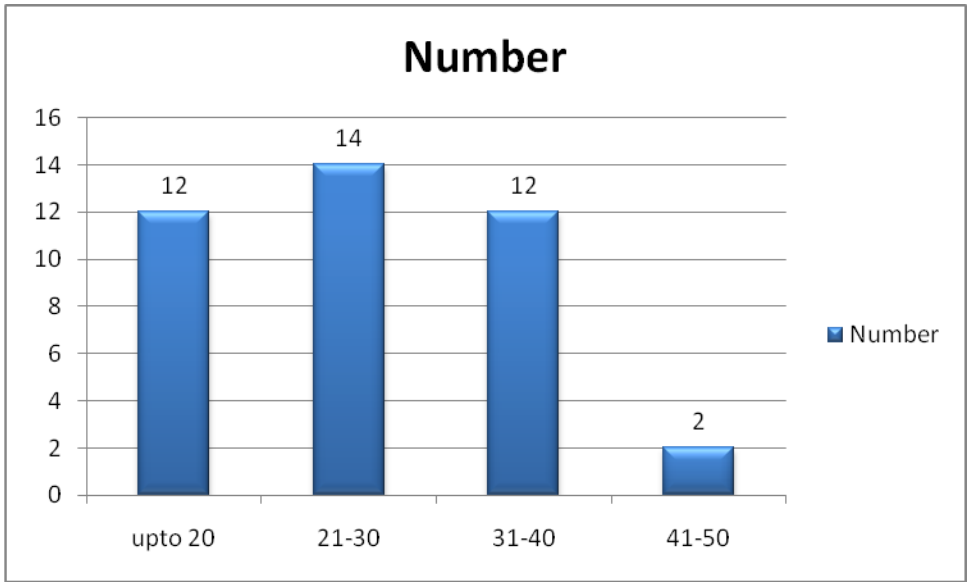

Table.3 Risk factors associated with *T.gondiii* IgG positive donors (n=40)

Variables	Total number	Percentage(%)
Age group		
Upto 20	12	20
21-30	14	23.3
31-40	12	27.3
41-50	2	16.7
Residential place		
Urban	30	75
Rural	10	25
Dietary habits		
Vegetarian	10	25
Non-vegetarian	30	75
Blood group		
A	12	30
B	10	25
AB	6	15
O	12	30

The present study observed none of the female voluntary blood donors reported in the blood bank. A seroprevalence study in antenatal and postnatal clinics can offer better idea of the prevalence in females in the society.

In conclusion, toxoplasma is one of the most important congenitally transmitted infection. Toxoplasma prevalence studies are required throughout the country for the general population and pregnant woman to take preventive measures.

To ensure availability of toxoplasma seronegative blood for transfusion, a national policy of screening of blood and blood products for toxoplasma may need to be included along with other mandatory screening tests.

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