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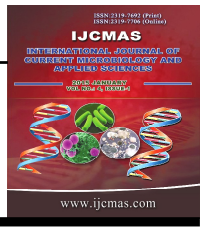

Original Research Article

Prevalence of Toxoplasma gondii infection in blood donors

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Keywords

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A B S T R A C T

Toxoplasmosis caused by the protozoan Toxoplasma *gondii*, is a major health concern in which almost one- third of people are born with anti Toxoplasma antibodies worldwide. The present study aimed to determine prevalence and factors associated with *T. gondii* infection in blood donors. Through a cross-sectional study, 186 blood donors were randomly recruited in the capital city of Tehran, Iran in 2010. Serum samples were collected and tested for IgG and IgM antibodies against *T. gondii* using ELISA method. Overall, 186 volunteers including 136 males and 50 females were recruited. The mean age was 36 and 31 years for men and women respectively. In general, 47% (n=87) and 0.05 % (n=1) of blood donors were positive for anti *T. gondii* Ig G and Ig M antibodies respectively. There was a significant association between *T.gondii* seropositivity and education level (p=0.006), job (p=0.002) and increasing age (p=0.001), but not for either blood groups or gender. The probability of *T.gondii* IgM contamination should seriously be considered for blood donors and in those who might use immune-suppressive drugs in particular. Testing blood donors for Toxoplasma *gondii* is suggested to be done routinely in blood transfusion centers.

Introduction

Toxoplasma gondii is an intracellular protozoan parasite that infects nucleus cells of mamelian. Infection in human is usually asymptomatic and auto limitation in hosts with healthy immune compromised. Toxoplasmosis in people with immune incompetent would be a major opportunistic infections (H Mak, 2004, Auhwewo, 2009).

Parasites are transmitted to humans through semen and by consumption of contaminated vegetables and foods containing placenta and livestock infection milk. Patients with immune deficiency diseases, blood transfusion and organ transplantation are also at risk (en.wikipedia 2009, Gnttg M , 2008, M H-RNA, 1993, Noorbakhsh Mamishi S, 2004, NSMDMSAM, 2005).

Risk of being infected with Toxoplasma *gondii* Tackyzoites in asymptomatic donors while blood transfusion is considerable. Thalassemic patients and those with aplastic anemia, sickle cell anemia, are also most at risk for Toxoplasma infection (.Spmajrsds SK,2007) The probability of blood infection with Tackyzoites will be increased significantly in case of receiving fresh blood infected by Toxoplasma due to immunodeficiency disorders(Literak S,1998).

A Cuban study has found significant association between *T.gondii* seropositivity and blood groups (R LRF,1993). The present study aimed to determine prevalence of Toxoplasmosis among blood donors and to investigate associated risk factors.

Materials and Methods

This was a cross sectional study carried out at the Blood Transfusion Organization (BTO) in Tehran-Iran in 2010. Overall, 186 participants including 50 females and 136 males were recruited.

Blood samples were taken according to the routine policy of BTO. They were kept in 70^0 C until the examination time. A validated questioner contains questions about gender, blood type, age, occupation and education was completed by each donor.

The ELISA test was taken for all samples. The Kits provided by the Pishtaz Teb Co. Tehran-Iran was used for IgG and IgM measurements in which samples more than 1.1 units per ml was considered positive and samples less than 0.9 U/ml as negative. Meanwhile samples between 1.1 and 0.9 were considered suspicious.

The statistical univariate analysis was performed using SPSS software and p values less than or equal to 0.05 were considered statistically significant.

Result and Discussion

Overall, 186 samples including 136 males and 50 females were recruited. The mean age was 36 and 31years for men and women respectively. In general, 47% (n=87) and 0.05 % (n=1) of blood donors were positive for anti *T. gondii* Ig G and Ig M antibodies respectively. There was a significant association between *T.gondii* seropositivity and education level (p=0.006), job (p=0.002) and increasing age (p=0.001). No significant differences were observed between either blood groups (p=0.816), or gender (p=0.774) in terms of *T. gondii* infection.

Among 186 patients referred to the Blood Transfusion Center, 87 subjects (47%) including 58 males and 29 females were IgG positive. Meanwhile, only one male (0.5 %) was IgM positive. There was a significant association between *T.gondii* sero-positivity and education level (p=0.006), (Table 1), and job status (p=0.002), (Table 2).

In sero-positive individuals, the proportion of A, B, AB and O blood groups were 31% (n=27), 23% (n=20), 10% (n=9) and 36% (n=31) respectively. The corresponding rates among sero-negative blood groups were 27 %(n=27), 20 % (n=20), 10 %(n=10) and 43 % (n=42) respectively. No significant differences were observed between blood groups (p=0.816), in terms of T. gondii infection (Table 3).

The main blood transfusion centre in Tehran capital was selected as the study setting to improve representativeness. Overall, 47.0% and 0.5 % of IgG and IgM were sero-positive respectively. The corresponding rates were 20.3% for IgG and 3.6% for IgM sero-positivity in Karnataka,

India(Spmajrsds SK,2007). Meanwhile, 59.6% sero-positivity for IgG in Egypt (Ehamanrmedr D2009), 74% in Mexico(Alvarado-Esquivel C FM-Sm2007), 52.1% for IgG and 4.1% for IgM in Saudi Arabia(Spmajrsds SK,2007) and 51.6% in Brazil (Celho RA،Kobayashi M CL,2003) have already been reported. Although, only one IgM positive was found in the present study, it is a very dangerous sign for immuno-suppressed susceptible blood donors. Toxoplasmosis in natural hosts is a common infection and in the most instances has no any symptoms and may be fatal in acute infection (GHorbani M ،Keshavarz H,2008).

There was a significant association between *T.gondii* sero-positivity and education level, job status and increasing age in the present study. Similar reports have already been reported in Eslamshahr(Keshavarz H PN, Eskandari S,2003) and Khoramabad cities in central and western Iran(Athari. D.v.2005)

There is no certain reason for why job and education level might be related to sero-positivity. Probably improper handling of raw meat by housewives (not washing cutting boards/knives, lack of hand washing) might be the case. Jobs involving contact with soil may also increase the risk. Meanwhile well educated persons do not perform manual labor & may be more careful about hand hygiene. This could justify the association between education levels and sero-positivity.

In the present study, a significant relationship was found between age and IgG sero-positivity. However, this association has not been confirmed by other studies(Fallah E NR, Majidi J, Kushavar H, Mahdipourzareh N,2005)

No significant relationship was observed between ABO blood groups with positivity of IgG anti Toxoplasma in the present study. However,a recent study in Cuba upon 1063 blood donors showed a significant relationship between AB blood group and positivity of IgG anti Toxoplasma(Noorbakhsh Mamishi S ، Rimaz S MM,2004). Even tough, this finding is controversial yet(Rodrigues ACF US, Vono MB, Pandossio T, Spegiorin LCJF,2011, Loo V.G lrg,1984).

Table.1 Toxoplasmosis infection by education levels in blood donors

Education levels	Toxoplasmosis infection, n (%)		**Total**
	Yes	No	
Illiterate*	34 (18.3)	26 (14.0)	60 (32.3)
High school	33 (17.7)	30 (16.1)	63 (33.9)
Undergraduate	18 (9.7)	36 (19.4)	54 (29.1)
Postgraduate	2 (1.1)	7 (3.8)	9 (4.8)
Total	87 (46.8)	99 (53.2)	186 (100.0)

*P=0.006(literate vs illiterate, ANOVA)

Table.2 Toxoplasmosis infection by job status in blood donors

Job status	Toxoplasmosis infection, n (%)		**Total**
	Yes	No	
House wife*	23 (12.4)	9 (4.8)	32 (17.2)
Official Employment	23 (4.12)	34 (18.3)	57 (30.6)
Business/ Free jobs	36 (19.4)	38 (20.4)	74 (39.8)
Student	5 (7.2)	18 (9.7)	23 (4.12)
Total	87 (46.8)	99 (53.2)	186 (100.0)

*P=0.002(house wife vs employed, ANOVA)

Table.3 Toxoplasmosis infection by ABO blood groups

Blood groups	Toxoplasmosis infection, n (%)		**Total**
	Yes	No	
A	27 (31.0)	27 (27.0)	54 (30.0)
B	20 (23.0)	20 (20.0)	40 (21.0)
AB	9 (10.0)	10 (10.0)	19 (10.0)
O	31(36.0)	42 (43.0)	73 (39.0)
Total	87(46.8)	99(53.2)	186(100.0)

There are some limitations with the present study. First of all, it was better to take samples from all blood transfusions in Tehran not the central one. Secondly, blood donors are usually healthier and better educated than the general population. Thirdly, men were also over-represented in the blood donors.

As conclusions, the probability of *T.gondii* IgM contamination should seriously be considered for blood donors and in those who might use immune-suppressive drugs in particular. Testing blood donors for Toxoplasma *gondii* is suggested to be done routinely in blood transfusion centers.

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