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Seroprevalence of Toxoplasma Gondii in Pregnant Women with Bad Obstetric History

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ABSTRACT

The present work aimed to evaluate the seroprevalence of *Toxoplasma gondii* and their associated risk factors among the pregnant women. This study was carried out in 52 pregnant women attending a tertiary care hospital in and around Tirunelveli, Tamil Nadu. Anti-toxoplasma specific IgG and IgM were assessed using Enzyme-linked Immunosorbent assay (ELISA) test kits. Of these 52 samples, anti-toxoplasma specific immunoglobulin G antibodies were detected in 12 (23%) cases while 2 (3.8%) had positive anti-Toxoplasma specific immunoglobulin M suggestive of acute infection during or just before pregnancy. The higher infection rate of 25% was found with pregnant women living in urban area (11 subjects) than in rural area (1 subject). Abortion (57.14%) was the commonest form of pregnancy wastage, followed by Abortion and congenital defects (21.42%), stillbirths (14.28%) and premature deliveries (7.14 %). Considering the subclinical pattern of infection, routine serological test is recommended for all pregnant women for both IgG and IgM antibodies.

Keywords : *Toxoplasma gondii*, Seroprevalence, Pregnancy, Anti-Toxoplasma Immunoglobulin G (IgG), Immunoglobulin M (IgM).

Introduction

Infections with *Toxoplasma gondii* in humans are usually asymptomatic or in the form of mild febrile illness. *Toxoplasma gondii* infection during pregnancy is a causative factor for foetal loss and congenital infection of the newborn.^[1] In India, only a few studies in hospital based patients have shown prevalence of toxoplasmosis to be between 1.5 and 21%. Reports of prevalence of this parasitic infection among pregnant women from southern parts of TamilNadu are scanty. Screening for *Toxoplasma* in pregnant women is not mandatory in India. Hence the present study was therefore carried out to determine the seroprevalence of *T. gondii* in pregnant women attending antenatal clinic in a tertiary care hospital in and around Tirunelveli, Tamil Nadu, India.

Materials and Methods

Study population

This prospective study was conducted at Tirunelveli Medical College Hospital, Tirunelveli, Tamil Nadu over a 6 months period (April' 2012 to September' 2012). The study was approved by the Institutional Scientific and Ethical Committee and written informed consents were obtained from the patients. The study group comprised antenatal women of

Reproductive age with previous BOH, including unfavourable foetal outcome in terms of abortions, intrauterine foetal death, stillbirths, preterm deliveries, unexplained early neonatal death, and congenital anomalies.

Sample collection

For serological analysis, 2 ml of venous blood was collected in a sterile container with strict aseptic precautions from

each study subject. The serum was separated and stored in numbered aliquots at -20°C till assayed. Using a pretested questionnaire, data on sociodemographic characteristics and associated risk factors were collected from all study participants.

Serological assays

All the serum samples collected from the study group were tested for *Toxoplasma* IgM and IgG antibodies by commercially available (ELISA) kits (AB Diagnostics, New Delhi)) according to the manufacturers' instructions. Positive and negative controls were used with each series of anti *T. gondii* IgG/IgM test. The results of ELISA were read by a Microwell reader and compared in a parallel manner with controls; optical density was read at 450 nm on an ELISA reader.

Results

A total of 52 peripheral blood samples for this study were collected from pregnant women at Department of Obstetrics and Gynaecology, Tirunelveli Medical College Hospital and they were enrolled and screened for the presence of anti-Toxoplasma IgM and IgG antibodies. The seroprevalence of *T. gondii* IgG and IgM antibodies are given in **Table 1**. The results revealed that 12 (23%) out of 52 pregnant women were positive for anti-Toxoplasma specific IgG and 2 (3.8%) for IgM.

All positive study subjects were in the 20 to 40 years age group (**Table 2**).

A structured questionnaire interview for pregnant women was performed to investigate the risk factors associated with the *T.*

gondii infection. One member from the two anti-Toxoplasma IgM pregnant women reside in rural areas and only one were from urban zone. Similarly, from 12 positive anti-Toxoplasma IgG subjects, the higher infection rate of 25% (for anti-Toxoplasma IgG antibodies) was found with pregnant women living in urban area (11 subjects) than in rural area (1 subject).

A higher seroprevalence was observed in first and second trimesters for both anti Toxoplasma IgG (10 subjects) and IgM antibodies (2 Subjects) as compared to third trimester. The seropositivity of *Toxoplasma* in relation to the number of times the antenatal woman experienced BOH revealed that the highest percentages (31.81%) of positivity was noted among women with a history of two BOH, followed by 27.78% positivity among women with three or more BOH, and the lowest (16.67%) among women having one BOH (Table 3).

The seropositive cases were distributed in relation to the type of BOH (Table 4). It revealed that Abortion (57.14%) was the commonest form of pregnancy wastage, followed by Abortion and congenital defects (21.42%), stillbirths (14.28%) and premature deliveries (7.14 %). The seropositivity played an important role in determining the foetal outcome.

Discussion

Toxoplasmosis is a zoonotic disease with worldwide distribution. Most *Toxoplasma*-associated infections among people occur by ingesting tissue cysts from infected meat or oocysts from soil or by congenital transmission through the placenta. The seropositivity levels vary widely in different regions of the globe. The rates of prevalence change according to the nutritional factors, sociocultural habits, geographic factors, climate, and transmission route and typically rise with age.^[2] Interpretation of *Toxoplasma* serology was done according to Burrow and Duffy^[3]; when a positive IgM test result indicates acute/early infection, IgG titres should be retested in several weeks. A positive IgG titre is sufficient to establish that a patient has been infected with *T. gondii*. Recent infection is indicated by a positive test result for both IgG and IgM, and remote infection is usually indicated by a negative IgM with the positive IgG test result.

The prevalence of this infection reported in different studies in India shows a wide variation, and one pilot study on women in Kumaon region in 1991 reported the prevalence of 77%, the highest reported so far in India.^[4] A recent pilot study in the same region in 2005 reported 55% for *Toxoplasma* IgG antibodies and 20% for IgM antibodies.^[5] Singh *et al.* found an overall anti-*Toxoplasma* IgG seroprevalence of 45% among pregnant women in New Delhi (13). IgG, 2.32% for IgM, and 6.97% for both IgG and IgM.^[6]

In the present study, the seropositivity of IgG, indicating remote infection, was 23%, and it was 3.8% IgM, indicating recent infection. Sandhu *et al.* detected 8% IgG seropositivity among antenatal women without BOH, and none of them was positive for IgM.^[7] Borkakoty *et al.* also observed the IgG seroprevalence of 36.8% among pregnant women without history of pregnancy wastage; in addition, the IgM seroprevalence was 5.9% among the same group.^[8]

In the present study, the percentage of seropositivity was also assessed in relation to the number of BOH clearly shows that there was relationship between increase in the number of pregnancy wastages and seropositivity. This is in contrary to Borkakoty *et al.*^[9] According to their study, the increase in the number of pregnancy wastages had no significant association with infection due to *T. gondii*.^[9]

Among the seropositive cases, Abortion (57.14%) was the commonest form of pregnancy wastage, followed by Abortion and congenital defects (21.42%), stillbirths (14.28%) and premature deliveries (7.14 %). The seropositivity played an important role in determining the foetal outcome. Surpam *et al.* observed abortions in 27.27%, intrauterine growth restriction in 9.37%, intrauterine foetal death in 17.64%, and

preterm labour in 18.18% of cases.^[9] Kandle *et al.* reported similar results in their study; 42(50%) abortion cases were positive for anti-*Toxoplasma* antibodies.^[10] The result also partially matched with the observations of Bachhiwal *et al.* who reported that abortion was the commonest (85.45%) form of pregnancy wastage, followed by congenital anomalies, stillbirths, and premature deliveries.^[11]

Conclusion

The present study is directed at providing the profile of the seroprevalence of toxoplasmosis among antenatal women with BOH among the study subjects from Tirunelveli, Tamil Nadu, India. The findings revealed that the seropositivity of toxoplasmosis was significantly higher in abortion cases. It is a well documented risk factor for BOH and may play a vital role in determining the foetal outcome. Routine serological testing is to be advised to all pregnant women with or without BOH, attending the antenatal clinics for both *Toxoplasma*-specific IgG and IgM antibodies. For women with negative results in both the tests, information and education relating to preventive measures are of paramount importance because they are at a high risk of acquiring a primary infection during pregnancy. As the majority of acquired infections are subclinical, there is a need for regular screening of all pregnant women for this infection. The initiation of judicious treatment in time can, thus, be provided to prevent morbidity and mortality of infants born to such mothers.

Table -1 Prevalence of Toxo- IgG and Prevalence of Toxo- IgM

Result	Prevalence of Toxo- IgG		Prevalence of Toxo- IgM	
	No.	%	No.	%
Positive	2	3.85%	12	23.07%
Negative	50	96.15%	40	76.93%
Total	52	100%	52	100%

Table-2 Prevalence of Toxo- IgG and Prevalence of Toxo- IgM in different age groups

Age	Total	Prevalence of Toxo- IgG		Prevalence of Toxo- IgM	
		No.	%	No.	%
20-25	22	7	31.81%	1	4.54%
26-30	18	3	16.67%	0	0%
31-35	6	1	16.67%	1	16.7%
>35	6	1	16.67%	0	0%

Table-3 Seropositivity in relation to number of bad obstetric outcomes

No. of times with bad obstetric outcomes	No. of sera tested	Seropositive		Seronegative	
		No.	%	No.	%
1	12	2	16.67%	10	83.33%
2	22	7	31.81%	15	68.19%
3	18	5	27.78%	13	72.22%

Table-4 Seropositivity in relation to type of bad obstetric outcomes

Type of BOH	Seropositive	%
Abortion	8	57.14%
IUD/stillbirth	2	14.28%
Premature delivery	1	7.14%
Abortion and congenital defects	3	21.42%

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