ISSN 2321 – 7359 EISSN 2321 – 7367

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Medical Science

Seroprevalence of toxoplasmosis in pregnant women with bad obstetric history in a tertiary care hospital, Kanchipuram - a pilot study

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Received 7 October; accepted 18 November; published online 30 November 2017

ABSTACT

Introduction: Toxoplasmosis can cause significant morbidity and mortality in the developing fetus if the pregnant mother gets acute infection during pregnancy. Early diagnosis of toxoplasmosis is essential to start appropriate treatment on time to reduce the transplacental transmission to fetus. In India the seroprevalence for toxoplasmosis varies between 5% and 46.7%. This study was aimed to record the seroprevalence of toxoplasmosis in women with bad obstetric history (BOH) in our tertiary care hospital, Kanchipuram. **Materials & Methods:** A total of 84 pregnant women with bad obstetric history and 50 pregnant women without any bad obstetric history as control, attending to a tertiary care hospital were included in the study. All the serum samples were tested for the presence of specific toxoplasma IgM and IgG antibodies using ELISA BASED COMMERCIAL KIT from Ratio Diagnostics. **Results & Analysis:** Total seropositivity in pregnant women with BOH was 17 (20.23%) and 4 (8 %) among control group. More number of seropositivity was observed among women between 26-30 years (41.17%). Abortion was the commonest form (76.47%) of BOH, followed by preterm deliveries (17.67%). Various risk factors such as people living in rural area (70.6%), non-vegetarians (64.7%), outdoor farming and gardening (70.6%) and lower socioeconomic status (76.5%) had greater association of risk of getting toxoplasmosis than urban population, vegetarians, other occupation and higher socioeconomic status people. **Conclusion:** This study revealed that the seroprevalence of toxoplasmosis was significantly high in the study population than in control group. To estimate the real magnitude of the problem, investigative measures should be taken to undertake multicentric study as well as compulsory screening for the antenatal risk group.

Key Words: *Toxoplasma gondii,* BOH, Seroprevalence, ELISA.

Abbreviations Used: *Toxoplasma gondii* - *T.gondii;* Bad Obstetric History- BOH; Enzyme-Linked Immunosorbent Assay- ELISA

1. INTRODUCTION

Toxoplasmosis is caused by *Toxoplasma gondii* (*T.gondii*) which is an obligate intracellular protozoa, can cause significant morbidity and mortality in the developing fetus if the pregnant mother gets acute infection during pregnancy (Garcia, 2007). Infection is mainly acquired by ingestion of food and water or soil contaminated with oocysts shed by infected cats or by eating undercooked meat containing oocysts of *T.gondii* (Dubey et al. 2005). Infection is usually asymptomatic and subclinical in immunocompetents but, in immunocompromised individuals it is dangerous and life threatening. Infection in pregnant women manifests as spontaneous abortion, still birth, intrauterine growth retardation, preterm deliveries and fetal abnormalities like hydrocephalus with mental retardation, ocular damage and fetal death which is apparent only in 3rd trimester or after birth (Zargar et al. 1998 and Montoya et al. 2004). Therefore early diagnosis of toxoplasmosis is essential to start appropriate treatment on time to reduce the transplacental transmission (Munmun et al. 2012). The diagnosis of acute and latent toxoplasmosis during pregnancy are usually made by serological tests for specific IgM and IgG respectively (Razzak et al. 2005). Seropositivity levels vary widely in different regions of the globe from 5% to 80%. High prevalence rate of 74.5% in South Brazil and 70.9% in Cuba were observed in studies conducted by Spalding et al. (2005) and Gonozolez-Morales et al. (1995). Low prevalence rates of 0.8% were observed in Korea (Song et al. 2005) and 11.2% in Vietnam (Buchy et al. 2003). In India the seroprevalence for toxoplasmosis varies between 5% and 46.7% in various studies (Dhumne et al. 2007, Akoijam et al. 2002, & Yasodhara et al. 2001). But in Tamilnadu, there are only limited study reports available that have estimated the prevalence of toxoplasmosis during pregnancy.

2. SCOPE OF THE STUDY

With this background, this pilot study was aimed to record the seroprevalence of toxoplasmosis in women with bad obstetric history (BOH) in our tertiary care hospital, Kanchipuram. Therefore, strategies for early recognition of maternal infection and the institution of appropriate treatment could be started; which in turn has a great impact in preventing the fetal mortality and morbidity associated with congenital toxoplasmosis.

2.1. Materials

This cross sectional study was conducted in Meenakshi Medical College & Research Institute, Kanchipuram. 84 pregnant women with bad obstetric history and 50 pregnant women without any bad obstetric history as control were included in the study. The study period was from March 2012 to February 2013. Detailed history about the age, contact with cat, and

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Table 1
Total number of seropositives (IgM and IgG) among cases and controls

Type of antibody	No. of positives in patients with BOH (cases) (n=84)	Percentage (%)	No. of positives in control group (n=50)	Percentage (%)
IgM	6	7.14%	-	0%
IgG	11	13.09%	4	8%
Total	17	20.23%	4	8 %

Table 2
Shows age distribution of seropositive cases

Age in years	No. & % of positive cases for IgM (n=6)	No. & % of positive cases for IgG (n=11)	Total positivity n=17 (IgM & IgG)
<20	1 (16.66%)	1 (9.09%)	2 (11.76%)
21-25	2 (33.33%)	4 (36.36%)	6 (35.29%)
26-30	2 (33.33%)	5 (45.45%)	7 (41.17%)
31-35	1 (16.66%)	-	1 (5.88%)
36-40	-	1 (9.09%)	1 (5.88%)
>40	-	-	0

Table 3
Distribution of seropositive cases in relation to type of BOH

Type of BOH	No. & % of positive cases for IgM (n=6)	No. & % of positive cases for IgG (n=11)	Total Seropositivity N=17
Abortion	4 (75%)	9 (81.82%)	13 (76.47%)
Still birth	0	1 (9.09 %)	1 (5.88%)
Pre-term delivery	2 (25%)	1 (9.09 %)	3 (17.67%)
Congenital anomalies	0	0	0

Table 4
Distribution of seropositive cases in relation to risk factors involved with spread of toxoplasmosis

Socio-economic factors	Variables	Total cases (n=84)	No. & % of positive cases for IgM (n=6)	No. & % of positive cases for IgG (n=11)	Total Seropositivity N=17
Residence	Rural	58	5 (8.62%)	7 (12.06%)	12 (70.6%)
	Urban	26	1 (3.85 %)	4 (15.38%)	5 (29.4%)
Food habit	Vegetarian	19	2 (10.5%)	4 (21.05%)	6 (35.3%)
	Non- Vegetarian	65	4 (6.15%)	7(10.76%)	11 (64.7%)
Cat as pet animal	Yes	38	2 (5.26%)	5 (13.15%)	7 (41.2%)
	No	46	4 (8.69%)	6 (13.04%)	10 (58.8%)
Outdoor farming/ gardening	Yes	49	4 (8.16%)	8 (16.32%)	12 (70.6%)
	No	35	2 (5.71%)	3 (8.57%)	5 (29.4%)
Socio-economic status	High	41	2 (4.87%)	2 (4.87%)	4 (23.5%)
	low	43	4 (9.3%)	9 (20.93%)	13 (76.5%)

area from where they are coming, socioeconomic status and past obstetric history including abortions, intrauterine growth retardation, premature deliveries and intrauterine death was taken from all the patients. Oral informed consent was also obtained from all these patients.

2.2. Methodology

From each patient, 5ml of venous blood was drawn aseptically in a sterile vacutainer and the serum was separated. All the serum samples were tested for the presence of specific toxoplasma IgM and IgG antibodies using ELISA BASED COMMERCIAL KIT from Ratio Diagnostics. It is a solid phase immunoassay, intended for *in vitro* use only. This kit utilizes purified and inactivated *T.gondii* antigen for detection of specific IgM and IgG antibodies in the serum. All serum samples were tested according to the manufacturer's literature guidelines provided along with the kits. Optical Density (OD) was read at 450 nm in an ELISA reader. Ratios were calculated by calculating the ratio between the average OD value and the cut-off.

The sample is considered
Positive= if the ratio is > 1.1;
Negative = if the ratio is < 0.9;
Doubtful= = if +/- 10% of the cut-off. (Or)
All the samples showing OD reading above the cut-off value were considered to have significant antibody titre for toxoplasmosis.

3. RESULTS

3.1. Distribution of results among cases and control

In our study, out of 84 women with BOH, 6 (7.14%) were found to be seropositive for IgM, 11 (13.09 %) for IgG antibodies for *T.gondii* in women with BOH. The total seropositivity was 17 (20.23%). None of the control group women were positive for IgM and 4 (8 %) were positive for IgG antibodies and hence total seropositivity was also 4 (8 %) in the control group (Table 1).

3.2. Age Distribution

More number of seropositivity was observed among women between 26-30 years (41.17%) followed by 21-25 years (35.29%), (Table 2).

3.3. Distribution of seropositive cases in relation to type of BOH

The seropositive subjects were analyzed in relation to the type of Bad Obstetric History (BOH) (Table 3). This revealed that abortion (76.47%) was the commonest form of BOH, followed by preterm deliveries (17.67%). None of the patient had babies born with congenital anomalies in their past deliveries.

3.4. Distribution of seropositive cases in relation to risk factors involved with spread of toxoplasmosis

Other risk factors in relation to the spread of infection (contact with cat as pet animal, gardening and farming) and socio-economic factors were also analyzed (Table 4). Various risk factors in relation to the *T.gondii* infections were analyzed. More number of cases has been observed in people living with rural area than urban (70.6% vs. 29.4%). More number of seropositive cases for toxoplasmosis was seen in non-vegetarians than in vegetarians (64.7% vs 35.3%). Association of cat as risk factor in the toxoplasma infection was observed in patients with and without cat as pet animal (41.2 % vs 58.8 %). The role of outdoor farming and gardening was also noted and compared to people occupied with other jobs (70.6% vs. 29.4%). Maximum number of patients belongs to lower socioeconomic status than higher socioeconomic status (76.5% vs. 23.5%).

4. DISCUSSION

Toxoplasma gondii is the causative protozoan parasite of toxoplasmosis, which is widely distributed around the world (Liesenfeld et al. 2005 and Hill et al. 2005). It leads to many serious health complications (Malarvizhi et al. 2012). In pregnancy, it causes tremendous damage to the fetus, which necessitates the need for serological evaluation in all the pregnant women for toxoplasmosis for early diagnosis and treatment to prevent the congenital infections in the fetus (Akoijam et al. 2002). Detection of IgM and IgG antibodies are the sensitive indicators of acute and remote infections respectively (Garcia, 2007).

According to the various studies conducted in India, the seroprevalence varies from 5% to 46.7%. In our study the overall seroprevalence among antenatal women with BOH is 20.23%. It is

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concordant with the studies of Khurana et al. (2010), (18.3%), Dhumne et al. (2007), (24.3%). In the control group it was 8%. Study done by Sandhu et al. (1994), (13.3% vs 4%) and Bachhiwal et al. (2007), (22% vs 2%) also showed the increased prevalence in study group when compared to control group. In this study, seroprevalence of IgM antibodies was 7.14%; which is the indicator of acute toxoplasmosis. Similar reports were observed with Sandhu et al. (1994), (7.72%) and Borkakoty et al. (2007), (8.9%). Seroprevalence of IgG in our study was 13.09%; which is the indicator of latent *Toxoplasma* infection. According to the study done by Khurana et al. 2010, it was 15.33%. Slightly lower rate was reported by Cosme-Alvardo et al. (2006), (6.1%) and higher prevalence rate was reported by Sripura pal et al. (2011), (26%), Sarkar (2008), (27.6%).

In many countries such as France and Austria, systematic serological surveillance is compulsory to prevent congenital toxoplasma manifestations. Though these studies are showing lower prevalence, it is necessary to include the toxoplasma antibody detection as routine antenatal screening program.

Maximum number of seropositivity in pregnant women was noted in the age between 26-30years (41.17%); followed by 21-25 years (35.29%). The overall prevalence was higher between 20-30 years in our study. The same range has been observed with many studies (Malarvizhi et al. 2012, Khurana et al. 2010 and Spalding et al. 2005). This is probably because women of child bearing age group commonly belong to 20-30 years. Among the seropositive antenatal women with BOH, abortion was the commonest reason of pregnancy wastage (76.5%); which is followed by preterm deliveries (17.6%). None of the subject had any congenital anomalies in our study. Abortion was the frequent form of presentation of BOH in the studies of Surpam et al. (2006) (27.27%), Kandle et al. (1995), (50%) and Bachhiwal et al. (2007), (85.45%), whereas congenital anomalies were the commonest form in the report of Saxena et al. (1993), (33.3%).

The associations of various risk factors were analyzed in relation to seropositive cases. Significant association was found in meat consumption individuals (non-vegetarians) and seropositive toxoplasmosis (64.7%). Similar observation was made by Sripura et al. (2011), (56.7%) and Cook et al. (2000), (61.7%). People from rural area were most commonly infected (70.6%) compared to people from urban (29.4%) in our study. It is concordant with the study of Cosme et al. (2006), (77.6% vs. 13%) and Khurana et al. (2010), (22% vs.12%). Outdoor farming and gardening has got some significant role (70.6%) in our study. Cook et al. (2000) and Petersen, (2007) also reported that the contact with soil, while farming and gardening are risk factors in their study. It was observed that high prevalence of toxoplasma infection was seen in lower socioeconomic group. Studies of Cosme et al. (2006) and Sandhu et al. (1994) showed the similar observation. Lack of education and knowledge about hygiene, close contact with soil and surface water which is contaminated with excreta of infected animal could be the possible reasons for this high prevalence in these groups. No significant difference has been observed in people with and without cat as pet animal (41.2% vs. 58.8%). It is concordant with the studies of Kapperud et al. (1996), Khurana et al. (2010) and Sripura et al. (2011).

5. LIMITATIONS OF THE STUDY

Limited research works are available about seroprevalence of toxoplasmosis in pregnant women in southern part of India; as well as in our area. So for comparison and for reference enough reports were not available. Due to financial constraints we limited our study group; hence to correlate the data obtained by our study to community, large scale studies have to be conducted.

6. CONCLUSION

This study revealed that the seroprevalence of toxoplasmosis was significantly high in the study population than control. Maximum seropositivity was between 20-30 years and abortion was the commonest form of pregnancy wastage. Based on this study, information obtained about the prevalence of toxoplasmosis in this area could be the tip of iceberg. To estimate the real magnitude of the problem, investigative measures should be taken to undertake multicentric study as well as compulsory screening for the antenatal risk group. Increased awareness and education at the patient and public level through government and private organizations are required to reduce the toxoplasma exposure and to reduce the risk of congenital transmission with respect to the various modes of spread. Clinical effects of toxoplasma infection, importance of testing antibodies and risk factors that contribute to infections should be kept in mind while dealing with a pregnant lady with BOH. Preventive measures like- promoting healthy life style, eating adequately cooked meat, hygienic vegetable preparation, pet hygiene, handling and good quality of water supply should be given prime importance in our day to day life.

DISCLOSURE STATEMENT

Financial support for this research work was provided by MAHER University, Chennai, India.

ACKNOWLEDGEMENT

Dean of Meenakshi medical college and research institute, and MAHER University.

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