ORIGINAL ARTICLE

SEROPREVALENCE OF TOXOPLASMA GONDII IN SPONTANEOUS ABORTIONS IN PREGNANT WOMEN
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ABSTRACT: INTRODUCTION: Toxoplasmosis is one of the diseases comprising the TORCH [Toxoplasma gondii, Rubella virus, Cytomegalovirus, Herpes simplex virus] infections. It is known to cause perinatal death if the organism is acquired during pregnancy. Toxoplasmosis during pregnancy can cause congenital infection which may result in mental retardation and blindness in the infant. The present study aimed to evaluate the seroprevalence of Toxoplasma gondii and it is associated risk factors among the women with history of spontaneous abortion. MATERIALS & METHODS: A total of 60 women with past or present history of spontaneous abortion and another 60 pregnant women without any bad obstetric history as control attending our hospital were included in the study. All the serum samples were tested for the presence of specific Toxoplasma IgM and IgG antibodies using the On Site Toxo IgG/IgM Rapid Test strip, a lateral flow chromatographic immunoassay. RESULTS: Total seroprevalence of Toxoplasma gondii in the study was 12.5%. Total seropositivity in women with history of spontaneous abortion was 12(20%) and 3(5%) among control group. More number of seropositivity was observed among women between 26 to 30 years (60%). Risk factor of having cat as pet animal had greater association of getting toxoplasmosis. CONCLUSION: This study revealed that the seroprevalence of toxoplasmosis was significantly high in the study population than in control group. There should be routine screening for antenatal women with bad obstetric history. KEYWORDS: Toxoplasma gondii, Spontaneous abortion, Seroprevalence.

INTRODUCTION: Toxoplasma gondii is an obligate intracellular tissue protozoan parasite with a worldwide distribution, causing infection in humans as well as other warm blooded domestic and wild animals. Approximately one third of the world population is estimated to be exposed to this parasite.1 The importance of Toxoplasma from the perspective of public health is mainly due to the risk of disease transmission during pregnancy.2 The prevalence of toxoplasmosis in pregnant women in India is variably reported to be as low as 5 per cent to as high as 80 per cent.3-7 Studies analyzing the role of maternal infection in the causation of bad obstetric history are less in number, probably due to lack of facilities in isolating etiological agents and the prohibitive cost of commercial diagnostic kits. Since testing for toxoplasmosis is not a routine activity in our country, information on this zoonotic infection, diagnosis and interpretation of test results is also lacking. In Odisha, so far, to the best of our knowledge, no study is reported in on seroprevalence of toxoplasmosis in women with spontaneous abortions. Therefore, the present study is designed to detect antibodies and find out the seroprevalence of Toxoplasma gondii in women with history of spontaneous abortions.

MATERIALS AND METHODS:
Study Area: This cross sectional study was conducted from June 2012 to June 2014 in Hi Tech Medical College & Hospital, Bhubaneshwar, Odisha.
**Study Subjects:** The study group comprised women of reproductive age with past or present history of spontaneous abortion. The control group comprised antenatal women with no bad obstetric history attending the hospital.

**Sample Size:** In total 120 women were included in the study 60 with history of spontaneous abortion (Study group) and 60 without Bad obstetric history (BOH) (Control group).

**Collection of Data:** The women presenting to the Gynecological OPD with history of spontaneous abortions were included in the study. The inclusion and exclusion criteria were applied and the women who were eligible to participate were taken in the study. The nature and purpose of this study was explained to all women and those who gave the informed written consent were enrolled in the study. A total of 60 women who met the inclusion criteria were selected as study group and 60 pregnant women without BOH were taken as controls.

After selecting the patients who fulfilled the eligibility criteria in the OPD, detailed medical, obstetrical and gynecological histories were taken, and complete general physical examination was done. Socio-demographic data including age, residential place, educational level, was obtained from all subjects, as well as clinical data including previous bad obstetrics history, also data about risk factors like pet cat owning, dietary habits were taken from the subjects.

A total of 120 blood samples were collected using sterile disposable syringes under aseptic precautions. 5 ml of blood was withdrawn by venipuncture from all subjects and was transferred into plain vial. The serum was separated by centrifugation. All the samples were screened for Toxoplasma specific IgG and IgM antibodies by On Site Toxo IgG/IgM rapid test strip. It is a lateral flow chromatographic immunoassay.

**Analysis of Data:** The data collected was systematically entered on specifically designed proforma. The results were then compiled on a masterchart and statistically analyzed using SPSS Software.

**RESULTS:**

**Distribution of Result among Study and Control Groups:** Table 1 shows that in the study group, out of 60 women 12 (20%) were found to be positive for Toxoplasma IgG antibody and in none IgM antibodies were detected. In the control group, 3 women (5%) were positive for Toxoplasma IgG antibodies and none were positive for IgM antibodies. Overall seropositivity of Toxoplasma gondii according to IgG antibodies in the study group was 20% and in the control group was 5%.

| Result            | STUDY GROUP | CONTROL GROUP |
|-------------------|-------------|---------------|
|                   | No | Percent | No | Percent |
| IgG Positive      | 12 | 20%     | 3  | 5%      |
| IgM Positive      | 0  | 0%      | 0  | 0%      |
| IgG & IgM Negative| 48 | 80%     | 57 | 95%     |
| Total             | 60 | 100%    | 60 | 100%    |

Table 1: Seropositive Women in Study & Control Group
Distribution of Seropositivity in Relation to Age: Most (60%) of the women who were IgG seropositive in the study were between 26 to 30 years of age while 20% of the seropositive women were in between the age of 21 to 25 years and the rest 20 % of the seropositive women were in the age group of 31 to 35 years of age.

| Age Distribution (yrs) | No. of women | Percent |
|------------------------|--------------|---------|
| 21-25                  | 3            | 20%     |
| 26-30                  | 9            | 60%     |
| 31-35                  | 3            | 20%     |
| Total                  | 15           | 100%    |

Table 2: Distribution of IgG Seropositive Women According to Age

Distribution of IgG Test Result in Women According to Bad Obstetric History: 12 women were seropositive for Toxoplasma IgG antibodies in the case group while only 3 women were positive in the control group. This is statistically significant (p <0.013).

| NATURE OF BAD OBSTETRIC HISTORY (BOH) (B. O. H) | NEGATIVE | %   | POSITIVE | %   | TOTAL | %   | P VALUE |
|-----------------------------------------------|----------|-----|----------|-----|-------|-----|---------|
| Abortion (study group)                        | 48       | 80% | 12       | 20% | 60    | 50% | 0.013   |
| No b. O. H (control group)                    | 57       | 95% | 3        | 5%  | 60    | 50% |         |
| Total                                         | 105      | 87.5% | 15       | 12.5% | 120 | 100% |         |

Table 3: Distribution of IgG Seropositive Women According to Their Bad Obstetric History

Distribution of seropositivity in relation to Risk factors: Various risk factors in relation to T. gondii infection was analysed and keeping cats as pet animal was found significant. Past history of spontaneous abortion was also found to be significant.

| RISK FACTOR                        | RESULT            | NEGATIVE | %   | POSITIVE | %   | TOTAL | %   | P VALUE |
|------------------------------------|-------------------|----------|-----|----------|-----|-------|-----|---------|
| No. of previous abortion           | 0                 | 57       | 95% | 3        | 5%  | 60    | 50% | 0.000   |
|                                    | 1                 | 43       | 100%| 0        | 0%  | 43    | 35.83% |        |
|                                    | 2                 | 4        | 57.14% | 3 | 42.86% | 7 | 5.83% |        |
|                                    | 3                 | 1        | 10% | 9        | 90% | 10 | 8.34% |        |
| Contact with cat                   | Absent            | 56       | 86.15% | 9 | 13.85% | 65 | 54.17% | 0.628  |
|                                    | Present           | 49       | 89.09% | 6 | 10.91% | 55 | 45.83% |        |
| Owns cat                           | No                | 101      | 89.38% | 12 | 10.62% | 113 | 94.17% | 0.012  |
|                                    | Yes               | 4        | 57.14% | 3 | 42.86% | 7 | 5.83% |        |
| Contact with other animal          | Absent            | 66       | 85.71% | 11 | 14.29% | 77 | 64.17% | 0.429  |
|                                    | Present           | 39       | 90.7% | 4 | 9.3% | 43 | 35.83% |        |
| Dietary habit                      | Nonveg            | 83       | 86.46% | 13 | 13.54% | 96 | 80% | 0.490  |
|                                    | Veg               | 22       | 91.67% | 2 | 8.33% | 24 | 20% |        |
| Frequency of                       | < than a          | 71       | 89.87% | 8 | 10.13% | 79 | 82.29% | 0.069  |
| meat consumption | week | Once a week | 2 | 5 | 17 | 17.71% |
|------------------|------|-------------|---|---|----|---------|
| chicken          | 12   | 80%         | 3 | 20%| 15 | 15.62%  |
| Fish             | 57   | 87.69%      | 8 | 12.31%| 65 | 67.71%  |
| Mutton           | 14   | 87.5%       | 2 | 16 | 16.67% |
| Raw vegetable consumed | No | 73 | 84.88% | 13 | 15.12% | 86 | 71.67% |
|                 | Yes  | 32 | 94.18% | 2  | 5.88%  | 34  | 28.33%  |
| Source of water  | Tap  | 73 | 86.9%  | 11 | 13.1%  | 84  | 70%     |
|                 | Tube | 32 | 88.89% | 4  | 11.11% | 36  | 30%     |
| Purification method | Boiling | 84 | 87.5% | 12 | 12.5% | 96 | 80%     |
|                 | Filter | 21 | 87.5% | 3  | 12.5%  | 24  | 20%     |

Table 4: Toxo IgG test result in relation to risk factors

DISCUSSION: The prevalence of toxoplasmosis in pregnant women in India is variably reported to be as low as 5 per cent to as high as 80 per cent.\(^3\)\(^-\)\(^7\) In our study, total seroprevalence of Toxoplasma specific antibodies was found to be 12.5%. In our study 120 women were included. Out of them 15(12.5%) were positive for Toxoplasma specific IgG antibodies. None of the women in the study were positive for Toxoplasma specific IgM antibodies. This is in accordance with the study done by Malarvizhi,\(^8\) et al, Senthamarai S,\(^9\) et al and Ebadi,\(^10\) et al who reported Toxoplasma gondii seroprevalence of 13.8%, 15.67% and 16.47% respectively.

In our study, seropositivity for Toxoplasma specific IgG antibodies was found to be 20% in the women with history of spontaneous abortion and 5% in the women with no bad obstetric history. In our study we got a high seroprevalence of Toxoplasma specific IgG antibodies in women with bad obstetric history as compared to women with no past bad obstetric history. This finding is in accordance with studies conducted by Senthamarai S,\(^9\) et al (13.09% Vs 8%) , Ebadi P\(^10\) et al (17.5% Vs 14%), and Suryamani,\(^2\) et al (45% Vs 8.33%).

None of the women in our study were positive for Toxoplasma specific IgM antibodies, indicating that no one has acute infection.

Most (60%) of the women who were IgG seropositive in the study were between 26 to 30 years of age while 20% of the seropositive women were in between the age of 21 to 25 years and the rest 20% of the seropositive women were in the age group of 31 to 35 years of age. In this study, 80% of seropositive women were between 20 to 30 years of age. This is in accordance with the study done by Senthamarai S\(^9\) et al who has also reported 76.46% seropositive women in the age of 20 to 30 years. This is so probably because women of child bearing age group commonly belong to the age group of 20 to 30 years.

In our study, association of various risk factors were analysed among the seropositive women. The present study showed that there was significant association between Toxoplasma seropositive cases and women who keep cats as pet animal. This is in accordance with study of Malarvizhi A\(^8\) et al in 2012 who also reported that rearing cats as pet animals is associated with increased Toxoplasma seroprevalence.

There was no significant association seen between seropositive cases and women with contact with cat and other animal. This finding is not in accordance with study of Suryamani Chintapalli I,\(^2\) et al in 2013 and study of Susann Sroka,\(^11\) et al in 2010.
There was no significant association seen between seropositive cases and frequency of meat consumption, type of meat consumption which is not in accordance with study by Srirupa Pal,12 et al in 2007, Susann Sroka,11 et al in 2010 respectively.

There was no significant association seen between seropositive cases with consumption of raw vegetables and source of drinking water which is in accordance with study by Srirupa Pal,12 in 20007. No statistically significant association was found between method of purification of drinking water and Toxoplasma seroprevalence. This is not in accordance with a study of Susann Sroka,11 et al in 2010.

CONCLUSION: In our study “Seroprevalence of Toxoplasma gondii in pregnant women with spontaneous abortions” we conclude that the seroprevalence of this parasite is more in women with history of spontaneous abortion than in the women who had no bad obstetric history. In our study, seropositivity of this parasite was found to be 20% in women with history of spontaneous abortion and 5% in women with no bad obstetric history. However, in our study the overall seroprevalence of Toxoplasma gondii comes out to be 12.5%.

In our study maximum seropositivity was found between 26 to 30 years. We noted that among the various risk factors keeping of cats as pet animal had greater association of risk of getting toxoplasmosis than the women who do not keep cat as pet animal.

In our study strong association of IgG antibodies in women with recurrent abortions was found, though no association between exposures to toxoplasmosis with premature termination of pregnancy was noted. So, it is suggested that all women especially those of child bearing age should be educated regarding risk factors contributing to toxoplasmosis as well as the importance of taking adequate preventive measures, especially during pregnancy.

We also recommend that studies with larger sample size may be undertaken to further evaluate the real prevalence of this parasite in our community. A compulsory Toxoplasma screening for the antenatal women with bad obstetric history should be done in all the primary health care setting in our country.

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