

---

**LETTER TO EDITOR****Seroprevalence of *Toxoplasma gondii* in Healthy Pregnant Women of Puducherry***Selvaraj Stephen<sup>1\*</sup>, Velmurugan Anitharaj<sup>1</sup>, Seetesh Ghose<sup>2</sup>, Jothimani Pradeep<sup>1</sup>**<sup>1</sup>Department of Microbiology, <sup>2</sup>Department of Obstetrics & Gynecology, Mahatma Gandhi Medical College & Research Institute, Pillaiyarkuppam, Pondicherry- 607403 (Puducherry), India*

---

Sir,

Toxoplasmosis is a common parasitic infection of humans, to which almost one third of humanity is exposed to [1]. While more than 50% women of child bearing age in Western Europe, Africa, South and Central America are seropositive for toxoplasmosis, some populations of El Salvador, Germany and France show 75% seropositivity, with approximately 90% adults of Paris and 50% adults in Germany being seropositive for this zoonosis [2]. Global status of toxoplasmosis has been elaborately reviewed by Pappas *et al*, who observed 40 to 70% positivity in South American and Caribbean countries [3]. Across India, during the last five decades, a lot of variation between different states and sometimes within the same geographical area has been observed regarding prevalence of this zoonosis [4-14]. This could be perhaps due to selection of subjects, tests employed, demographic and environmental factors. During the past four decades, but for a single report on toxoplasmosis in patients with Bad Obstetric History (BOH) [15], there is no report regarding toxoplasmosis seroprevalence in healthy antenatal women of Puducherry. Hence, we have attempted to explore the presence of this zoonosis in and around Puducherry. Based on national seroprevalence of Toxoplasmosis in healthy pregnant women, 193 antenatal mothers were examined for *T. gondii* IgG and IgM antibodies. Those serum samples positive for *T. gondii* IgG were subjected to IgG avidity test by

ELISA. The results are presented in this communication.

After getting approval from the Institutional Human Ethical Committee (IHEC), this study was carried out during December 2015 – February 2017, in the department of Microbiology. Before collection of blood samples, written informed consent was obtained from the healthy pregnant women (first and second trimesters) who were attending out patients department of Obstetrics and Gynecology (OBG), in a tertiary care teaching hospital, Puducherry. Five ml blood was collected without anticoagulant from each participant by trained technicians. The serum was separated, aliquoted and preserved at -20°C till the time of testing. A total of 193 healthy pregnant women were screened for IgG and IgM antibodies to *T. gondii* by ELISA test. All IgG positive samples were subjected to IgG avidity ELISA. The following three commercial ELISA kits were used in the study (NovaTec Immunodiagnostica, GmbH, Dietzonbach, Germany):

1. NovaLisa Toxoplasma gondii IgM ELISA – TOXMO460
2. NovaLisa Toxoplasma gondii IgG ELISA – TOXGO460
3. NovaLisa Toxoplasma gondii IgG Avidity Test – TOXGA460

Sample size calculation was made on the basis of national seroprevalence of Toxoplasmosis in pregnant women.

Out of the 193 antenatal mothers screened, 30 were positive for *T. gondii* IgG antibody (15.54%). Among these positive cases, two serum samples exhibited low avidity (1.04%), indicating past infection within the previous four months. All samples were negative for *T. gondii* IgM antibody. *Toxoplasma gondii* is probably the only protozoan, whose all three stages (tachyzoite, tissue cyst and oocyst) are infective for man [2]. Humans acquire toxoplasmosis by consumption of inadequately cooked meat /close contact with domestic cats/blood transfusion/mother-to-child (vertical) transmission [2]. A pan-India survey was conducted by Dhumne *et al* [4] involving 23, 094 persons and covered North, South, East, West and Central Indian states. The prevalence varied from 9.4% in Rajasthan to 48% in Kerala. Zone-wise, West Zone with Maharashtra and Goa had a positivity of 31 to 32%, followed by South representing Tamil Nadu, Andhra Pradesh, Karnataka, Kerala with 21.8%, 22.2%, 28.8% and 42.2% respectively. East Zone comprising of Bengal, Orissa, Assam, Tripura and Arunachal Pradesh had almost the same prevalence like south with 22 to 29% positivity. North Zone with Rajasthan, Punjab, Bihar, Delhi, UP and Chattisgarh had a positivity varying from 9.4% to 19.9%. Another recent pan-India study by Singh and co-workers [5] involved 1,464 women of child bearing age from four centres, viz., North, South, East and West. All-India seroprevalence average was 22.4%, with lowest in Gujarat (8.8%), moderate in Delhi (19.7%) and Assam (21.2%) and highest in Manipal (37.3%). Individual reports from different parts of India show a diverse picture: Highest 57% seropositivity in Kumaon (UP) [5] followed by Bombay 39% [13], Jodhpur (17.2%) [14] and Chandigarh (5.4%) [10]. The lowest seroprevalence of 1% was observed in the

year 1990 at Delhi by Mittal *et al* [11]. However, in contrast to this report, Akoijam *et al* [12] from New Delhi in 2002 recorded a very high positivity of 41.75%. Recently Borkakoty *et al* [6] from Assam recorded a very high positivity of 48%. Other states like Tamil Nadu [7], Andhra Pradesh [8] and Uttar Pradesh [9] demonstrated a moderate seropositivity ranging from 11-15% [8].

Toxoplasma IgG Avidity test has been used as a marker to indicate if the infection was in the recent ( $\leq 4$  months) or distant past ( $\geq 4$  months). Low IgG avidity is related to recent infection whereas high avidity points to past infection [1-5]. Only two among 30 IgG positive women in our study showed low avidity and thus infection in the recent past. Gold standard serological Dye test employing live parasites or *T.gondii* DNA detection in blood confirms diagnosis.

Seroprevalence of toxoplasmosis in the Union Territory of Puducherry is of moderate significance, similar to that of neighbouring Tamil Nadu. Further work involving larger samples and including both symptomatic and asymptomatic pregnant women is recommended. Toxoplasmosis ELISA kits are cost-effective and affordable. Screening for Toxoplasmosis may be considered for inclusion in the routine antenatal protocol to prevent neonatal morbidity and mortality.

#### **Acknowledgment:**

This project has been funded from Faculty Research Fund, Sri Balaji Vidyapeeth University. Authors are grateful to the Chairman, Vice-Chancellor, Dean (Research & Allied Health Sciences) and Dean (Academic), Mahatma Gandhi Medical College & Research Institute, Sri Balaji Vidyapeeth University, Pondicherry, for providing financial assistance through Faculty Research Fund

---

### References

1. Dubey JP. Toxoplasmosis In: Cox FEG, Kreier JP, Wakelin D (eds). Topley wilson's Microbiology & Microbiology Infections Vol. V, Parasitology. 10ed, Oxford University Press, New York. 2005: 422-42.
2. Parija SC. Textbook of Medical Parasitology: Protozoology & Helminthology. 4ed, All India Publishers and Distributors, New Delhi. 2013: 172-181.
3. Pappas G, Roussos N, Falagas ME. Toxoplasmosis snapshots: global status of *Toxoplasma gondii* seroprevalence and implications for pregnancy and congenital toxoplasmosis. *Int J Parasitol* 2009; 39(12): 1385-94.
4. Dhumne M, Sengupta C, Kadival G, Rathinaswamy A, Velumani A. National Prevalence of *Toxoplasma gondii* in India. *J Parasitol* 2007; 93(6):1520-21.
5. Singh S, Munawwar A, Rao S, Mehta S, Hazarika NK. Serologic prevalence of *Toxoplasma gondii* in Indian women of child bearing age and effects of social and environmental factors. *PLoS Negl Trop Dis* 2014; 8(3): e2737.
6. Borkakoty B, Biswas D, Jakharia A, Mahanta J. Seroprevalence of *Toxoplasma gondii* among pregnant women in Northeast India. *J Indian Med Assoc* 2016; 64(10): 24-28.
7. Sucilathangam G, Palaniappan N, Sreekumar C, Anna T. Seroprevalence of *Toxoplasma gondii* in southern districts of Tamil Nadu using IgG-ELISA. *J Parasitol Dis* 2012; 36(2):159-164.
8. Sarkar MD, Anuradha B, Sharma N, Roy RN. Seropositivity of Toxoplasmosis in Ante-natal women with bad obstetric history in a tertiary care hospital of Andhra Pradesh. *India J Health Popul Nutr* 2012; 30(1):87-92.
9. Sen MR, Shukla BN, Banerjee T. Prevalence of serum antibodies to TORCH infection in and around Varanasi, Northern India. *J Clin Diagn Res* 2012; 6(9):1483-85.
10. Mohan B, Dubey ML, Malla N, Kumar R. Seroepidemiological Study of toxoplasmosis in different sections of Union territory of Chandigarh. *J Commun Dis* 2002; 34(1):5-22.
11. Mittal V, Bhatia R, Sehgal S. Prevalence of Toxoplasma antibodies among women with bad obstetric history and general population in Delhi. *J Commun Dis* 1990; 22(3): 223-26.
12. Akoijam BS, Shashikant, Singh S, Kapoor SK. Seroprevalence of toxoplasma infection among primi gravid women attending antenatal clinic at a secondary level hospital in North India. *J Indian Med Assoc* 2002; 100(10): 591-92.
13. Rawal BD. Toxoplasmosis. A dye – test on sera from vegetarians and meat eaters in Bombay. *Trans Roy Soc Trop Med Hyg* 1959; 53(1):61-63.
14. Joshi YR, Vyas S, Joshi KR. Seroprevalence of Toxoplasmosis in Jodhpur, India. *J Commun Dis* 1998; 30(1): 32-37.
15. Parija SC, Shiva Prakash MR, Murali P, Habeebullah S. Toxoplasma IgM antibodies prevalence in women with bad obstetric history. *Biomedicine* 2001; 21: 46-48.

---

\***Author for Correspondence:** Dr. Selvaraj Stephen, Department of Microbiology, Mahatma Gandhi Medical College & Research Institute, Pondy- Cuddalore Main road, Pillaiyarkuppam, Pondicherry- 607403, India.  
Email: stephens4950@gmail.com Cell: 09894383368