

Impact Factor:

ISRA (India) = 6.317
ISI (Dubai, UAE) = 1.582
GIF (Australia) = 0.564
JIF = 1.500

SIS (USA) = 0.912
PIIHQ (Russia) = 0.126
ESJI (KZ) = 9.035
SJIF (Morocco) = 7.184

ICV (Poland) = 6.630
PIF (India) = 1.940
IBI (India) = 4.260
OAJI (USA) = 0.350

SOI: [1.1/TAS](#) DOI: [10.15863/TAS](#)
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) e-ISSN: 2409-0085 (online)
Year: 2021 Issue: 06 Volume: 98
Published: 01.06.2021 <http://T-Science.org>

QR – Issue



QR – Article



M. Rahimkhani
Tehran University of Medical Sciences
M.D. & Ph.D, Associated Professor, Faculty of Allied Medical Sciences,
Tehran, Iran. Phone number: 09124253368
rrahimkhani@sina.tums.ac.ir

K. Kazemian
Tehran University of Medical Sciences
Al.Mahdi Clinic, Tehran, Iran

M. Zarebavani
Tehran University of Medical sciences
Faculty of Allied Medical Sciences, Tehran, Iran

A. Khavarydaneshvar
University of Tehran
Faculty of Engineering, Tehran, Iran

M.S. Safari
Science and Research Branch of Azad University
Faculty of veterinary, Tehran, Iran

SEROPREVALENCE OF TOXOPLASMA IgG AND IgM ANTIBODIES IN IRANIAN YOUNG WOMEN BEFORE PREGNANCY

Abstract: Background: Toxoplasmosis is an infection caused by an intracellular parasite called *Toxoplasma gondii*. One of the most common methods of diagnosis and screening of women in terms of these infectious agents is serological tests.

Material and methods: The totals of 103 women were referred to the laboratory for pre-pregnancy tests. One of the pre-pregnancy tests was to determine the amount of serum *Toxoplasma gondii* antibodies of both types IgG and IgM antibodies.

Results: A total of 103 women were enrolled during the study period with the mean age \pm standard deviation (SD) of 28.02 ± 6.07 years. The prevalence of specific anti -*Toxoplasma gondii* IgG and IgM was of 18.4% (19/103) and 0.97%(1/103) respectively. 32.4% of studied women kept cats at home or have been in contact with cats for some time.

Conclusion: In this study the incidence of acute Toxoplasmosis was very low and also the rate of IgG antibody positive was less than other previous reports. Women's awareness about transmitting ways of the Toxoplasmosis has a very important role in the prevention and prevalence of Toxoplasmosis in society.

Key words: *Toxoplasma gondii*, IgG antibody, IgM antibody, pre-pregnancy.

Language: English

Citation: Rahimkhani, M., Kazemian, K., Zarebavani, M., Khavarydaneshvar, A., & Safari, M. S. (2021). Seroprevalence of Toxoplasma IgG and IgM Antibodies in Iranian young women before pregnancy. *ISJ Theoretical & Applied Science*, 06 (98), 1-5.

Soi: <http://s-o-i.org/1.1/TAS-06-98-1> **Doi:**  <https://dx.doi.org/10.15863/TAS.2021.06.98.1>
Scopus ASCC: 2700.

Impact Factor:

ISRA (India) = 6.317
ISI (Dubai, UAE) = 1.582
GIF (Australia) = 0.564
JIF = 1.500

SIS (USA) = 0.912
PIIHQ (Russia) = 0.126
ESJI (KZ) = 9.035
SJIF (Morocco) = 7.184

ICV (Poland) = 6.630
PIF (India) = 1.940
IBI (India) = 4.260
OAJI (USA) = 0.350

Introduction

Toxoplasma gondii is an obligate intracellular parasitic protozoan eukaryote that causes the infectious disease toxoplasmosis. *T. gondii* is capable of infecting virtually all warm-blooded animals, but domestic cats, are the only known definitive hosts in which the parasite may undergo sexual reproduction.(1) In humans, *T. gondii* is one of the most common parasites in developed countries. Serological studies estimate that 30–50% of the global population has been exposed to and may be chronically infected with *T. gondii*, although infection rates differ significantly from country to country. (2) For example, estimations have shown the highest percentage of people infected is in France, at 84%, as of 2000. Although mild, flu-like symptoms occasionally occur during the first few weeks following the exposure, infection with *T. gondii* produces no readily observable symptoms in healthy human adults.(3)

The lifecycle of *T. gondii* may be broadly summarized into two components: a sexual component that occurs only within cats (felids, wild or domestic), and an asexual component that can occur within virtually all warm-blooded animals, including humans, cats, and birds. (4)

Toxoplasmosis is a [parasitic disease](#) caused by [Toxoplasma gondii](#). Infections with toxoplasmosis usually cause no obvious symptoms in adults. Occasionally, people may have a few weeks or months of mild, [flu-like illness](#) such as muscle aches and tender [lymph nodes](#). Toxoplasmosis is usually spread by eating poorly cooked food that contains cysts, exposure to infected cat feces, and from an infected mother to her baby during pregnancy. Rarely, the disease may be spread by blood transfusion. It is not otherwise spread between people. The parasite is known to reproduce sexually only in the cat family. However, it can infect most types of warm-blooded animals, including humans. (5)

Toxoplasmosis Infection has three stages:

1. Acute

Acute toxoplasmosis is often asymptomatic in healthy adults. However, symptoms may occur and are often influenza-like: swollen lymph nodes, headaches, fever, and fatigue, or muscle aches and pains that last for a month or more. It is rare for a human with a fully functioning immune system to develop severe symptoms following the infection. People with weakened immune systems are likely to experience headache, confusion, poor coordination, seizures, lung problems or blurred vision caused by severe inflammation of the retina (ocular toxoplasmosis). Young children and immunocompromised people, such as those with HIV/AIDS, those taking certain types of chemotherapy, or those who have recently received an organ transplant, may develop severe toxoplasmosis. Infants infected via placental transmission may be

born with either of these problems, or with nasal malformations, although these complications are rare in newborns.

2. Latent

Due to the absence of obvious symptoms, hosts easily become infected with *T. gondii* and develop toxoplasmosis without knowing it. Although mild, flu-like symptoms occasionally occur during the first few weeks following the exposure, infection with *T. gondii* produces no readily observable symptoms in healthy human adults.(6)

3. Skin

While rare, skin lesions may occur in the acquired form of the disease, including roseola and erythema multiforme-like eruptions, prurigo-like nodules, urticaria, and maculopapular lesions. Newborns may have punctate macules, ecchymoses, or "blueberry muffin" lesions. (7)

The diagnostic test for the detection of *T. gondii* (oocyst, tachyzoite, and bradyzoite) in a suspected tissues of humans or animals has evolved greatly over time, but serological test is frequently more common [17], followed by molecular techniques [18], and then histological techniques [19]. Other diagnostic methods with less reportage include bioassay in mice or cat, tissue culture, and microscopy. (8)

Reviews of serological studies have estimated that 30–50% of the global population has been exposed to and may be chronically infected with latent toxoplasmosis, although infection rates differ significantly from country to country. This latent state of infection has recently been associated with numerous disease burdens, neural alterations and subtle gender-dependent [dubious – discuss] behavioral changes in immunocompetent humans as well as a increased risk of motor vehicle collisions.(9)

The serological test measures the antibodies and determines the seroprevalence of the infection by checking the immunoglobulin G (IgG), immunoglobulin M (IgM), and IgG avidity levels in a sample, usually serum from the blood of the specific host. This is the simplest and the easiest test but mostly is characterized by either false-positive or false-negative results. (10)

The aim of this study was to evaluate the level of *Toxoplasma* antibodies (IgG & IgM) in Iranian young women during their pre-pregnancy.

Material and Methods:

This study was a cross-sectional study and in 9 months during 2020-2021, the levels of serum *Toxoplasma* IgG and IgM antibodies for 103 young women were evaluated. These pregnant women were admitted to the AlMahdi clinic for pre-pregnancy tests. Al-Mahdi Clinic is in the south of Tehran and is under the supervision of the Tehran University of Medical Sciences Vice Chancellor.

Data on demographic and potential risk factors were collected from each study participant using

Impact Factor:

ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
ISI (Dubai, UAE) = 1.582	PIHIQ (Russia) = 0.126	PIF (India) = 1.940
GIF (Australia) = 0.564	ESJI (KZ) = 9.035	IBI (India) = 4.260
JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

structured questionnaire. Moreover, venous blood specimens were collected and tested for IgM and IgG anti-T. gondii antibodies by quantitative immunoassay with the immunoassay method and using Immolite 2000 auto-analyzer (Siemens, Germany) and according to the instructions of the manufacturer of the kit and the device mentioned above. All positive and suspicious results of antibodies were tested two times.

The normal range of serum Toxoplasma IgG antibodies was as follows:

- Reactive >8 IU/ml
- Inter 6.5-8 IU/ml
- non-reactive <6.5 IU/ml

The normal range of serum Toxoplasma IgG antibodies was as follows:

- Reactive >1.1 IU/ml
- Inter 0.9-1.1 IU/ml
- non-reactive <0.9 IU/ml

The data entry was carried out using Excel software and analyzed by Statistical Package for the Social Sciences (SPSS). Percentages were used to analyse of the categorical variables and quantitative variables are presented as mean \pm standard deviation (\pm SD).

Results:

A total of 103 women were enrolled during the study period with the mean age \pm standard deviation (SD) of 28.02 \pm 6.07 years.

Mean age and distribution of age in studied women are shown on table 1.

Table 1: distribution of age in women

variable	mean	maximum	minimum	SD
Age	28.02	42	17	6.07

Seroprevalence of Toxoplasma and demographic characteristics in the studied women are shown on table 2.

Table 2: Univariate analysis of Toxoplasma IgG in relation to socio-demographic characteristics among the studied women in south of Tehran

variable	Toxoplasma seroprevalence (IgG positive)	P-value
Category age		
17-19	14 (1/7)	0.85
20-29	11.9 (5/42)	0.78
>30	24 (13/54)	0.05
Occupation		
Housewife	17.5 (16/91)	0.05
Others	25 (3/12)	0.01
Education level		
Primary school	0 (0/4)	-
Diploma	18.3(16/87)	0.93
Bachelor science and more	25 (3/12)	0.78
Present of cat at home or have been in contact with cats for some time.		
Yes	32.4 (12/37)	0.01
No	10.6 (7/66)	0.24

The prevalence of specific anti -Toxoplasma gondii IgG and IgM were of 18.4% (19/103) and 0.97%(1/103) respectively. Frequency distribution of

Toxoplasma IgG antibody positive (> 8 IU/ml) and Toxoplasma IgM antibody positive (>1.1 IU/ml) in the studied women were shown in table 2.

Impact Factor:

ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
ISI (Dubai, UAE) = 1.582	PIIHQ (Russia) = 0.126	PIF (India) = 1.940
GIF (Australia) = 0.564	ESJI (KZ) = 9.035	IBI (India) = 4.260
JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

Table2: Frequency distribution of Toxoplasma IgG antibody positive (> 8 IU/ml) and IgM antibody positive (>1.1 IU/ml) in the studied group.

variable	frequency	Percent (%)
IgG positive	19	18.4
IgG negative	84	81.6
IgM positive	1	0.97
IgM negative	102	99.03

Discussion:

Toxoplasmosis is one of the most prevalent zoonotic diseases infecting wide range of warm-blooded animals including humans. The presence of Toxoplasma has been reported in every country and its prevalence ranges from 30% to 60% in both developed and developing countries.

Generally, countries in Latin America and Southeast Africa with warm and humid climates were found to have high seroprevalences, moderate seroprevalences were found in Central and Southern Europe, and lower seroprevalences were reported in North America, North Europe, Southeast Asia, China, and Korea. (11)

There are many investigations about seroprevalence of Toxoplasma gondii in different groups of population i.e. pregnant women, healthcare personnel, students, housewives, etc. the present study is seroprevalence of Toxoplasma gondii in young women who admitted to Almahdi clinic (south of Tehran) for pre-pregnancy tests.

Serological tests to detect specific anti-T. gondii IgG and/or IgM antibodies are the first step in the diagnosis of toxoplasmosis. A 2-fold rise in IgG titre or positive IgM indicates recent/acute infection. A high incidence of seroprevalence of up to 92.5% was reported in Ghana but a moderate to low seroprevalence was reported in most South Asian countries.(12)

The prevalence of anti-Toxoplasma gondii IgG antibodies was observed 31.1% in pregnant women from urban areas of Burkina Faso. (13) This percentage was higher than what we achieved in the present study. Based on another study in Pakistan, eastern neighboring country, The overall seroprevalence of T. gondii infection in women of childbearing age, pregnant women and non-pregnant women were 57.28%, 56.46% and 43.53% respectively but in the present study 18.4% of non-pregnant women were IgG antibody positive. (14) That's almost twice the percentage that was achieved in this study.

Some investigations figured out that, there is a technique that can be effective and specifically

diagnose Toxoplasma infections in women with high risk of spontaneous abortion. The findings of the present investigation suggest that loop-mediated isothermal amplification (LAMP) assay is a preferred method for determining Toxoplasma infection in pregnant women with serological tests. (15)

In the present study, the seroprevalence of T. gondii among women who had cats was higher than in women who did not. A significant connection was found between the presence of cats in the household and T. gondii seropositivity (P=0.01), Similar results were shown by studies conducted in Luanda (Angola). (16)

Women's awareness about transmitting ways the Toxoplasmosis has a very important role in the prevention and prevalence of diseases in society. (17) Therefore, although 18.4% of the women in our study were IgG antibody positive, only one person was an IgM antibody positive. This means that only one person had an acute illness, despite the fact that 32.4% of women kept cats at home or have been in contact with cats for some time. Therefore, in our studied women group, due to moderate level of knowledge and literacy, the incidence of acute Toxoplasmosis was very low and also the rate of IgG antibody positive was less than other previous reports. Fortunately, 99% of the women in this study had at least a high school education, and their subjects described the toxoplasma parasite.

· **Ethics Approval and Consent to Participate:**

This study was approved by local conventional manner and by the ethical committee of Tehran University of Medical Sciences by number: IR.TUMS.SPH.REC.1398.089.

· **Consent for Publication:** All the authors approved the paper.

· **Funding:** There has been no financial support for this work.

· **Availability of Data and Materials:** All data and information is available.

· **Conflict of Interest:** The authors declare that they have no conflict of interests.

Impact Factor:	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	PIIHQ (Russia) = 0.126	PIF (India) = 1.940
	GIF (Australia) = 0.564	ESJI (KZ) = 9.035	IBI (India) = 4.260
	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

References:

- Dubey, J. P. (2010). "General Biology". *Toxoplasmosis of Animals and Humans* (Second ed.). (pp.1-20). Boca Raton, London, New York: Taylor and Francis Group.
- Pappas, G., Roussos, N., & Falagas, M.E. (2009). "Toxoplasmosis snapshots: global status of *Toxoplasma gondii* seroprevalence and implications for pregnancy and congenital toxoplasmosis". *International Journal for Parasitology*, 39 (12): 1385–94.
- Berdoy, M., Webster, J.P., & Macdonald, D.W. (2000). "Fatal attraction in rats infected with *Toxoplasma gondii*". *Proceedings of the Royal Society of London B: Biological Sciences*, 267 (1452): 1591–94.
- Kami Kim, I., & Weiss, L.M. (2004). *Toxoplasma Gondii: The Model Apicomplexan. Perspectives and Methods. Int J parasitol.*, 34(3): 423-32.
- Liu, Q., Wang, Z., Huang, S., & Zhu, X. (2015). Diagnosis of toxoplasmosis and typing of *Toxoplasma gondii*. *Parasites and Vectors*, 8: 292.
- Ybañez, R. H. D., Ybañez, A. P., & Nishikawa, Y. (2020). Review on the Current Trends of Toxoplasmosis Serodiagnosis in Humans. *Front Cell Infect Microbiol*, 10: 204.
- Layon, A. J., Gabrielli, A., & Friedman, W. A. (2013). Central Nervous System Infections. *Textbook of Neurointensive Care*, 427–517.
- Dubey, J.P., & Dubey, J.P. (2010). *Toxoplasmosis of Animals and Humans*, 2nd ed. (p.313). CRC Press: Boca Rato, FL, USA.
- Parlog, A., Schlüter, D., & Dunay, I.R. (2015). "Toxoplasma gondii-induced neuronal alterations". *Parasite Immunology*, 37 (3): 159–170.
- Mohammed Nasiru Wana, Mohamad Aris Mohd Moklas, Malaika Watanabe, Norshariza Nordin, Ngah Zasmy Unyah, Sharif Alhassan Abdullahi, Ashraf Ahmad Issa Alapid, Tijjani Mustapha, Rusliza Basir, Roslaini Abd. Majid. (2020). A Review on the Prevalence of *Toxoplasma gondii* in Humans and Animals Reported in Malaysia from 2008–2018. *Int. J. Environ. Res. Public Health*, 17: 4809.
- Kuo Zhang Guigao Lin, & Yanxi Han Jinming Li (2016). Serological diagnosis of toxoplasmosis and standardization. *Clinica Chimica Acta*, 461: 83-89.
- Al-Shammari, N., & Iqbal, J. (2021). Decreasing trend in toxoplasma seroprevalence among pregnant women in Kuwait. *Eastern Mediterranean Health Journal*, 27(1): 67-75.
- Bamba, S., Cissé, M., Sangaré, I., Zida, A., Ouattara, S., & Guiguemdé, R. T. (2017). Seroprevalence and risk factors of *Toxoplasma gondii* infection in pregnant women from Bobo Dioulasso, Burkina Faso. *BMC Infect Dis.*, 17(1): 482.
- Khan, M.A., Islam, Z., Jan, A.U., Khan, K., & Shah, A. (2021). Seroepidemiology of toxoplasma gondii infection in child bearing age women in dir Khyberpakhtunkhawa, Pakistan. *Pakistan Journal of Zoology*, 53(1): 375-378.
- Kheirandish, F., Fallahi, S., Mahmoudvand, H., Araban, A., Anbari, K., Rouzbahani, A.K., & Akbari, S. (2021). A loop-mediated isothermal amplification (LAMP) assay for detection of *Toxoplasma gondii* infection in women with spontaneous abortion. *Archives of Microbiology*, 203(2):763-769.
- Vueba, A. N., Faria, C. P., Almendra, R., Santana, P., & do Céu Sousa, M. (2020). Serological prevalence of toxoplasmosis in pregnant women in Luanda (Angola): *Geospatial distribution and its association with socio-demographic and clinical-obstetric determinants*, 15(11): e0241908.
- Ait Hamou, S., & Laboudi, M. (2021). An analytical study on the awareness and practice relating toxoplasmosis among pregnant women in Casablanca, Morocco. *BMC Public Health*, 21(1): Article number 507.