

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

SJIF Impact Factor: 6.711

ISSN: 2457-0400 Volume: 9 Issue: 5 Page N. 173-179 Year: 2025

Original Article

ww.wjahr.com

SEROPREVALENCE OF TORCH INFECTION AMONG PREGNANT LADIES: CROSS-SECTIONAL STUDY CONDUCTED IN MOSUL CITY-IRAQ

¹*Nagham Ismael Ibrahim, ²Ekhlas Ahmed Faraj and ³Entesar M. Ali Hameed

¹M.B.Ch.B./F.I.C.M.S. (OG) ^{2,3}M.B.Ch.B./F.A.B.H.S (FM).

Article Received date: 07 March 2025

Article Revised date: 28 March 2025

Article Accepted date: 18 April 2025



*Corresponding Author: Nagham Ismael Ibrahim M.B.Ch.B./F.I.C.M.S. (OG).

ABSTRACT

Background: Prenatal and antenatal TORCH infections are linked to poor fetal outcomes and infertility. TORCH infections tend to have long-lasting effects on a person's life. Since Irag's Mosul province lacks baseline serological data on the immunity to the TORCH infection during pregnancy, it is essential to enhance prenatal care and evaluate the immunological status of pregnant mothers in order to give suitable counseling and infection control measures. **Objectives:** Is to assess the seroprevalence of TORCH infection during pregnancy among ladies from Mosul city. Methods: This is cross-sectional study included 200 pregnant women recruited from the Gynecology and Obstetrics Department at Al Khansa'a Teaching Hospital and Al Sukar Primary health care center, from January 2024 to April 2025. The questionnaire includes five sections, section one for demographic information, section two for the patients' presenting complaints, section three for the investigation results. Results: The study included 200 pregnant ladies who did TORCH test, the majority of them are presented to the study setting for checking during first trimester. TORCH positive seroprevalence was present among 129 (69.5%) patients of the study participants. Additionally; IgG antibody against Toxoplasma was found to be the positive among (37.5%) followed by IgG antibody against Cytomegalovirus among (29.5%), then IgG against Rubella among (24%), while IgM against Toxoplasma was prevalent among (15.5%) and IgG against Herps simplex was prevalent among (4.5%). The study found that patients with positive history of cat contact during antenatal life and patients with positive history of blood transfusion were statistically significant different for having positive TORCH seroprevalence (P value = 0.031). in contrast to housewives were less likely to have positive TORCH seroprevalence than employed ladies with statistically significant difference (P value <0.001). Positive seroprevalence of toxoplasmosis infections (IgM and IgG) was found to be significantly correlated with age group of less than 25 years (P value <0.001), while positive seroprevalence for Cytomegalovirus infection was founded to be significantly correlated with age group of more than 25 years (P value <0.001). Furthermore; less than 25 vears old age group was found to have infection with mono agent (P value = 0.047). In contrast to those of more than 25 years old which were found to have two agent infection (P value <0.001). Lastly; patients with previous history of first trimester abortion were found to have a significant two agent infection than ladies which were presented for checking or having offspring with congenital anomalies (P value <0.001). Conclusion: Mosul has a relatively high rate of TORCH infection seroprevalence. Long-term IgM persistence makes it difficult to discriminate between acute and chronic infections, therefore; other techniques such as molecular studies like PCR, are one way to distinguish between active infections. Additionally, routine health education campaigns and TORCH vaccination will aid in lowering the incidence of these illnesses.

KEYWORDS: Congenital infection, Antenatal care, Screening, Vaccination.

1. INTRODUCTION

Toxoplasma gondii, rubella virus, cytomegalovirus, and *herpes simplex virus* (types 1 and 2) are the infections that comprise TORCH infection complex.^[1] These maternal infections are linked to poor fetal outcomes and infertility. Additionally; it can be passed on in utero at

L

different stages throughout pregnancy.^[2] If the mother contracts *Toxoplasma* during the first or second trimester of pregnancy, the congenital infection is more severe.^[3] *Rubella* is a minor viral exanthemous illness that can have a severe effect on a fetus's health and reproductive system in adults.^[4] Numerous congenital abnormalities,

L

L

including sensory neural deafness, congenital heart disease, microcephaly, mental retardation, cataracts, blindness, etc., are present in at least 20% of infants infected with Rubella during pregnancy, and around 10% of the babies pass away before reaching one year old.^[5-6] Cytomegalovirus (CMV) from the Herpes viridae family can cause congenital abnormalities in newborns.[[] Although rare, it can cause serious fetal defects such as chorioretinitis, sensorineural deafness, and cerebral palsy.^[8] Disseminated neonatal herpes, which has an 80% case fatality rate, may be brought on by genital herpes, which is primarily caused by herpes simplex virus types 2 and 1 during the third trimester of pregnancy.^[9] Over the past 20 years, *herpes simplex* virus type 2 has been declined, while *herpes simplex* virus type 1 has not.^[9-10] Clinical diagnosis of TORCH infection is unreliable, and the majority of infected cases are asymptomatic. The presence of serum antibodies, especially IgM, in the patient's serum is the primary basis for diagnosing these infections.^[11-12]

TORCH infections tend to have long-lasting effects on a person's life, and the life cycles of TORCH agents show considerable variations.^[13] Additionally; IgG levels rise and IgM levels fall during the natural course of a primary infection.^[14] Women who have *cytomegalovirus* infection and have IgG antibodies are not completely protected against reinfection or reactivation by the same virus.^[14-15]

Since Iraq's Mosul province lacks baseline serological data on the immunity to the TORCH infection during pregnancy, it is essential to enhance prenatal care and evaluate the immunological status of pregnant mothers in order to give suitable counseling and infection control measures. The aim of this study is to assess the seroprevalence of TORCH infection during pregnancy among ladies from Mosul city.

2. PATIENT AND METHODS

This is cross-sectional study included 200 pregnant women recruited from the Gynecology and Obstetrics Department at Al Khansa'a Teaching Hospital and Al Sukar Primary health care center, from January 2024 to April 2025. The study participants were presented to the study setting for routine antenatal check-ups. Regardless of their age or prior obstetric history, all women who agreed to participate in the current study were enrolled. Written agreement was obtained from all of the participating females after they were briefed about the study, its significance.

The study collected basic socio-demographic data, related to TORCH infection by using a modified questionnaire which include; patients' age, residency, presenting complaint, previous history of abortions, stillbirths, deliveries with congenital defect or wellbeing fetus and their TORCH investigation results. Women who were undergoing treatment for TORCH or

L

had previously received treatment were not allowed to participate in the study.

Moreover; the study preceded by taking 3 ml of venous blood was collected from each pregnant lady who consented to participate in the study. Blood samples were transferred to the study setting laboratory. Initially, the blood samples were centrifuged at 4000 revolutions per minute for five minutes. The sera were separated and stored at -20°C for future analysis. By employing ELISA methods in accordance with the manufacturer's instructions. The kits listed below were used:

- 1. BIOTEC Laboratories Ltd.'s Rubella IgG ELISA (UK).
- 2. BIOKIT, S.A. Spain's Rubella IgM ELISA.
- 3. BIOKIT, S.A. Spain's CMV IgG ELISA.
- 4. CMV IgM ELISA.
- 5. The Biotech Laboratories Ltd. (UK) Toxoplasma gondii IgG Elisa kit.
- 6. BIOTECH Laboratories Ltd.'s Toxoplasma gondii IgM (UK).
- 7. Serion Diagnostics' HSV-IgG and IgM Elisa kits (Germany)

Data analysis was done using SPSS (Statistical Package for Social Sciences) software version 30 (IBM Corporation, USA). Frequencies and percentages were used to represent categorical characteristics like patient's gender. A mean \pm standard deviation was used to display continuous variables like patient's age. Comparing percentages of different studied groups was done using the Z test. Also, chi-square (X²) was used to compare groups with qualitative data. A P-value of less than 0.05 determined a statistically significant.

3- RESULTS

The study included 200 pregnant ladies who did TORCH test, the majority of them are presented to the study setting for checking during first trimester, while patients with previous first trimester abortion or congenital anomalies are presented in less frequent percentages. As shown in figure 1.1.



Figure 3.1: Distribution of the study participants according to their chief complaint.

TORCH positive seroprevalence was present among 129 (69.5%) patients of the study participants. As shown in figure 3.2.



Figure 3.2: Prevalence of TORCH infection among the study participants.

Table 3.1 illustrates that patients with positive TORCH seroprevalence was frequently presented accidentally during first trimester checking. While; lesser percentage

of patients having previous abortion during first trimester or previous congenital anomalies.

Table 3.1: Comparison between patients with positive and negative TORCH infection regarding their pr	resenting
complaint.	_

Presenting complaint	TORCH positive seroprevalence, number = 129		TORCH negative seroprevalence, number = 71	
	Number	Percent	Number	Percent
Checking during first trimester (number =115)	77	66.9	38	33.1
Previous abortion during first trimester (number =80)	49	61.25	31	38.75
Previous congenital anomalies (number =5)	3	60	2	40

Table 3.2 shows comparison between patients with positive TORCH seroprevalence and those with negative TORCH seroprevalence regarding different variables. It's evident that patients with positive history of cat contact during antenatal life, were statistically significant different from those with negative history of cat contact during antenatal life (P value < 0.001). Moreover;

patients with positive history of blood transfusion were statistically significant different from those who denied such a history (P value = 0.031). From the other hand; been housewife were less likely to have positive TORCH seroprevalence than employed ladies with statistically significant difference (P value <0.001).

Table 3.2: Comparison between patients with positive and negative TORCH seroprevalence regarding their demographic, history of cat contact and history of blood transfusion.

Variable	TORCH positive	TORCH negative	Р-
Variable	seroprevalence = 129	seroprevalence = 71	value
Residency, number (%):			
Urban	93 (72.1%)	55 (77.5%)	0.240
Rural	36 (27.9%)	16 (22.5%)	0.249
Occupation, number (%):			
Housewife	58 (44.9%)	52 (73.3%)	-0.001
Employee	71 (55.1%)	19 (26.7%)	<0.001
History of contact with cat during			
antenatal life, number (%):			
Positive	101 (78.3%)	33 (46.5%)	-0.001
Negative	28 (21.7%)	38 (53.5%)	<0.001
History of blood transfusion, number (%):			
Positive	11 (8.5%)	0 (0%)	
Negative	118 (91.5%)	71 (100%)	0.031

Table 3.3 shows the number and percent of each one of TORCH antibody test. *Toxoplasma* IgG antibody was the most frequent positive test found in the study, with less

frequent percentages for other tests reaching *Herps simplex* IgG antibody which was the lowest positive test founded in the study.

 Table 3.3: Number and percent of each one of TORCH items within the study participants.

TORCH variable	Number	Percent
<i>Toxoplasma</i> IgM, number (%):		
Positive	31	15.5
Negative	169	84.5
Toxoplasma IgG, number (%):		
Positive	75	37.5
Negative	125	62.5
Cytomegalovirus IgG, number (%):		
- Positive	59	29.5
- Negative	141	70.5
<i>Rubella</i> IgG, number (%):		
- Positive	48	24
- Negative	152	76
Herps simplex IgG, number (%):		
-Positive	9	4.5
-Negative	191	95.5
Negative, number (%):	71	30.5

Table 3.4 explores comparisons between patients aged less than 25 years old and those of more than 25 years old regarding different TORCH antibody variables. It's evident that patients aged less than 25 years old were statistically significant different from those older than 25 years regarding the presence of positive both *Toxoplasma* IgM, *Toxoplasma* IgG (P value <0.001). From the other hand; patients with more than 25 years old were statistically significant different from those of less than 25 years old regarding the positivity of *Cytomegalovirus* IgG.

TORCH antibody variable	Less than 25 years = 120	More than 25 years = 80	P-value
Toxoplasma IgM, number (%):			
- Positive	26 (21.66%)	5 (6.25%)	<0.001
- Negative	94 (78.34%)	75 (93.75%)	
Toxoplasma IgG, number (%):			
- Positive	57 (47.5%)	18 (22.5%)	<0.001
- Negative	63 (52.5%)	62 (77.5%)	
Cytomegalovirus IgG, number (%):			
- Positive	22 (18.33%)	37 (46.25%)	<0.001
- Negative	98 (81.67%)	43 (53.75%)	
<i>Rubella</i> IgG, number (%):			
- Positive	31 (25.83%)	17 (21.25%)	0.328
- Negative	89 (74.17%)	63 (78.75%)	
<i>Herps simplex</i> IgG, number (%):			
- Positive	6 (5%)	3 (3.75%)	0.273
- Negative	113 (95%)	77 (96.25%)	
Negative all tests, number (%):	37 (52.11%)	34 (42.5%)	0.078

 Table 3.4: Comparisons between less and more than 25 years old patients regarding different TORCH antibody variables.

Table 3.5 compares between patients aged less than 25 years old and those of more than 25 years old regarding the multiplicity of TORCH agents. Less than 25 years old patients were statistically different for having mono

agent (P value = 0.047), while more than 25 years old patients were statistically significant for having two agents (P value <0.001).

 Table 3.5: Comparisons between less and more than 25 years old patients regarding the multiplicity of TORCH agents.

TORCH variable	Less than 25 years = 120	More than 25 years = 80	P-value
Infection with mono agent, number (%):	83 (69.16%)	46 (57.5%)	0.047
Infection with two agents, number (%):	17 (14.16%)	37 (46.25%)	<0.001
Infection with three agents, number (%):	6 (5%)	2 (2.5%)	0.192

Table 3.6 illustrates comparison between the study participants' chief presenting complaint and multiplicity of TORCH agents. Patients with previous history of first trimester abortion were statistically significant different from those presented for first trimester checking or having previous history of congenital anomalies regarding the presence of infection by two agents (P value < 0.001).

 Table 3.6: Comparisons between the study participants' chief presenting complaint and multiplicity of TORCH agents.

TORCH variable	Patients checked during first trimester = 115	Patients with previous history of first trimester abortion = 80	Patients with history of congenital anomalies = 5	P-value
Infection with mono agent, number (%):	77 (66.95%)	49 (61.25%)	3 (60%)	0.743
Infection with two agents, number (%):	21 (18.26%)	32 (40%)	0 (0%)	<0.001
Infection with three agents, number (%):	6 (5.21%)	2 (2.5%)	0 (0%)	0.192
Negative, number (%):	38 (33.1%)	31 (38.75%)	2 (40%)	0.367

4- DISCUSSION

Prenatal and antenatal serological screening of pregnant ladies are crucial for managing TORCH infections which resulting from vertical transmission from mother to the fetuses, because these screening can determine the immunological condition of women and diagnose early infection during the first trimester of pregnancy.^[16] Data on the seroprevalence of TORCH infections at the national and regional levels are currently fragmented and inadequate. Even though; at western countries inadequate screening coverage for TORCH susceptibility, primarily among women of reproductive age, due to variations in reporting, prenatal and antenatal screening procedures, and immunization policy.^[17]

This study found that among the study participant, the presence of IgG or IgM seropositive antibody against one of the TORCH agents was 69.5%. Additionally; IgG

antibody against *Toxoplasma* was found to be the positive among (37.5%) followed by IgG antibody against *Cytomegalovirus* among (29.5%), then IgG against *Rubella* among (24%), while IgM against *Toxoplasma* was prevalent among (15.5%) and IgG against *Herps simplex* was prevalent among (4.5%). These results are consistent with Marwa A. Gouda et al study findings.^[18] However; the presence of IgM antibody against *Toxoplasma Gondii* among 15.5 % of study participants indicating recent maternal infection which is runs with Srirupa Pal et al study findings (18%).^[19] But its inferior to the study conducted by Mohammed T. Mahmood et al at 2021 in Mosul (33.3%).^[20] Anyhow; different sampling methods might result in such difference.

Unfortunately, the majority of the study participant did TORCH screening as a routine investigation during first trimester, while the primary infection during pregnancy might have effects on the fetus that cannot be reversed especially among those with weak immune systems. This is mean more coverage campaigns and excessive health promoting programs are need for educating Mosul females about the importance of treating these infections at prenatal stage.

The current study found that patients with positive contact with cat during antenatal life or those with history of blood transfusion were significantly having more TORCH positive seroprevalence. As mentioned in literature review, the distinct pathogenesis of TORCH infection which resulted in serious clinical signs and catastrophic outcomes can be avoided by taking preventative measures, such as avoiding raw meat and cats.^[21-22]

Positive seroprevalence of toxoplasmosis infections (IgM and IgG) was found in the present study to be significantly correlated with age group of less than 25 years, which is the most common childbearing age group. While in contrast, positive seroprevalence for Cytomegalovirus infection was founded to be significantly correlated with age group of more than 25 years. Furthermore; less than 25 years old age group was found in this study to have infection with mono agent in contrast to those of more than 25 years old which were found to have two agent infection. Additionally; patients with previous history of first trimester abortion were found to have a significant two agent infection than ladies which were presented for checking or having offspring with congenital anomalies. These findings emphasize the need for screening all of the ages for TORCH infections in order to identify the susceptible population. Comparable results were obtained from Marwa A. Gouda et al.^[18]

The study limitations are; as the study findings were based solely on the population of Mosul city in Iraq, it is yet unknown whether researchers would find the same outcomes in a different ethnic group. Additionally, the

study did not evaluate patients' housing situation, socioeconomic status, dietary patterns, and immunization status. Which might affect the study results.

5- Conclusion and recommendation

Mosul has a relatively high rate of TORCH infection seroprevalence. According to the study, the majority of seroconversion happens when people are younger than 25 years old. Long-term IgM persistence makes it difficult to discriminate between acute and chronic infections, which is critical during pregnancy, even though the detection of a particular IgM antibody is used to differentiate acute infection. Therefore, other techniques, such as molecular studies like PCR, are one between wav to distinguish active infections. Additionally, routine health education campaigns and TORCH vaccination will aid in lowering the incidence of these illnesses.

ACKNOWLEDGEMENT

We are grateful for the help provided by the medical team at Al Khansa'a Teaching Hospital and Al Sukar Primary health care center, as well as the careful consideration received from the Nineveh Directorate of Health. Without the help of each of these individuals, this study would not have been possible.

CONFLICT OF INTEREST

About this study, the authors disclose no conflicts of interest.

REFERENCES

- Morsy TA, Hussein HE, MORSY AT. TORCH infections, pathogenicity & mortality assessments. Journal of the Egyptian Society of Parasitology, May 1, 2022; 52(1): 53-70.
- Devaraju M, Li A, Ha S, Li M, Shivakumar M, Li H, Nishiguchi EP, Gérardin P, Waldorf KA, Al-Haddad BJ. Beyond TORCH: A narrative review of the impact of antenatal and perinatal infections on the risk of disability. Neuroscience & Biobehavioral Reviews, Oct. 1, 2023; 153: 105390.
- Dubey JP, Murata FH, Cerqueira-Cézar CK, Kwok OC, Villena I. Congenital toxoplasmosis in humans: an update of worldwide rate of congenital infections. Parasitology, Oct. 2021; 148(12): 1406-16.
- da Rosa Hoefel I, de Moraes MR, Hartung Lovato B. Rash. InDermatology in Public Health Environments: A Comprehensive Textbook, Apr. 1, 2023; 1719-1755. Cham: Springer International Publishing.
- 5. Reef SE, Orenstein W. Rubella Virus. InViral Infections of Humans: Epidemiology and Control, Mar. 29, 2024; 1-23. New York, NY: Springer US.
- Al Beloushi M, Saleh H, Ahmed B, Konje JC. Congenital and Perinatal Viral Infections: Consequences for the Mother and Fetus. Viruses, Oct. 30, 2024; 16(11): 1698.
- 7. Pass RF. Human herpesviruses: cytomegalovirus. InViral Infections of Humans: Epidemiology and

Control, Jun. 29, 2022; 1-49. New York, NY: Springer US.

- Modrzejewska M, Połubiński P, Zdanowska O. Ophthalmic Complications, Diagnosis, and Treatment of Congenital Human Cytomegalovirus Infection. Journal of Clinical Medicine, Jun. 8, 2024; 13(12): 3379.
- Koca R, Çetinkaya EA. Herpes Simplex Viruses in Children. InPediatric Airway Diseases, Jan 7, 2025; 859-879. Cham: Springer Nature Switzerland.
- AlMukdad S, Farooqui US, Harfouche M, Aldos L, Abu-Raddad LJ. Epidemiology of herpes simplex virus type 2 in Canada, Australia, and New Zealand: systematic review, meta-analyses, and metaregressions. Sexually transmitted diseases, Jun. 1, 2022; 49(6): 403-13.
- 11. Alareeki A, Osman AM, Khandakji MN, Looker KJ, Harfouche M, Abu-Raddad LJ. Epidemiology of herpes simplex virus type 2 in Europe: systematic review, meta-analyses, and meta-regressions. The Lancet Regional Health–Europe, Feb. 1, 2023; 25.
- 12. Mohammed M, Al-Saadi MS, Al-Karawi AS. An examination of the seroprevalence of torch infections and their correlation with adverse reproductive outcomes in females exhibiting a bad obstetric history. Indian Journal of Microbiology Research, 2023; 10(4): 209-15.
- Radoi CL, Zlatian O, Balasoiu M, Giubelan L, Stoian AC, Dragonu L, Neacsu A, Iliescu DG. Seroprevalence of infections with TORCH agents in Romania: A systematic review. Microorganisms, Aug. 20, 2023; 11(8): 2120.
- Ren X, Wang K, Chang Z, Liu M, Cheng F, Min B, Wei S. Serological Screening of TORCH Pathogen Infections in Infertile Women of Childbearing Age in Northwest China. Reproductive Sciences, Sep. 2024; 31(9): 2877-84.
- 15. Esposito S, Chiopris G, Messina G, D'Alvano T, Perrone S, Principi N. Prevention of congenital cytomegalovirus infection with vaccines: state of the art. Vaccines, May 19, 2021; 9(5): 523.
- Fitzpatrick D, Holmes NE, Hui L. A systematic review of maternal TORCH serology as a screen for suspected fetal infection. Prenatal diagnosis, Jan. 2022; 42(1): 87-96.
- 17. Fuchs FE, Pauly M, Black AP, Hübschen JM. Seroprevalence of torch pathogens in southeast asia. Microorganisms, Mar. 11, 2021; 9(3): 574.
- Gouda MA, Katawy AM, Ashry WM, Said HE. Current status of TORCH infection Seroprevalence in pregnant women: a cross-sectional study in Al Sharqia Governorate, Egypt. Bulletin of the National Research Centre, Aug. 14, 2023; 47(1): 123.
- Pal S, Das N, Pal D. SERO-PREVALENCE AND RISK FACTORS OF TOXOPLASMA GONDI IN PREGNANT WOMEN IN KOLKATA, INDIA. Journal of recent advances in applied sciences, Dec. 1, 2011; 26.
- 20. Mahmood MT, Kahya HF. Serological study of torch complex in pregnant women with an obstetric

L

history in mosul city, iraq. Immunology, 2021; 22: 95-102.

- 21. Smith CT, Megli C, Chappell CA. Infectious Diseases in Pregnancy. Obstetric Anesthesia and Uncommon Disorders, Feb. 1, 2024; 367.
- Ahmadi R, Sadeghinasab J, Siyadatpanah A, Mirzaei F, Aghcheli B, Norouzi R. Frequency of Toxoplasma gondii, Rubella, and Cytomegalovirus Antibodies in Pregnant Women in Yazd Province, Iran. Avicenna Journal of Clinical Microbiology and Infection, Dec. 29, 2023; 10(4): 145-51.