AMJ
ISSN: 0005-2523

ISSN: 0005-2523
Volume 62, Issue 03, May, 2022

TORCH in Repeated Miscarriage in Mosul City

Karam A Aldabbagh[1*], Khalid W. Almola[2], Nadia M. Mahmood[3]

College of Pharmacy, University of Mosul, Mosul, Iraq[1]
College of Medicine, University of Mosul, Mosul, Iraq[2]
Ibn-Siena Teaching Hospital, Mosul, Iraq[3]

Corresponding author: 1*

Keywords:
Abortion, Miscarriage, TORCH, viral infection.

ABSTRACT

TORCH (Toxoplasmosis, Rubella, Cytomegalovirus, and Herpes Simplex) infections are diagnosed by examining the blood for the presence of antibodies of the IgM, and IgG classes to the pathogens of toxoplasmosis, rubella, cytomegalovirus, and herpes. Determine the concentration of antibodies to the listed pathogens. If there are antibodies, this does not mean that the person is necessarily sick. This may mean that he once had this infection and is immune to it. However, if the number of antibodies to a particular infection is very high or increases over time, this already indicates the activity of the process. Moreover, clinically, the disease may not manifest itself or manifest itself in dim, erased forms. The severity of the external manifestations of the disease is in no way connected with the danger of its impact on the fetus. With a pronounced disease, the fetus can remain healthy, and, conversely, in the absence of clinical manifestations, the fetus may or may not be severely affected. Antibodies of Class IgM in the blood appear 2-4 weeks after infection and disappear after 3-9 months. By 3-4 weeks, antibodies of the IgG class appear, and their concentration gradually increases and reaches a peak by 2-5 months from infection. Antibodies of the IgG class remain in the blood for a long time, sometimes for life. If a woman planning a pregnancy, as well as a pregnant woman up to 12 weeks of gestation, is found to have negative.

1. Introduction

Many reasons can be attributed to bad obstetric history (BOH) which could be infections, hormonal, genetic, and many other factors. Specifically, infection is one of the manageable factors that can be prevented or cured [1]. Bad obstetric history (BOH) has many social and psychological impacts on family life, specifically the mother's life and it is more obvious in eastern societies [2]. The most common infections connected to BOH are Toxoplasma Gondi, rubella, cytomegalovirus, and herpes simplex virus and all can be acquired for testing by TORCH test. Such test is frequently asked to be conducted by many gynecologists and obstetricians around the world for women with BOH, especially after suffering from unexplained abortion(s) [3]. This test is conducted serologically by measurement of serum IgG and/or IgM antibodies titer for suspected microbial infections to implicate one (or more) of these microbes in BOH

condition [4].

2. Patients, material, and methods

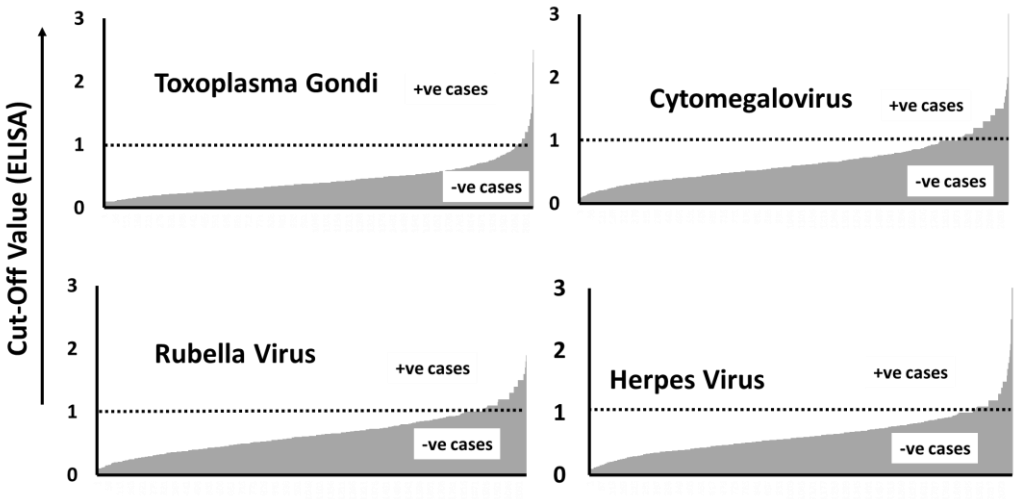
The included data in this study were collected from 2009-2010 Al-Salam teaching hospitals' immunology laboratory records, all patients are women (aged from 20-37 years) who suffered at least once from spontaneous miscarriage [5]. The data include 2130 female patients; all patients are tested for the collected TORCH tests which include anti-toxoplasma gondii IgM antibodies, anti-rubella virus IgM antibodies, anti-cytomegalovirus IgM antibodies, and anti-herpes simplex IgM antibodies in patient's serum using ELISA method as referred by treating gynecologists [6]. The testing methods are conducted by using ELISA kits from BioMerieux company using the instructions as supplied by the company inserts, and the tests are conducted using the ELISA BioTek ELX-800 instrument. Knowing that the accuracy rate of used kits is 97.4% for anti-Toxoplasma gondii IgM antibodies, anti-rubella IgM antibodies, anti-CMV IgM antibodies, and 97% for anti-Herpes simplex IgM antibodies [7].

In the 70s of the last century, a group of infections was identified, the peculiarity of which is that being relatively harmless to adults and children, they become extremely dangerous for pregnant women [8]. This group of infections is usually called TORCH infections, after the first letters of the Latin names of the infections included in it. This abbreviation stands for: TO - toxoplasmosis (Toxoplasmosis); R - rubella (Rubella); C - cytomegalovirus infection (Cytomegalovirus); H - herpetic infection (Herpes simplex virus) [9].

A feature of TORCH infections is that when they infect a woman during pregnancy, they can have a detrimental effect on all systems and organs of the fetus, especially on its central nervous system, increasing the risk of miscarriage, stillbirth, and congenital deformities of the child [10]. Perinatal infections account for approximately 2-3% of all congenital fetal anomalies. Most infections are dangerous when they first become infected during pregnancy. Herpes recurrences can be dangerous during childbirth and in the postpartum period. Often, infection of a pregnant woman with TORCH-complex infections is a direct indication for termination of pregnancy [11].

3. RESULTS AND DISCUSSION

The overall results showed a small number of positive cases in the overall sample of 2130 subjects (figure 1). The highest values were shown in cytomegalovirus and the lowest was associated with toxoplasmosis gondi.



ISSN: 0005-2523
Volume 62, Issue 03, May, 2022

Figure 1. Individual results of ELISA cut-off value representative of overall cases. The dotted line represented the cut-off value above which is where the positive cases lie.

The percentage of positive cases in the overall sample revealed that the prevalence of CMV was the highest and was up to 16% of overall cases and toxoplasmosis was the lowest at 4% (see Table1)

Table 1. The prevalence of the studied virus in subjects included in the study.

Virus type	No. of Positive cases (%)
Toxo	84 (4)
CMV	337 (16)
Rub	309 (15)
Herps	269 (13)

ELISA cut-off values of overall cases have shown that the herpes virus has shown significantly higher ($p<0.05$) values than toxoplasmosis, rubella, and herpes. The results also confirmed that cytomegalovirus is significantly the lowest among the studied virus (Figure 2).

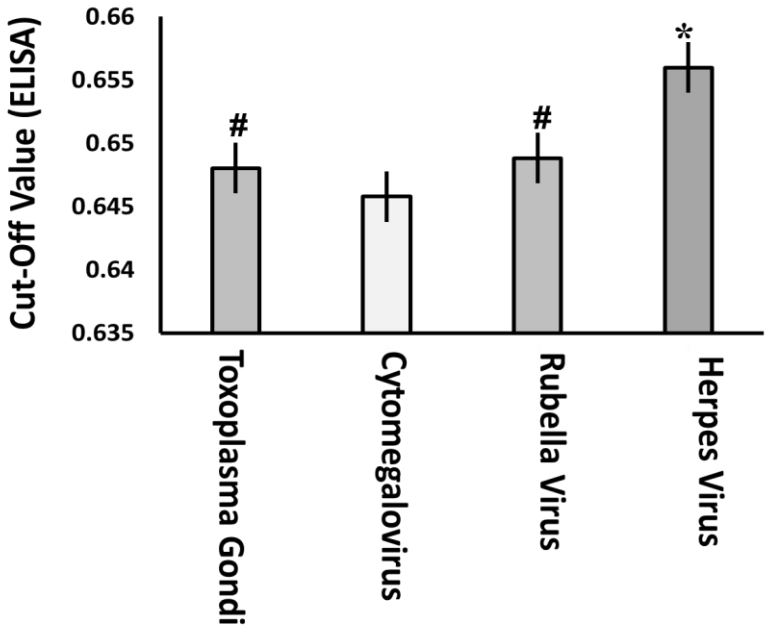


Figure 2. The cut-off value of the studied virus in overall cases. Data expressed as mean±SD, *#$p<0.05$.

The correlation between total samples of each virus and others revealed a weak positive correlation between cytomegalovirus compared to Rubella or herpes simplex while the correlations were negligible between rubella and herpes simplex. Alongside, the correlation has shown a negligible association between toxoplasmosis compared to cytomegalovirus Rubella or herpes simplex (see Table 2)

Table 2. The correlation between total samples included in the study.

Correlation (n=2130 sample)	CMV	Rubella Virus	Herpes Simplex
Toxoplasmosis	0.07	0.04	0.01
CMV		**0.3**	**0.1**

Rubella			0.06

When positive cases were plotted separately (Figure 3), the result revealed that herpes viral infection is significantly ($p<0.05$) higher than that of rubella or cytomegalovirus, or toxoplasmosis gondi. Rubella has shown the lowest value compared to cytomegalovirus or toxoplasmosis gondi.

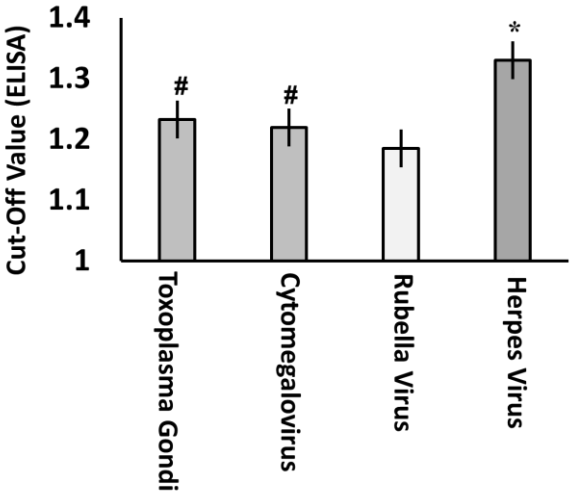


Figure 3. The cut-off value of the studied virus in positive cases (cut-off value ≥1). Data expressed as mean±SD, *#$p<0.05$.

Toxoplasmosis is a widespread disease caused by the intracellular protozoan parasite Toxoplasma gondii. The primary host of Toxoplasma, in whose body this parasite reproduces, is a domestic cat, which most often becomes a source of human infection. In addition, the human infection can also occur through food contaminated or contaminated with parasite oocysts [12]. The disease can be transmitted to the fetus transplacentally from an infected mother. Cases of infection transmission during blood transfusion and organ transplantation are described [13].

Almost 30% of people in the world are infected with toxoplasmosis. In adults, toxoplasmosis is often asymptomatic, sometimes there may be a headache, tonsillitis, asthenia, and in rare cases, lymphadenitis. In exceptional cases, Toxoplasma can cause myocarditis, hepatitis, pneumonia, meningoencephalitis, and eye damage. After the illness, a stable immunity to Toxoplasma is developed [14].

Toxoplasmosis is a danger in the primary infection of a woman during pregnancy. If a woman had the disease before pregnancy (at least six months), her unborn child is not threatened by toxoplasmosis, but if a woman was infected during pregnancy, then much depends on how long the pregnancy toxoplasma entered the body of a pregnant woman [15]. The most dangerous is considered to be infected with toxoplasmosis in the first trimester. In these cases, congenital toxoplasmosis often leads to the death of the fetus or the development of severe lesions of the eyes, liver, spleen, and nervous system of the child.

The frequency of fetal infections varies depending on the period of pregnancy at which the infection of the mother occurred:

- less than 5% when the mother is infected in the first trimester;
- more than 60% when the mother is infected in the third trimester.
- If the mother becomes infected later in pregnancy, the risk of transmission to the fetus is very high,

ISSN: 0005-2523
Volume 62, Issue 03, May, 2022

but the risk of severe damage to the fetus is reduced.

- If a woman has not had toxoplasmosis, then infection during pregnancy can be prevented by observing basic hygiene rules:
- During pregnancy, there should be no contact with cats, especially young ones, because cats infected with toxoplasmosis also develop immunity to it with age.
- To exclude work with the earth in the garden, if it is impossible to completely abandon them, then it is necessary to work only with gloves [16].
- All vegetables, fruits, and herbs must be thoroughly washed before use.
- Avoid contact with raw meat, all meat dishes must be thoroughly boiled or fried.
- The diagnosis of toxoplasmosis is made based on clinical data and laboratory examination data (determination of antibodies to Toxoplasma gondii in the blood).

Rubella is a viral infectious disease transmitted by airborne droplets. The incubation period for rubella is from 11 to 24 days, and the sick person poses a danger to others, starting from the 7th day after infection and up to the 6th day from the moment the rash appears [17]. The disease usually has a benign clinical course, with rare complications. Symptoms are moderate and are characterized by fever, malaise, skin rashes, and conjunctivitis is possible. The disease is usually accompanied by an increase in lymph nodes. After an infection, persistent immunity develops [15]. Women who have recovered from rubella have a high level of protection against reinfection. With reinfection during pregnancy, the risk of infection of the fetus is minimal [16]. Reinfection occurs more frequently in vaccinated people than in those who have had the disease.

Rubella infection in a pregnant woman is deadly to the fetus. The risk of infection of the fetus decreases with increasing gestational age: the highest risk occurs when the mother is infected during the first two months of pregnancy (40-60%), then it progressively decreases during the fourth and fifth months (10-20%) [13]. Infection in the first trimester is an indication of termination of pregnancy [18]. If rubella infection occurred in the second or third trimester of pregnancy, then, as a rule, there are no irreparable consequences for the fetus, but its growth retardation and other disorders are possible [19]. Finally, when infected with rubella in the last month of pregnancy, a child may be born with manifestations of rubella, after which it proceeds in the same way as in children infected after birth, and usually does not cause serious consequences.

Cytomegalovirus infection is an infectious disease caused by cytomegalovirus (CMV). The incidence in the US is as high as 60-70% and nearly 100% in parts of Africa. Most people (40-90%) acquire a primary cytomegalovirus infection during childhood or adulthood [6]. The infection can be transmitted sexually, through saliva, transplacentally from a pregnant woman to a fetus, during organ transplantation. Cytomegalovirus infection can be primary or secondary. After the primary infection, a latent phase occurs, during which the virus can reside in B-lymphocytes. Possible subsequent reactivation of the virus during pregnancy reduced immunity, and immunosuppressive therapy [9].

However, if primary CMV infection occurs during pregnancy, the consequences can be catastrophic [20]. The problem is exacerbated by the fact that the risk of intrauterine transmission of CMV is quite high - the infection occupies one of the first places in intrauterine infection of the fetus. Moreover, infection of the fetus can occur in different ways, not only from a sick mother but also from the father at the time of conception, since CMV may be contained in male sperm [5]. However, most often CMV enters the fetus either through the placenta or through the fetal membranes. Infection of the child can occur during childbirth when passing through the infected birth canal of the mother and while breastfeeding, but this

option is much less dangerous and, as a rule, does not lead to serious consequences for the child [21].

Herpes is a group of viral infections caused by the herpes simplex virus (HSV). HSV is a DNA-containing virus morphologically similar to other viruses of the Herpetoviridae family [22]. There are two types of HSV, with different biological and epidemiological characteristics. Type I affects the mucous membranes of the eyes, mouth, and nose and is one of the causes of severe sporadic encephalitis in adults. Type II in most cases affects the genitals (the so-called urogenital herpes) [23]. HSV is transmitted by airborne droplets and sexually, as well as transplacental from a pregnant mother to her fetus [24]. In the case of a neglected chronic course of the disease, both types of herpes can be manifested by lesions not only of the skin and mucous membranes, but also of the central nervous system, eyes, and internal organs. As with all TORCH infections [25].

4. CONCLUSION

The results of the present study have shown the inconclusive outcome of the superiority of one virus in their contribution to the miscarriage, however, Herpes Simplex seems to be the major and rubella the minor contributor to abortion. Despite that these results are not clear-cut and further larger sample multi-center studies need to be conducted to clarify the outcome.

5. References

[1] Mahmood MT, Kahya HFH. Serological study of torch complex in pregnant women with an obstetric history in mosul city, Iraq. Curr Trends Immunol 2021. https://doi.org/10.31300/ctimm.22.2021.95-102.

[2] Singh L, Mishra S, Prasanna S, Cariappa MP. Seroprevalence of TORCH infections in antenatal and HIV positive patient populations. Med J Armed Forces India 2015. https://doi.org/10.1016/j.mjafi.2014.12.009.

[3] Ahmed Ibrahim Ahmed M, Elzain Musaad H, Mohammed Abdurrahman NA, Mohammed Yasin W, Mohammed Hamad MN, Khalid Abdelrahman N, et al. Seroprevalence of torch infections among complicated pregnancies in Atbara river Nile state - Sudan. MOJ Women's Heal 2021. https://doi.org/10.15406/mojwh.2021.10.00281.

[4] Konikkara KP, Manjiyil IJ, Narayanan VA, Kannambra PN. Seroprevalence of TORCH Infections in Pregnant Women Attending Antenatal Clinic in a Tertiary Care Hospital. J Evol Med Dent Sci 2019. https://doi.org/10.14260/jemds/2019/643.

[5] Goud NS, Reddy MM, Desai S. Incidence and pattern of infections in pregnant women with bad obstetric history. Int J Reprod Contraception, Obstet Gynecol 2021. https://doi.org/10.18203/2320-1770.ijrcog20213848.

[6] Turbadkar D, Mathur M, Rele M. Seroprevalence of TORCH infection in bad obstetric history. Indian J Med Microbiol 2003. https://doi.org/10.1016/s0255-0857(21)03131-5.

[7] Nirmal K, Saha R, Ramachandran VG, Maroof Khan A. TORCH infection in antenatal women: A 5-year hospital-based study. East J Med Sci 2017. https://doi.org/10.32677/ejms.2017.v02.i04.002.

[8] Fiedoruk M, Laskowski K, Tokarska-Rodak M. INFECTIONS CAUSED BY TORCH PATHOGENS CLASSIFIED AS "OTHER." Heal Probl Civiliz 2016. https://doi.org/10.5114/hpc.2016.59634.

ISSN: 0005-2523
Volume 62, Issue 03, May, 2022

[9] Malik S, Shahi N, Dhole TN. Status of TORCH infections and Parvovirus B19 in women with high-risk pregnancy. Int J Infect Dis 2014. https://doi.org/10.1016/j.ijid.2014.03.1066.

[10] Mocanu A, Gorun F, Ciohat I, Navolan D, Malita D, Vilibic-Cavlek T, et al. Simultaneous seroprevalence to toxoplasma gondii, cytomegalovirus and rubella virus in childbearing women from western Romania. Med 2021. https://doi.org/10.3390/medicina57090927.

[11] Sadik MS, Fatima H, Jamil K, Patil C. Study of TORCH profile in patients with bad obstetric history. Biol Med 2012.

[12] Tabacco S, Salvi S. Predictors of Pregnancy Outcome in Antiphospholipid Syndrome: A Review. J Allergy Ther 2016. https://doi.org/10.4172/2155-6121.1000239.

[13] De Carolis S, Botta A, Santucci S, Garofalo S, Martino C, Perrelli A, et al. Predictors of pregnancy outcome in antiphospholipid syndrome: A review. Clin Rev Allergy Immunol 2010. https://doi.org/10.1007/s12016-009-8144-z.

[14] Onoja TO UE, Umeh JC AC. Seroprevalence of Cytomegalovirus Antibodies in Pregnant Women, Benue State, Nigeria. J Infect Dis Ther 2015. https://doi.org/10.4172/2332-0877.1000242.

[15] Sahu SK, Pradhan SK, Nayak LM. Seroprevalence of TORCH infection among pregnant women. Int J Community Med Public Heal 2019. https://doi.org/10.18203/2394-6040.ijcmph20191842.

[16] De Carolis S, Santucci S, Botta A, Salvi S, Degennaro VA, Garufi C, et al. The relationship between TORCH complex false positivity and obstetric outcome in patients with antiphospholipid syndrome. Lupus, 2012. https://doi.org/10.1177/0961203312447866.

[17] Strizhakov A, Ignatko I, Popova J. Antenatal fetal death: The role of infections. J Matern Neonatal Med 2014.

[18] Lamichhane S, Subedi S, Pokharel Ghimire S, Chetri M, Banerjee B. Relationship of Torch Profile in First Trimester Spontaneous Miscarriage. J Nobel Med Coll 2016. https://doi.org/10.3126/jonmc.v5i2.16310.

[19] Kumar H, Singh VA, Isha M, Mehta S, Garg R, Shinu P. Line Immunoassay: A Rapid Test for Screening TORCH Complex in Antenatal Patients with Bad Obstetric History. Mymensingh Med J 2018.

[20] Zimmermann S, Mauer G, Rauwald KH, Schein J. Characterization of an Axial-Injection Plasma Spray Torch. J Therm Spray Technol 2021. https://doi.org/10.1007/s11666-021-01235-6.

[21] Caliari FR, Miranda FS, Reis DAP, Filho GP, Charakhovski LI, Essiptchouk A. Plasma torch for supersonic plasma spray at atmospheric pressure. J Mater Process Technol 2016. https://doi.org/10.1016/j.jmatprotec.2016.06.027.

[22] Fuchs FE, Pauly M, Black AP, Hübschen JM. Seroprevalence of torch pathogens in southeast asia. Microorganisms 2021. https://doi.org/10.3390/microorganisms9030574.

[23] Neu N, Duchon J, Zachariah P. TORCH infections. Clin Perinatol 2015. https://doi.org/10.1016/j.clp.2014.11.001.

[24] Coyne CB, Lazear HM. Zika virus-reigniting the TORCH. Nat Rev Microbiol 2016. https://doi.org/10.1038/nrmicro.2016.125.

[25] Chen L, Liu J, Shi L, Song Y, Song Y, Gao Y, et al. Seasonal influence on TORCH infection and analysis of multi-positive samples with indirect immunofluorescence assay. J Clin Lab Anal 2019. https://doi.org/10.1002/jcla.22828.