

Toxoplasma gondii as an indicator of infection with Cytomegalovirus

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Abstract

A previous study was conducted about pregnancy loss in women caused by *Toxoplasma gondii* parasite, and during the examination and registration of its criteria, it was concluded that a woman who is infected with this parasite must be infected with Cytomegalovirus (CMV). This study was reworked after five years on other patients and the same results were reached. Evidence or examination criteria indicate the presence of pre-existing infection with the virus before infection with the toxoplasmosis parasite, and the parasite cannot be present without this virus accompanying it, while the virus can present without the parasite accompanying it. As if Cytomegalovirus was the ideal condition or the prerequisite for infection with the toxoplasmosis parasite.

Key words: *Toxoplasma gondii*, Cytomegalovirus, Pregnancy loss, and ELISA

Problem

Many pathogens are diagnosed by the ELISA device. Each of these pathogens require special work materials to diagnose it. These materials cost the state millions of dollars. In addition, working on the ELISA device requires focus, accuracy and experience to obtain a reliable result, as well as a time that lasts for hours for performing this test, the matter requires the health institution to provide additional cadres.

Aim of the study

Saving materials, time and effort through the possibility of performing only one test instead of two tests to diagnose pathogens that cause pregnancy loss in women.

Introduction

Abortion is the delivery of fetus before its mature, where this fetus may be alive or dead, before the expected time of parturition because mechanisms failure that control pregnancy. If pregnancy finished before organogenesis, it is called death of early embryonic. A stillbirth is the delivery of dead fetus after matured fully in uterus[1].Pregnancy loss can happen either by noninfectious nutritional, physical, toxic and chemical etiologies or infectious as viral, bacterial, fungal and protozoal etiologies [2].

The most common parasitic infection in humans is toxoplasmosis, which is caused by *Toxoplasma gondii*. Toxoplasmosis may have no symptoms but its effect appears on infected pregnant women by causing her pregnancy loss [3]. Man and most of warm-blooded animals represent intermediate hosts which become infected when consuming contaminated food or water with the cat feces containing oocysts or consuming undercooked meat containing viable tissue cysts [4]. Main economic losses in most classes of livestock, stillbirth and neonatal losses are caused by toxoplasmosis [5].

Cytomegalovirus is one member of the herpesviridae family. Cytomegalovirus is a very important pathogen where miscarriage, mental retardation, and fetal death are caused by this virus [6]. The most common intrauterine infection is congenital CMV (7). Cytomegalovirus can be found in body fluid, saliva, tears, semen, and breast milk of an infected person [8].

Cytomegalovirus represents the prime reason for miscarriage. Infection of *T. gondii* represents the evidence of infection with CMV in the same patient in which *T. gondii* is found. In other words, *T. gondii* is an indicator of CMV infection [9].

Notably, pregnancy loss has been categorized into two terms which are abortion (intentional termination of pregnancy before 28 weeks) and miscarriage (loss of a fetus spontaneously or as a result of an accident).

Materials and Methods

Blood samples were drawn from women (lost pregnancy) who were lying in Bint Alhuda Hospital in Nassiriyah city during 2019 and 2020 years. Serum samples (that were obtained from subjecting the blood samples to centrifuge) were subjected to enzyme-linked immunosorbent assay (ELISA) to perform Anti-Toxoplasma (IgM) - (IgG) and Anti-CMV (IgM) - (IgG) tests by following the procedures that come with kits from the company.

Results and discussion

A total of 884 women who had lost pregnancy, 666 (75.33%) women were infected with Cytomegalovirus, only 4 (0.45%) were infected with *Toxoplasma gondii*, and 198 (1.8%) were infected with Cytomegalovirus + *Toxoplasma gondii* (table 1).

Table (1): Distribution of pathogens percents that are caused (that included in the study) pregnancy loss

Causes of abortion	Number	%
Cytomegalovirus	666	75.33
<i>Toxoplasma gondii</i>	4	0.45
Cytomegalovirus + <i>Toxoplasma gondii</i>	198	22.39
Without of any included causes in this study	16	1.8
Total number	884	

High percentage of infection with Cytomegalovirus, and Correlation of *Toxoplasma gondii* presence with Cytomegalovirus presence are only evidence that *Toxoplasma gondii* is an indicator of the presence of Cytomegalovirus. This conclusion is in agreement with that of [9].

However, percentage of 0.45% is the presence of *Toxoplasma gondii* parasite alone without Cytomegalovirus, which is too small to be taken into account because it may be due to an error in the readings or inaccuracy in preparing the solutions and completing the examination.

Most doctors ask for at least identification of two or three causes of miscarriage from the hospital laboratory in which women had lost pregnancy were found, so when they ask to diagnose *Toxoplasma gondii* and cytomegalovirus together, some steps should be done to shorten the time and save materials and manpower, according to the findings that were reached [10,11].

The study recommends that infection of *Toxoplasma gondii* should be examined at the first and when the result is positive, this definitely means that the result is positive for Cytomegalovirus, therefore, there is no need to waste materials and time and exhaust the staff in conducting an examination whose results are predetermined, however, when the result is negative, in this case, examination of Cytomegalovirus should be conducted to confirm the positive or negative result of this virus. Thus, at least a third of the materials will be available, the price of which can be used to purchase equipment or other materials and a number of staff can be employed in other tasks [12].

Conclusion

The woman who is infected with the toxoplasmosis parasite is definitely infected with the Cytomegalovirus.

References

- 1- Gelaye, A.A.; Taye, K.N. and Mekonen, T. (2014). Magnitude and risk factors of abortion among regular female students in Wolaita. Sodo University, Ethiopia, BMC. Women's Health 14(50):1–9.
- 2- Pretzer, S.D. (2008). Bacterial and protozoal causes of pregnancy loss in the bitch and queen. Theriogenology, 70:320–326. doi: 10.1016/j.theriogenology.2008.04.035.
- 3- Kalantari, N.; Gorgani-Firouzjaee, T.; Moulana, Z.; Chehrizi, M. and Ghaffari, S. (2021). *Toxoplasma gondii* infection and spontaneous abortion: A systematic review and meta-analysis. Microb Pathog, 158:105070. doi: 10.1016/j.micpath.2021.105070.
- 4- Dubey, J.P. (2010). Toxoplasmosis of animals and humans. Second Edition. Boca Raton: CRC Press. Webster Parasites & Vectors, 3:112. <http://www.parasitesandvectors.com/content/3/1/112>.
- 5- Raeghi, S.; Akaberi, A. and Sedeghi, S. (2011). Seroprevalence of *T. gondii* in sheep, cattle and horses in North-West of Iran. Iran J Parasitol., 6: 90–94.
- 6- Abdul Wahab, S.A. (2012). Cytomegalovirus Incidence in Pregnant Women with Recurrent Abortion. J Bioanal Biomed, 4: 6. DOI: 10.4172/1948-593X.1000071.
- 7- Ablfors, K.; Ivansson, S. and Harris (2001). Secondary Maternal Cytomegalovirus Infection-A Significant Cause of Congenital Disease. Pediatrics 107: 1227-1228.
- 8- Zainab I. Mohammed and Maytham T. Qasim. (2021). HORMONAL PROFILE OF MEN DURING INFERTILITY. Biochemical and Cellular Archives 21 (Supplement 1), pp. 2895-2898.
- 9- Tahmasebi S, Qasim MT, Krivenkova MV, Zekiy AO, Thangavelu L, Aravindhan S, Izadi M, Jadidi-Niaragh F, Ghaebi M, Aslani S, Aghebat-Maleki L. The effects of Oxygen-Ozone therapy on regulatory T-cell responses in multiple sclerosis patients. Cell biology international. 2021 Mar 16.
- 10- Gowhari Shabgah A, Qasim MT, Mojtaba Mostafavi S, et al. CXCL chemokine ligand 16: a Swiss army knife chemokine in cancer. Expert Reviews in Molecular Medicine. 2021;23:e4. doi:10.1017/erm.2021.7.
- 11- Geo, J.F.; Brooks, J. and Butel, S. (1995). Nicholas ornston (medical microbiology): 370-378. Cited by Abdul Wahab, S.A. (2012). Cytomegalovirus Incidence in Pregnant Women with Recurrent Abortion. J Bioanal Biomed, 4: 6. DOI: 10.4172/1948-593X.1000071.

- 12- Al-Mozan, H.D.K.; Abbas, A.T.; Salih, H.A.; Hassan, T.; Jabber, A.; Saleh, M. and Katea, K.O. (2015). ABORTION WHEN WOMEN PREGNANT AND EXTENT OF RELATED IT WITH TOXOPLASMA GONDII. G.J.B.A.H.S., 4(1):13-15.