

Detection of anti-CMV IgM and anti-toxoplasma gondii IgG in pregnant women with history of abortion

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Saeed Kholam Husain*

Zagros Kamal Al-Barzanjy*

Amin Aziz Bakir*

Rezan Kamal Ahmad**

Abstract

Background and objectives: Several infection are associated with abortion among them toxoplasmosis and cytomegalovirus infection. *Toxoplasma gondii* causes congenital toxoplasmosis along with HCMV a highly teratogenic virus that interfere embryogenesis. Both infections are almost asymptomatic thus, diagnosis depends primarily on serological tests namely ELISA to detect antibodies in serum of pregnant women.

Methods: A semi-quantitative Elisa technique is applied for detection of anti-toxoplasma IgG and anti-CMV IgM in sera of 348 pregnant women tested in Rezan Private Lab who have previously experienced abortion.

Results: The seropositivity rates are 29.05% for Toxoplasma-IgG and 45.25% for CMV-IgM. The increasing age is associated with increasing times of abortion ($p \leq 0.0001$). Cases with co-infection are more likely to have multiple abortions. The number of abortions is statistically not highly associated with socioeconomic status of pregnant women ($p \geq 0.1364$).

Conclusion: Through this study a plain connection can be figured out between chance of multiple times of abortion and infections caused by CMV and *Toxoplasma gondii*. Similarly, this association is verified more with increasing age while the socioeconomic status of cases is not indicative for the possibility of multiple miscarriages. All these results are rationally expected and in agreement with most other studies.

Key words: Abortion, Congenital Toxoplasmosis, Cytomegalovirus Infections.

Introduction

Infections associated with pregnancy and childbirth has caused concern for women and their caregivers for centuries. Much attention therefore has been focused on understanding these infections¹. Epidemiological studies have associated infections such as toxoplasmosis and cytomegalovirus infection with abortion and stillbirth². Toxoplasmosis is a disease caused by *Toxoplasma gondii* an obligate intracellular protozoan able to infect different species³.⁴ *Toxoplasma gondii* occurs worldwide

and is one of the most common parasitic infections in human frequently associated with congenital infection and abortion⁵. When primary infection occurs during pregnancy, *Toxoplasma gondii* can be transmitted transplacentally from mother to her fetus known as congenital toxoplasmosis⁶. Vertical transmission rates increase from 10 to 15% in the first trimester to 60% in the third trimester. The severity of disease is inversely related to gestational age with worsening sequelae occurring earlier in

*Department of Medical Microbiology, College of Medicine, Hawler Medical University, Erbil, Iraq.

**Department of Biology, College of Science, Salahaddin University, Erbil, Iraq.

pregnancy^{7,8}. Infections in the mother or congenital toxoplasmosis are usually asymptomatic and can only be detected by serological screening for toxoplasma specific antibodies⁹. Human cytomegalovirus (HCMV) is a ubiquitous double-stranded DNA virus belonging to the herpes virus family with capacity to establish life-long latency in the host and represents the major infectious cause of birth defects^{10,11}. Cytomegalovirus is found universally throughout all geographic locations and in all socioeconomic groups¹². Human and higher primates are apparently the only reservoir for the human CMV¹³. It is the most common cause of congenital and perinatal infections throughout the world¹⁴. Primary HCMV infection occurs in 0.5% – 2.0% of all pregnancies^{15,16}. It is a highly teratogenic virus that affects fetal organs after major organogenesis throughout the entire pregnancy¹⁷. However, the damage is still more severe in infections occurring during the first half of pregnancy, while infections in the second half would result in reduced morbidity¹⁸. Seroconversion of antibodies against CMV or the presence of high titers of serum IgG antibody during pregnancy is indicative of primary infection. The presence of serum anti-CMV IgM antibody is also diagnostic evidence of primary or acute CMV infection, and may be seen with reactivation along with IgG¹⁹. The study is done with aim to achieve the following objectives;

- To define the sero-status of toxoplasma IgG and Cytomegalovirus IgM in women with history of abortion.
- To determine the effect of co-infection on repetitive abortion
- To find out the association between abortion and factors like age and socioeconomic status.

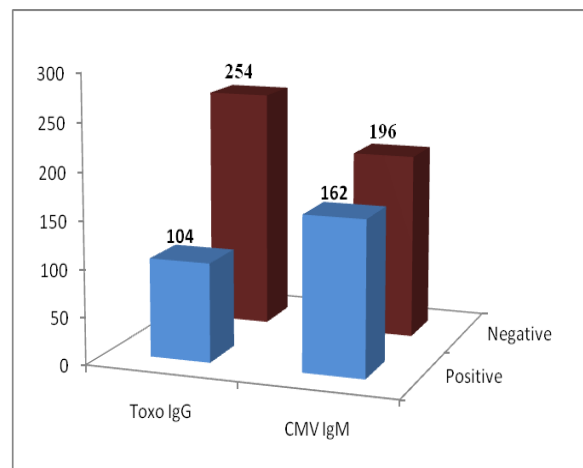
Methods

In this descriptive study 348 pregnant women with history of abortion are subjected for serological test of Toxoplasma IgG and consequently CMV IgM using Elisa test. The specimens of

pregnant women attending Rezan Private Lab in Erbil city are collected from 13th September 2007 to 17th February 2009 in which 5ml venous blood has been taken from each individual to tackle the parameters of age, socioeconomic status, and number of abortions. ToxoIgG Enzyme Immunoassay test kit and Cytomegalovirus (CMV)IgM Enzyme Immunoassay test kit are used to detect serum antibodies against *Toxoplasma gondii* and Cytomegalovirus respectively. The BioCheck ELISA is a semiquantitative method of high accuracy 99.0% level (sensitivity: 100% and Specificity: 97.6%) that needs biosafety level 2. The attained results are analyzed using SPSS (Statistical Package for Social Science) program www.spss.com version 17.0 to find out the associations within and between different variables.

Results

1. Figure (1), reveals that among 358 women tested for antibody seroprevalence, 104 (29.05 %) are anti-Toxo IgG seropositive and 254 (70.95 %) are seronegative. Meanwhile, for anti-CMV IgM antibodies 162 (45.25 %) are seropositive and 196 (54.74 %) are seronegative.



2. Table (1), shows the association between numbers of abortion with seropositivity rates of Toxo IgG and CMV IgM. In 178 pregnant women with only one abortion, 18 (10.11 %) are seropositive for both Toxo IgG and CMV IgM antibodies, 48

are Toxo IgG seropositive and CMV IgM seronegative, 51 (28.65 %) are Toxo IgG seronegative and CMV IgM seropositive,

seronegative, in age group 31 – 35 years 5 seropositive and 18 seronegative, in age group 36 – 40 years 5 seronegative and 11

Table 1: The seroprevalence of Toxo IgG and CMV IgM antibodies regarding the numbers

Toxo IgG Seroprevalence	CMV IgM Seroprevalence						Sum
	One time Abortion			Two and More Abortions			
	Positive	Negative	Total	Positive	Negative	Total	
Positive	18	48	66	30	8	38	104
Negative	51	61	112	63	79	142	254
Total	69	109	178	93	87	180	358
Pearson chi square	0.02		0.00001				

and 61 (34.26 %) are seronegative for both Toxo IgG and CMV IgM.

3. Figure (2), illustrates the seroprevalence of anti-Toxo IgG antibodies in women who are seropositive CMV IgM according to their age. Thus, there is one anti-Toxo IgG seropositive case younger than 16 years old. Among age group 16 – 20 years 10 seropositive and 11 seronegative, in age group 21 – 25 years 7 seropositive and 30 seronegative, in the 26 – 30 years age group 20 are seropositive and 39 are

seronegative, and in those cases of 41 years and older one is seropositive and 4 are seronegative for anti-Toxo IgG antibodies.

4. Table (2), shows that among 178 women with only one abortion 64 are in a low socioeconomic status, 97 have intermediate, and 17 are in a high socioeconomic status. Whereas, those 180 women

Table 2: The numbers of abortions distributed among socioeconomic status.

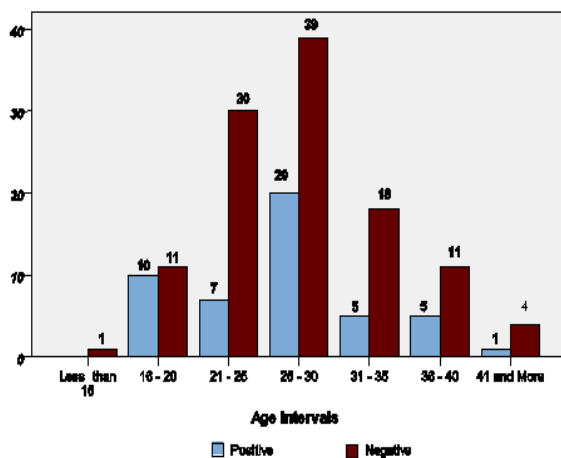


Figure 2: The seroprevalence of anti-Toxo IgG antibodies in CMV IgM seropositive women distributed in different ages.

Times of Abortion	Socioeconomic Status			Total
	Low	Interme-diate	High	
One	64	97	17	178
Two and more	54	89	37	180
Total	118	186	54	358
Pearson chi square	P ≥ 0.01364			

with history of two or more abortions, 54 are in low, 89 in an intermediate, and 37 in high socioeconomic status. There is statistically no significant association between numbers of abortion and the socioeconomic status: ($X^2 P \geq 0.01364$).

Discussion

Infection with bacteria, viruses, and other organisms such as toxoplasma can all interfere with pregnancy, but none seems to be significant causes of early miscarriage²⁰. A considerable link exists between abortion and infections namely; cytomegalovirus and toxoplasmosis. In this regard, the 29.05% seropositivity of toxoplasma IgG in pregnant women with history of abortion accounts for high incidence rate among them that gives the idea of possible cause of first time abortion due to *Toxoplasma gondii*. It is worth to mention that the reliability of testing technique is very high since, the accuracy of applied ELISA kit in this research reaches to 99.0% by means of highest level of sensitivity and specificity characteristics compared with other available similar techniques^{7,21}. Considering this accuracy of technique the serostatus of tested individuals reflects an established infection in seropositive cases. In the same way, an incidence rate of 45.25% of anti-CMV IgM in the same group of aborted women must be taken in consideration; providing that IgM antibodies are related to recent infection and ongoing process of viral interference with embryogenesis²¹. Though, the rate of CMV-IgM seropositivity in the studied group is higher in comparison with a similar study done previously in 2006 on a group of aborted women from Hawler city in which, the seropositivity rate was 30.25%²². Meanwhile, it is relatively lower than results of other researchers namely, Stango and coworkers that achieved 73% also, Munro, et al. with 62.3% of seropositivity in their studied¹². The five years age intervals are allocated over pregnant women subjected for anti-CMV and anti-toxoplasma antibody detection¹.

Thus, our results show the highest infection rate among those enrolled cases at age interval between 16 – 30 years with the maximum ranges located at 16 – 20 years; denoting the fact that despite the chance of recurrent HCMV infections in all stages of life, toxoplasmosis occurs among those of younger ages. Moreover, this result is not coincide with similar studies including a research done by Mombrò et al. that refers the association of older ages with higher incidence of toxoplasmosis²³. Based on our results, the numbers of abortion increase with increasing age; indicating a rational relation that normally along with rising age of individuals there is more experience of miscarriage that has proven by many studies⁴. Considering that toxoplasmosis does not cause subsequent abortion as its effects confined to the first pregnancy loss not more, the results of this study support this fact. Accordingly, a great portion of cases with more than one abortion are seronegative for Toxo-IgG in comparison to those pregnant women with history of only one abortion which is statistically proved ($p \leq 0001$). Among the factors that create problem during pregnancy and related with occurrence of miscarriage is the socioeconomic status in which, the rate of infections namely toxoplasmosis and also cytomegalovirus are high among women of lower socioeconomic²⁴ status and consequently, growing possibility of abortion. Whereas, in our study, the women in high socioeconomic status have more experience of subsequent abortion than those in low or intermediate socioeconomic status. Though, the difference is statistically not highly significant ($p \geq 0.01364$).

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