

Toxoplasmosis and Cytomegalovirus Infection among Aborted Women in Al-Anbar Governorate

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Abstract :

Background: Toxoplasmosis and cytomegalovirus infection constitutes a major economic and public health problem in the world particularly in the developing countries including the Middle East due to the high rate of morbidity and mortality especially, among pregnant women and patients.

Objective: This study was carried out to determine the prevalence of toxoplasmosis and infection among aborted women in order to establish basic knowledge for future pregnancy care.

Materials and Methods: A total number of 340 blood samples (230 samples from aborted women and 110 samples from normal pregnant women as control) was collected and tested for the presence of IgG and IgM concerning *Toxoplasma gondii* and CMV.

Results: A significant higher rate of IgG and IgM specific for Toxoplasma (58.3% and 8.3%) among aborted women than control women (36.4% and 2.7%), respectively. A higher seropositivity rates of anti-CMV IgG (90.4%) and IgM (6.1%) in aborted women than in normal control women (82.7% and 3.6%), respectively. The overall prevalence of toxoplasmosis and CMV infection was increased with increasing age of aborted women and frequency of recurrent of abortion. The rates of toxoplasmosis and CMV infection were higher among aborted women living in rural areas than those living in urban areas.

Conclusion: Toxoplasmosis as well as CMV infection are more prevalent among aborted women.

Key words: Toxoplasmosis, Cytomegalovirus, Abortion, Al-Anbar Governorate.

Introduction:

Toxoplasmosis is a multi-species zoonotic disease caused by *Toxoplasma gondii* that infects up to one third of the world's population (1). Humans become infected through ingestion of food or water contaminated with oocysts shed by cats; eating undercooked or raw meat containing tissue cysts and by transplantations or by blood transfusions (2).

Toxoplasmosis and CMV infection constitute a major economic and public health problem in the world particularly in the developing countries including the Middle East due to the high rate of morbidity and mortality especially among pregnant women and immunocompromised individuals such as haemodialysis patients (3,4,5 and 6).

Toxoplasmosis and CMV infection share many features since both are transmitted parentally, flourishes in states of immunosuppression and most of these infections are asymptomatic (7).

In Iraq, most studies focused on human toxoplasmosis among women of child-bearing age, pregnant women and their neonates. Two of these studies were conducted in Al-Anbar Governorate by (8 and 9), but there was no previous studies on CMV infection in pregnant women, especially in Al-Anbar Governorate.

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Therefore, this study was carried out to determine the seroprevalence of toxoplasmosis and CMV infection and other risk factors among aborted women in Al-Anbar governorate in order to establish basic knowledge for future pregnancy care.

Materials and Methods:

This study was carried out in Iraq , in Al-Anbar Governorate , west of Iraq between 2006 and 2008 and included 230 aborted women (study group), aged 16 and 40 years (mean age:24±7.4years). In addition to 110 healthy pregnant women (control group), aged 16 and 42 years (mean age:26±6.8 years). This is a laboratory-based study which included all blood samples of the study and control groups who were referred by their clinicians and attended Al-Gailani Medical Laboratory (private laboratory) as a case of toxoplasmosis/CMV infection or for routine investigations.

A questionnaire form was filled for each subject by direct interview. The data included: socio- demographic data which included : age, occupation, residency (rural/urban), education level , parity, gravida, history of abortion, single or recurrent (single/recurrent), history of consumption of raw or undercooked meat, vegetable, fruites and drinking unpasteurised milk, history of contact to domesticated particulary cats animals , history of practising outdoor gardening or work on farm and other possible risk factors such as history of blood transfusions and frequent surjical operations . 340 blood samples (230 samples from aborted women and 110 samples from normal pregnant women) were collected and tested for the detection of antibodies (IgG and IgM) specially for toxoplasma gondii and CMV using second generation commercial Enzyme-

Linked Immunosorbent Assay (ELISA) (Bioelisa kit) according to the manufacture's instructions. The sera of all blood samples were

carried out in Al- Ramadi City at Al-Gailani Medical Laboratory.

Statistical Analysis: This was performed using Chi-square test with Yate's correction. P value less than 0.5 was considered as statistically significant.

Results:

In the present study, the results showed that anti-toxoplasma gondii seropositivity rates for IgG and IgM in aborted women were (58.3% and 8.3%); while (36.4% and 2.7%) observed in normal pregnant women , respectively. These differences were statistically significant (P<0.5) (table 1).This table also showed significantly higher seropositivity rates of anti-CMV IgG (90.4%) and IgM (6.1%) in aborted women than normal pregnant women (82.7% and 3.6 %), respectively (P<0.5). All aborted women in this study were between 16 and 40 years old.The distribution of the seropositivity rates of antibodies for toxoplasma gondii and CMV stratified by age, was shown in table (2).It showed that there is a trend in the increasing prevalence of IgG antibodies specific for both toxoplasma gondii and CMV with increasing age of women and this increasing was of statistically significant (P<0.5); while a higher seropositivity rate of IgM specific for *Toxoplasma gondii* was observed among aborted women (12.4%) from age group (21-25), while (5.9%) of the aborted women from age group (16-20) showed positive for anti-CMV IgM antibody.These differences were not of statistically significant (P>0.5).

Table (3) showed seropositivity rates of antibodies (IgG and IgM) for toxoplasmosis and CMV infection in aborted women according to the history of abortion (single/recurrent). Both seropositivity rates of IgG antibodies specific for Toxoplasma and

CMV were found to be higher in women with history of recurrent abortion (63.8% and 94.4%) respectively, than women with history of single abortion (50.5% and 84.6%) respectively.

There is a significant difference in the seropositivity rate when each group of aborted women with history of single abortion or recurrent abortion compared to that detected in normal pregnant women ($P < 0.5$); while there were no significant differences observed regarding seropositivity rates of IgM antibodies specific for toxoplasma gondii and CMV ($P > 0.5$). The distribution of seropositivity rates of antibodies specific for toxoplasma gondii and CMV among aborted women according to their residency (rural/urban) was also studied (table 4). This table showed that aborted women living in rural areas got a significantly higher rate of exposure to *Toxoplasma gondii* and CMV than those living in urban areas ($P < 0.5$).

DISCUSSION:

This study revealed a significant higher seroprevalence of anti-toxoplasma IgG among aborted women (58.3%) than healthy pregnant women (36.4%). This rate is much higher than that previously reported among pregnant and aborted women from different regions in Iraq. In Kirkuk, it was 24.5% (10), in Baghdad 38.8% (11). Very low rates of toxoplasma antibodies were previously recorded by (12) who found that 11% of Iraqi aborted women were positive for toxoplasmosis using indirect immunofluorescent antibody test (IFAT), while (13 and 14) found that 6% of Iraqi pregnant women and 7.5% of Iraqi aborted women showed positive for toxoplasma gondii antibodies, respectively. Two previous studies examined the toxoplasma gondii serologic status in Iraq, at Al-Anbar governorate, reported seropositivity rates of 66.6% and 69.7% among aborted women by (8 and 9) respectively, which were slightly higher than our finding in this study.

With regard to studies from Arabian and other developing countries which showed a great variations in the prevalence of toxoplasma gondii IgG in pregnant and aborted women. (15) found that toxoplasma IgG antibodies

were 22.3% among delivering women and 15.8% in child-bearing age women in Bahrain,; 22.9% in United Arab Emirates (16); 35.6% in Saudi Arabia (17) and in Egypt, the rate was 27.8% using IFAT (18) and 81.4% using ELISA (19).

In developing countries, where standards of hygiene were low, many studies reported a higher and also variable results on the prevalence of anti-toxoplasma gondii in pregnant and aborted women. In Turkey, 30.19% (20); India, 43.7% (21); Brazil, 50-76% (22); Greece, 50.2% (23) and Nigeria, 75.4% (24).

In developed countries which enjoy a high standards of hygiene, the prevalence of anti-toxoplasma gondii is variable but lower than in the developing countries. In United Kingdom 7.7% (25); Sweden, 14-25.7% (26) and Spain 30% (27); Norway 10.9% (28).

In this study, toxoplasma IgM was observed in 8.3% of the aborted women and this is significant, when compared to its occurrence in 2.7% of the normal pregnant women. This rate is lower when compared to the 19.58% toxoplasma infection observed in Al-Anbar by Al-Ani (8) and 11.6% among child-bearing age women in Bahrain by Tabbara and Saleh (15). This prevalence is much lower than that reported among aborted Indian women who found that 50.7% of them were positive for toxoplasma IgM (29). On the other hand, our finding is higher than that reported by (16) who found that 3% of the delivering women in (8), UAE, were positive for IgM toxoplasmosis, in India, Brazil, 0.5% (30). Comparatively, much lower seroprevalence rates of toxoplasma IgM have been reported ranging from 0.0% to 0.1% in various countries (20,23 and 31).

In this study, the seropositivity rate of anti-CMV IgG was detected in (90.4%) of the

aborted women and (82.7%) of the normal pregnant women. Seroprevalence rates of CMV vary geographically. In Iraq, no previous studies have been conducted to determine seroprevalence of CMV infection in aborted

and pregnant women (32) found that seroprevalence of anti-CMV IgG among the general Iraqi population was 95.4%. In other studies, carried out in Baghdad, (33) found that 100% and 92.6% of HIV/AIDS patients and healthy controls were positive for anti-CMV IgG antibodies respectively; (34) also found that 99.6% and 92.6% of the immunocompromised patients and healthy controls were positive for anti-CMV IgG, respectively. These findings are higher than that reported in our study.

This prevalence is also lower as compared to other reports from different countries. In Nigeria 100% (35); Tunisia, 98.57% (36); Saudi Arabia 92.1% (17). On the other hand, this prevalence is higher than that previously reported in other countries. In France 51.5% (37); Spain 66% (38); Russia 78% (39) and North America 60% (40) IgM antibodies show in the blood as early as 7-10 days after infection and normally disappear from blood within 6-12 weeks. However, in some cases, IgM antibodies can be detected for as long as 8 months, and in up to 10% of reactivations; therefore, the detection of anti-CMV IgM antibodies is not necessarily an indication of recent or acute infection (41).

In our study, twofold increase in the prevalence of anti-CMV IgM among aborted women (6.3%) than normal pregnant women (3.7%). In Iraq, (33) reported a significantly higher prevalence of CMV IgM antibodies among AIDS patient (42.9%) than among HIV infected patients (0.0%) and healthy controls (0.8%). Our finding is fit to the study conducted in Bahrain by (15) who found that 6.3% of women in maternity wards were positive for anti-CMV IgM. This rate is much lower than that reported in India by. (29), who found that 28.2% of the aborted women were

positive for anti-CMV IgM. Other studies report lower rates of infection: 3% in Al-Ain, UAE, (16), 2.2% in Houston, 1.6-3.7% in Birmingham, and 0.009-0.7% in U.K. (42, 43d and 44).

The higher rates of toxoplasmosis and CMV infection among aborted women and their differences to other studies from different countries, or differences between different localities within a country may be due to differences in socio-demographic characteristics of the samples included in this study. In addition to socio-economic status, eating habits, household contact to animals, climatic conditions, availability of felines, level of hygiene, educational level, sensitivity and specificity of various employed serological techniques and/ or inter researchers differences in interpretation of serological technique (2, 20 and 45).

The distribution of IgG and IgM specific for toxoplasma gondii and CMV observed, according to maternal age groups, follows the worldwide pattern being higher in older age groups. This finding is in agreement with other studies (8, 9, 11, 44, and 46), though reports to the contrary also exist (47, 48 and 49). This finding may be attributed to poor hygiene, low standard of living; in addition, most of the older aborted women having long time in practice with household contact with soil, cutting meat, indoor contact with domestic animals, especially cats. All these factors may increase the chance for exposure to these microbial agents (20, 45 and 50).

A significantly higher prevalence of toxoplasmosis and CMV was observed among aborted women with history of recurrent abortion than women with history of spontaneous or single abortion in compatible to finding among normal pregnant women. This indicates that toxoplasma and CMV infections may be responsible for repeated history of abortion. This finding is in agreement with other studies from different countries that found positive correlation in seroprevalence of

toxoplasmosis and CMV infection with increasing frequency of abortions(in Egypt, (18), Jordan (51).,Iraq, (9) and India, (29), though studies to the contrary also present.In Turkey, (52) found a higher seropositivity rate

of toxoplasmosis among women with no history of abortion (34.6%) than women with history of abortion (17%). The hypothesis of (53) suggested that chronic toxoplasmosis causes abortion by the local effect of the parasite encysted in the uterus and not by spontaneous parasitemia. So toxoplasma gondii released from cyst in the myometium as a result of trophoblastic penetration.

The overall seroprevalence of toxoplasmosis and CMV infection was significantly higher among aborted women living in rural areas than those living in the urban areas. This result supports the finding of (9) who found that the rate of toxoplasma infection among aborted women living in rural areas (44.2%) was nearly two times greater than those living in urban areas (25.6%). Our finding is also similar to other reports from various countries: In Iraq, (8); Kuwait, (54); UAE, (49); Sudan, (55); Spain, (23); Russia, (39) and Italia, (8). On the other hand, this result was in contrary to other studies reported in other countries:In Iraq, (11); Norway, (28); Saudi Arabia, (56)UK, (44) and USA, (57).

The higher rate of toxoplasmosis and CMV infection among aborted women living in

rural areas than those living in urban areas may be due to the fact that the majority of the

aborted women living in rural areas were from low socio-economic status, low educational level and low standards of hygiene.In addition to that most of them were in frequent contact with soil that may be heavily contaminated with oocysts because of the high number of definitive feline hosts the load of oocyst in the soil, or contact with domestic animals as well as in contact to raw meat ,vegetables or in processing of meat and consumption of unpastuerised milk and untreated wateror unwashing fruites which are more prevalent in those living in rural areas (1,45 and 58)

In conclusion, the results of this study confirm a high prevalence of toxoplasmosis and CMV infection among aborted women. Toxoplasmosis and CMV infection increased with age and with increasing frequency of abortion and more prevalent in aborted women living in rural areas. According to thisreason, we recommend that prenatal and periodic serological screening program for early detection of toxoplasmosis and CMV infection in pregnant and aborted women in Iraq is necessary. Finally, more commmmunity-based studies are required to shed more light on the prevalence rates of toxoplasmosis as well as CMV infection in Iraq and the contribution of various known transmission risk factors.

Table-1: Seroprevalence of toxoplasmosis and CMV infection among pregnant and aborted women.

Study Group	Total No. tested	Anti-Toxoplasma IgG Positive No %	Anti-Toxoplasma IgM Positive No %	AntiCMV IgG Positive No %	AntiCMV IgM Positive No %
Aborted women	230	134 58.3	19 8.3	208 90.4	14 6.1
Pregnant women	110	40 36.4	3 2.7	91 82.7	4 3.6
Total	340	174 51.2	22 6.5	298 87.6	18 5.3
		P<0.5	P<0.5	P<0.5	P>0.5

Table -2: Seroprevalence of toxoplasmosis and CMV infection among aborted women according to age.

Age Groups	Total No. Tested	Anti-Toxoplasma IgG		Anti-Toxoplasma IgM		Anti-CMV IgG		Anti-CMV IgM	
		No.+	%	No.+	%	No.+	%	No.+	%
16-20	51	27	52.9	2	3.5	45	88.2	3	5.9
21-25	89	50	56.2	11	12.4	76	85.4	0	0
26-30	56	36	64.3	4	7.1	51	91.1	1	1.9
31-35	25	15	60	2	8	23	92	0	0
36-40	9	6	66.7	0	0	9	100	0	0
Total	230	134	58.3	19	8.3	208	90.4	4	1.7
		P<0.5		P>0.5		P<0.5		P>0.5	

Table -3: Seropositivity of antibodies for toxoplasma gondii and CMV in women according to the history of abortion.

Type of abortion	Total No. tested	Anti-Toxoplasma IgG		Anti-toxoplasma IgM		Anti-CMV IgG		Anti-CMV IgM	
		No.+	%	No.+	%	No.+	%	N0+	%
Single	91	46	50.5	12	13.2	77	84.6	1	1.1
Recurrent	139	88	63.8	7	5	131	94.4	3	2.2
Total	230	134	58.3	19	8.3	208	90.4	4	1.7

Table -4: Seroprevalence of Toxoplasmosis and CMV infection among aborted women according to their residence.

Residence	Total No. tested	Anti-Toxoplasma IgG		Anti-Toxoplasma IgM		Anti-CMV IgG		Anti-CMV IgM	
		No.+	%	No.+	%	No.+	%	No.+	%
Rural	142	98	69	15	10.6	133	93.7	4	2.8
Urban	88	36	40.9	4	4.5	75	85.2	0	0
Total	230	134	58.3	19	8.3	208	90.4	4	1.7
		P<0.5		P<0.5		P<0.5			

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