
THE POSSIBLE ROLE OF TOXOPLASMOSIS IN THE DEVELOPMENT OF ANTIPHOSPHOLIPID ANTIBODIES IN PREGNANCY-RELATED COMPLICATIONS

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The study studied the participation of *toxoplasma gondii* in the formation of antiphospholipid antibodies in pregnant women. The results showed that previous infection with *toxoplasma gondii* might lead to development antiphospholipid antibodies, which in turn might predispose to infertility, and abortion.

Key words: antiphospholipid antibodies, toxoplasmosis, pregnant women, abortion.

Introduction. Toxoplasmosis is a parasitic disease caused by the protozoan *Toxoplasma gondii* [1]. Congenital toxoplasmosis is a known fetal complication of infection during prenatal life from infected mother. Congenital infection leads to abortion, stillbirth, chorioretinitis, intracerebral calcifications, psychomotor disturbances, and hydrocephaly or microcephaly. Prenatal toxoplasmosis is a major cause of blindness and other congenital defects [2]. Antiphospholipid syndrome or antiphospholipid antibody syndrome is a known disorder of coagulation [3], which causes blood clots (thrombosis) in both arteries and veins, as well as pregnancy-related complications such as miscarriage or stillbirth, preterm delivery, or severe preeclampsia. The syndrome occurs due to the autoimmune production of antibodies against phospholipid (aPL), a cell membrane substance. Antiphospholipid syndrome is an autoimmune disease, though the exact cause of the formation of antiphospholipid antibodies is not known [4; 5]. *Toxoplasma gondii* might play a role in the formation of these autoantibodies with their consequences on pregnancy [6].

Aim of study. This paper aims to study the possibility of participation of *Toxoplasma gondii* in the formation of antiphospholipid antibodies in pregnant women.

Patients and Methods. The patient group was pregnant women were having antibody markers of recent or previous *Toxoplasma gondii* infection. The number of patient group was 118. The control group included healthy pregnant women with negative serological feature of *Toxoplasma gondii* infection. The control group was number and age matched with patient group. A signed consent was taken from each participant in the study. The study was done in Kamal Al-Samarae Hospital in Baghdad through a period of 11 months (8—2009 until 7—2010). A questionnaire was designated to include demographical data and some other information related to pregnancy. For screening of blood, five-milliliter blood sample was collected aseptically into a sterile test tube from each woman in the study and tested for IgM anti-*toxoplasma gondii* antibodies and

IgG anti-toxoplasma gondii antibodies, those who showed serological feature of *Toxoplasma gondii* infection (recent or previous) were included in patient group and further investigations for IgM anti-phospholipid antibodies, and IgG anti-phospholipid antibodies. The serological profile was determined by using Enzyme-Linked Immunosorbent Assay (ELISA). The assay has 99% sensitivity and 99% specificity. Samples were tested in duplicate and those who are positive for any of the above antibodies were re-tested. Results above the cutoff values were considered positive [7].

Statistical analysis. The mean age group, age intervals, time since marriage, number of abortions, and some other features were recorded. We set up a hypothesis that to be tested using Chi-Square test at 95% of confidence level and degree of freedom equal to one.

Results. The entire patients group had IgG anti-toxoplasma antibodies, while the IgM anti-toxoplasma antibodies were found in only six patients. The mean age of women was 32 ($\pm 2,4$) and the age group 30—34 was the most frequent. The mean of duration since marriage is 6 years ($\pm 1,7$). The results revealed that 17 (15,1%) women in patients group were positive for IgM antiphospholipid antibodies, while only one (0,8%) of control group was positive and the results were significant ($P < 0,05$). This is shown in table 1.

Table 1

Seroprevalence of IgM antiphospholipid antibodies in study groups

Serological markers	Patients group	Control group
Positive IgM antiphospholipid antibodies	17	1
Negative IgM antiphospholipid antibodies	101	117

$$\chi^2 = 15,39; P < 0,05.$$

The IgG antiphospholipid antibodies were positive in 32 (27,12%) of patients group and only two (1,7%) of the control group, the results were significant ($P < 0,05$). This is demonstrated in table 2.

Table 2

Seroprevalence of IgG antiphospholipid antibodies in study groups

Serological markers	Patients group	Control group
Positive IgG antiphospholipid antibodies	32	2
Negative IgG antiphospholipid antibodies	86	116

$$\chi^2 = 32,89; P < 0,05.$$

The pregnancy condition was followed in both groups and the number of abortions or stillbirths in study group was 30 (21 for those with IgM antiphospholipid antibodies and nine for those having IgG antiphospholipid antibodies), while only 8 of control group got abortions or stillbirths and the results were significant ($P < 0,05$), this is described in tables 3 and 4.

Table 3

The pregnancy outcome for patients group and control group

Pregnancy outcome	Patients group	Control group
Abortion or stillbirth	30	8
Full term labour	88	110

$$\chi^2 = 15,18; P < 0,05.$$

The pregnancy outcome for patients' group and control group

Infertility	Patients group	Control group
Primary infertility	12	5
Secondary infertility	22	1
No infertility	84	112

$$\chi^2 = 23,6; P < 0,05.$$

The results revealed no correlation between the concentration of IgG antiphospholipid antibodies and the time of abortion or stillbirth, as the correlation coefficient (r) was close to zero.

The results showed that 34 of patients group (30,3%) have history of infertility, most of them having secondary infertility and showing IgG antiphospholipid antibodies, while only 6 (5%) of control group have history of infertility and most of them are primary infertility, and the results were significant ($P < 0,05$). This is demonstrated in table 4.

Discussion. Many studies showed that *Toxoplasma gondii* infection and antiphospholipid antibodies are among many causes of pregnancy loss [8], but the possible participation of both in single pregnancy loss has not been studied before. APA represent a family of antibodies of different specificities, most of which are directed toward different anionic phospholipids, which include cardiolipin and phosphatidylcholine [9].

In this study, the highly significant differences regarding the presence of antiphospholipid antibodies of both types IgM and IgG in patients with toxoplasmosis when compared to those in control group illustrate the presence of a relation between *Toxoplasma gondii* infection and the possibility of developing antiphospholipid antibodies by mechanisms need to be explore. One possibility is the presence of autoimmune phenomenon that responsible for developing these autoantibodies due to antigen similarity between some *Toxoplasma gondii* epitopes and human cell membrane antigens, which might lead to cross reactivity. Thus, antiphospholipid antibodies in these patients might be post-toxoplasmal infection antibodies. Many studies suggest the pathological role of antiphospholipid antibodies in pregnancy loss [10]. Antiphospholipid syndrome is well established as a cause of later miscarriages as it is associated with slow progressive thrombosis and infarction of the placenta, which could lead to pregnancy loss [11], though some physicians are still unsure about the role of antiphospholipid antibodies in early miscarriage [12].

There is no correlation between IgG concentration and the time of abortion, which might indicate the presence of many factors participating in pathogenesis of pregnancy loss. The presence of abortions, stillbirths, or infertility in those patients having antiphospholipid antibodies without apparent or recent toxoplasma infection might reflect the participation of these autoantibodies in the pathogenesis of these complications during pregnancy.

Conclusion. The previous infection with *Toxoplasma gondii* might lead to development of antiphospholipid antibodies, which in turn are responsible for infertility, abortion, and stillbirth. Thus, pregnant women show negative recent toxoplasma infections and have such complications should be screened for antiphospholipid antibodies.

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ВОЗМОЖНАЯ РОЛЬ ТОКСОПЛАЗМОЗА В РАЗВИТИИ АНТИФОСФОЛИПИДНЫХ АНТИТЕЛ В СВЯЗАННЫХ С БЕРЕМЕННОСТЬЮ ОСЛОЖНЕНИЙ

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Изучали участие токсоплазмы гондий в образовании антифосфолипидных антител у беременных женщин. Результаты показали, что предыдущие инфекции токсоплазмы гондий могут привести к развитию антифосфолипидных антител, что, в свою очередь, может предрасполагать к бесплодию и аборту.

Ключевые слова: антифосфолипидные антитела, токсоплазмоз беременных, аборт.