

# Seroprevalence Of Toxoplasma Gondii Antibodies Among Pregnant Women In Babylon Province, Iraq

الانتشار المصلي للأجسام المضادة للطفيلي *Toxoplasma gondii* بين النساء الحوامل في محافظة بابل، العراق

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## الخلاصة:

**الهدف:** هدفت هذه الدراسة إلى تحديد الأجسام المضادة لطفيلي الـ *Toxoplasma* في النساء الحوامل في محافظة بابل باستخدام طريقة الاليزا.  
**المنهجية:** تم اخذ عينات دم من ٣٩٨ امرأة حامل من مركز صحي في قضاء المحاويل، شمال بابل. تم تقدير الأضداد المناعية IgM و IgG .  
**النتائج:** حلت النتائج إحصائيا بنظام SPSS 12 باستخدام مربع كاي. كانت النسب المئوية لانتشار الأجسام المضادة للطفيلي التوكسوبلازما IgM و IgG والمختلطة IgM و IgG والكلية هي ١٨.٠٩% و ٩.٧٩% و ١.٧٥% و ٢٩.٦٤% على التوالي.  
**الاستنتاج:** وجد علاقة معنوية بين الانتشار المصلي للإصابة بالمقوس الكوندي وفترة الحمل، حيث كان الانتشار الكلي للأضداد عالية في الفصل الثالث للحمل (٤٢.٦٩%). تركيز IgG كان الأعلى أيضا في الفصل الثالث للحمل (١٥٩.٦١ وحدة/لتر).  
**التوصيات:** تحديد الأضداد المناعية لطفيلي *Toxoplasma* IgM, IgG والمختلطة خلال فترة الحمل مهم جدا في التعرف على الطفيلي .

## Abstract

**Objective:** The aim of this study was to determine the *Toxoplasma* antibodies in pregnant women in Babylon, by ELISA method.

**Methodology:** Blood samples were taken from 398 pregnant women referred to the health centers of Al-Mahaweel City, North Babylon, IgM and IgG titers were primarily evaluated.

**Results:** The collected data were analyzed with SPSS 12 using Chi-Square test. Anti -*Toxoplasma* IgG, IgM, mixed IgG and IgM and Overall seropositivity of all antibodies were 18.09%, 9.79%, 1.75% and 29.64% respectively.

**Conclusion:** significant relationship was found between the seroprevalence of *T. gondii* infection and gestational age, the total prevalence was more in thrid trimester of pregnancy (42.69%). IgG were more concentration in third trimester (159.61 U/l).

**Recommendation:** Anibodies determination IgG, IgM, and mixd antibodies during pregnancy is very important in parasite identification.

**Keyword:** Seroprevalence, Toxoplasmosis, IgM, IgG, Pregnant, Eliaza.

## INTRODUCTION

Toxoplasmosis is a zoonotic disease caused by a protozoan parasite called *Toxoplasma gondii* which infect all mammals and birds species throughout the world (Ghoneim *et al.*, 2009). Most of the *Toxoplasma* infections are asymptomatic; the diagnosis relies mainly on the results of serological tests. Serious disease can result when the host is immunocompromised. Toxoplasmosis could also influence the human pregnancy (Kaňková *et al.*, 2007).The clinical implications of *Toxoplasma* infection in pregnant patients are manifold. Such patients may have spontaneous abortions, stillbirths or premature delivery in addition to various fetal anomalies (Jani and Dave, 1994). The foetus is only at risk of congenital disease when acute infection occurs during pregnancy. Congenital infection has also been reported from a chronically infected immunocompromised mother with a reactivation of toxoplasmosis (Marcinek *et al.*, 2008).

There are many studies on the prevalence of anti-*T. gondii* antibody among women in Iraq. The study of A'aiz (2010) demonstrated the prevalence of

toxoplasmosis among the women by using Latex test was 59.9%, and was 47.4% (IgG & IgM) when using ELISA test for seropositive cases of latex test. Aziz and Druish (2011) selected 122 aborted women to confirm toxoplasmosis by using ELISA test, the result showed that 51 (41.8%) women had antibodies against *Toxoplasma gondii*, 25 (59.5%) women were positive for IgG, and 17 (40.5%) women were positive for IgM, while 9 (17.6%) women were positive for both. The study of Addory (2011) on 226 pregnant women had single or multiple fetal loss in Salah – Adden government, indicated 66 (29.2%) of pregnant women had Toxoplasmosis by use enzyme-linked immunofluorescent assay. Anti-*Toxoplasma* IgG was 59 (26.1%) of cases while IgM antibody was 7 (3.1%) of cases. In the epidemiological and immunological study of Almosawi (2012) on *Toxoplasma gondii* in Babylon province included pregnant and non-pregnant women, showed that the total percent of seroprevalence of anti-*Toxoplasma* antibodies was 65.8% by using latex test and 60.3%, 17.7% and 42.3% for IgG, IgM and IgG and IgM respectively when using ELISA test for seropositive cases of latex test.

The present study was performed to determine the *Toxoplasma* antibodies in pregnant women in Babylon, by ELISA method because of its high sensitivity and specificity, easier technique and lower expense, which is preferred in order to screening *Toxoplasma* infection.

## **MATERIALS AND METHODS**

### **Samples:**

398 pregnant women were investigated about IgG and IgM serum antibodies for *Toxoplasma* parasite by ELISA method in the present study, during the period May 2011 to March 2012. All blood samples of these women were obtained from the typical Al-Mahaweel healthy center in north of Babylon province, this center includes pregnant care unit where pregnant women visited monthly, the ages of the pregnant women were  $26.53 \pm 7.3$  with a range of 18-42 years. The pregnant women were divided into 3 groups by gestational age; the first trimester (1.0 – 12.0 wk, n = 95), the second trimester (12.1 – 24.0 wk, n = 214) and third trimester (24.1 – 32.0 wk, n = 89).

### **Collection of samples:**

Disposable syringes and needles were used for blood collection. Venous blood samples, about 4-5 ml were collected from pregnant women in plain tubes. After allowing the blood to clot at room temperature for 15 min, blood samples were centrifuged at 3000 xg for 15 min. Sera were separated, and stored in -40 C° for determination of IgG and IgM anti-*Toxoplasma* antibodies.

### **Determination of IgG and IgM *Toxoplasma* antibodies**

For the qualitative and quantitative detection of IgM and IgG *Toxoplasma gondii* antibodies in serum of pregnant women used two types kits are *Toxoplasma* IgM EIA (enzyme immunoassay) Test Kit and *Toxoplasma* IgG EIA (enzyme immunoassay) Test Kit manufactured by ACON Laboratories, Inc. San Diego, USA.

### **Statistical analysis**

Statistical analysis was performed with SPSS software package (Version 12 for Windows). For comparison of three groups of continuous variables, chi square ( $\chi^2$ ) test was used. A probability value of  $P < 0.05$  indicated a statistically significant difference. One way ANOVA test (LSD value) was also used where appropriate.

## RESULT

**Table 1. Overall prevalence of anti- *T.gondii* antibodies in pregnant women**

<i>Toxoplasma</i> antibodies	total	+ve no.	%
IgG	398	72	18.09
IgM	398	39	9.79
IgG+IgM	398	7	1.75
total	398	118	29.64

A total of 398 pregnant women were included in the study. Of them 95 were at 1st trimester, 214 were at 2nd trimester, and 89 were at the 3rd trimester.

The prevalence of IgG and IgM anti-*Toxoplasma* antibodies were positive in 72/398 cases (18.09%) and 39/398 cases (9.79%), respectively. Mixed seropositive for IgG and IgM were recorded in 7/398 cases (1.75% ), the total prevalence of all antibodies were positive in 118/398 cases (29.64%) as show in table 1.

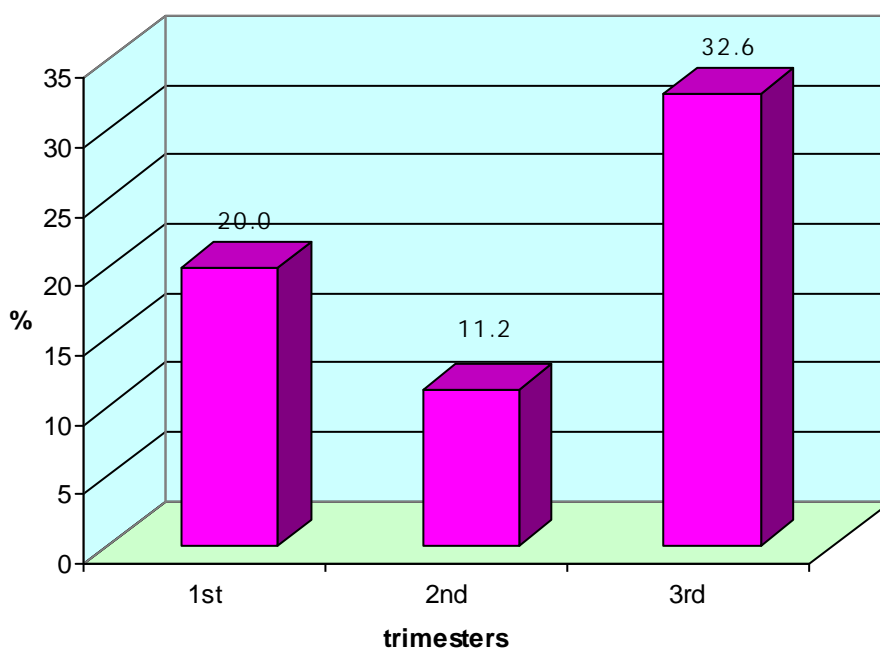


Fig.1 seroprevalence of IgG anti- *T.gondii* antibodies in pregnant women based on gestation age ( $X^2 = 19.6$ ,  $df = 2$ ,  $P = 5.33E-05$ ).

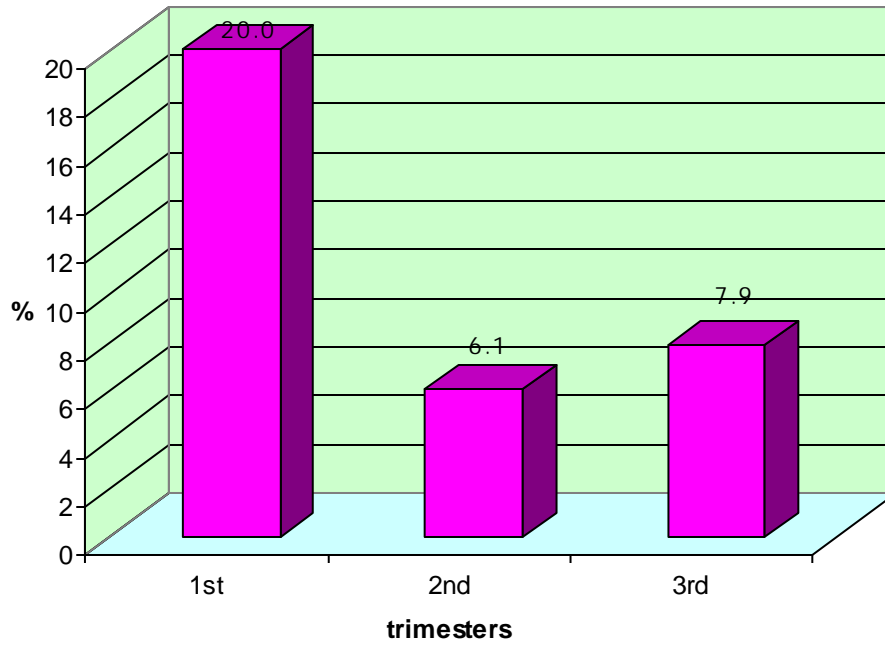


Fig.2 seroprevalence of IgM anti- *T.gondii* antibodies in pregnant women based on gestation age ( $X^2 = 14.9$ ,  $df = 2$ ,  $P = 0.00057$ ).

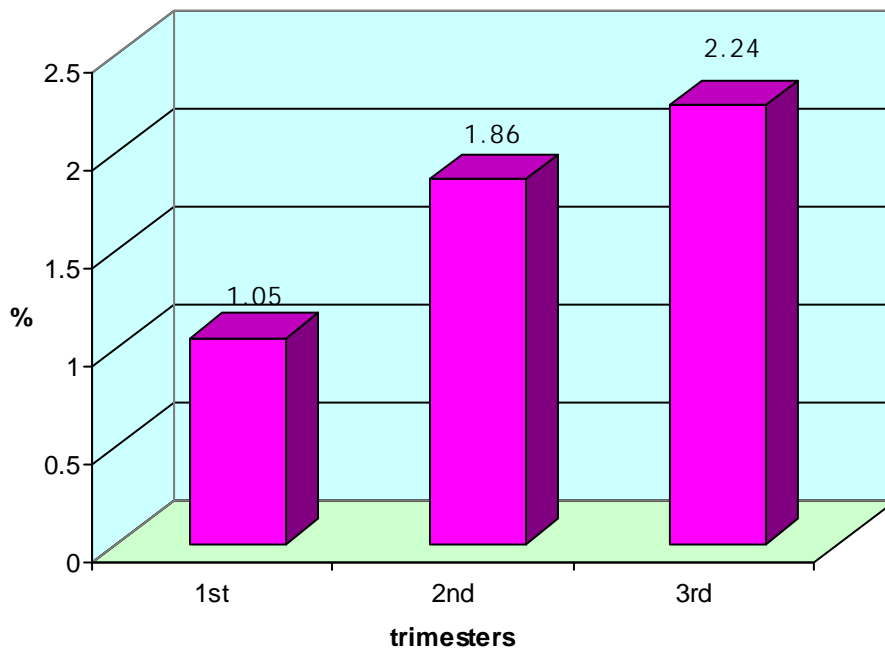


Fig.3 seroprevalence of mixed IgG and IgM anti- *T.gondii* antibodies in pregnant women based on gestation age ( $X^2 = 0.41$ ,  $df = 2$ ,  $P = 0.81378$ ).

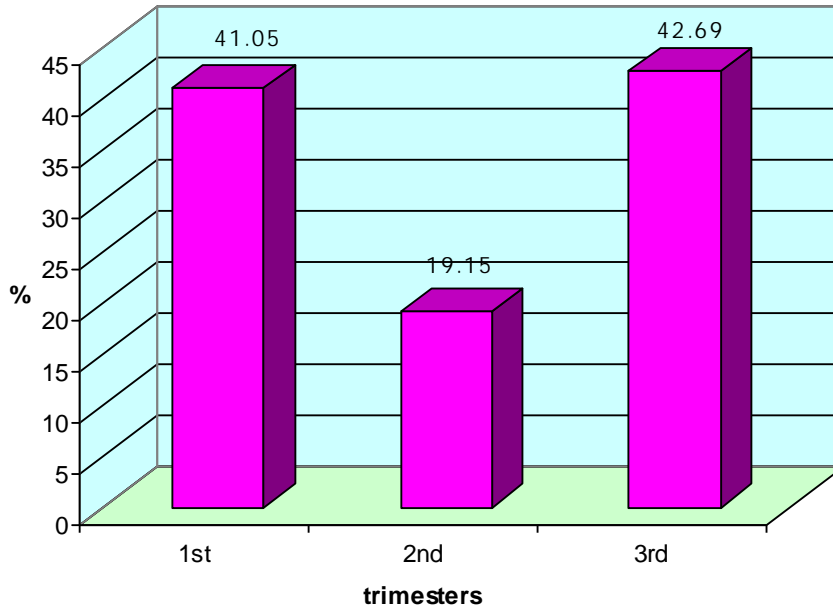


Fig.4 seroprevalence of total anti- *T.gondii* antibodies in pregnant women based on gestation age ( $X^2 = 24.4$ ,  $df = 2$ ,  $P = 4.84E-06$ ).

Seropositivity of IgG and IgM anti-*Toxoplasma* antibodies in relation to gestational age is presented in Fig. ( 1,2,3 and 4 ).

There was statistically significant association between seropositivity of IgG, IgM and total (positive IgG +positive IgM + positive mixed IgG and IgM) ( $p < 0.01$ ) and gestational age (Fig 1,2,4 ). However mixed IgG and IgM positive cases did not show any significant association with gestational age of fetus (Fig 3). seropositivity of anti- *T.gondii* antibody is highest in the 3rd trimester in IgG, mixed and total (Fig 1,3,4), while IgM antibodies were highest in 1<sup>st</sup> trimester though not statistically significant (Fig 2).

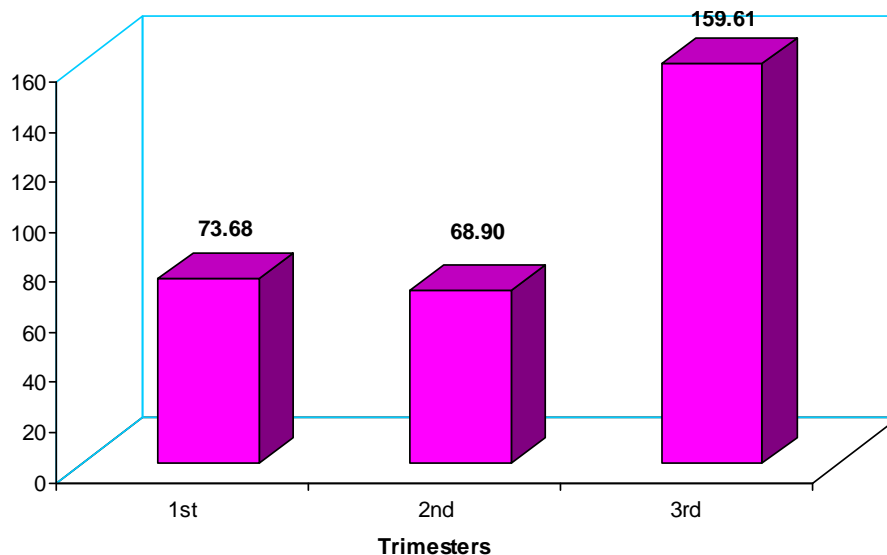


Fig.5 Variations in concentrations of IgG during trimesters of pregnancy in seropositive IgG pregnant women. (LSD=28.2).

The present study demonstrates statistically significant variations. IgG concentration of seropositive IgG pregnant women during trimesters of pregnancy. IgG concentration is highest in the 3rd trimester (159.61 U/l) (Fig 5).

## DISCUSSION

The current study is one of few studies in Iraq to explore the prevalence of *T. gondii* infection among one of the most important clinical categories of toxoplasmosis in pregnant women. If a woman gets infected with *T. gondii* for the first time in her life during pregnancy, she may pass infection to her fetus; a situation that ultimately could lead to a very serious fetal damage.

A wide variability in the prevalence of toxoplasmosis among pregnant women has been reported worldwide. The present study demonstrates that prevalence of anti-toxoplasmosis antibodies in pregnant women in Babylon province are 18.09% , 9.79% and 1.75% for IgG, IgM and IgG+IgM respectively, the total prevalence of all antibodies were 29.64%. (Table 1).

The prevalence of anti- *T. gondii* antibody observed in this study was in agreement with seroprevalence data from previous studies conducted in our country: 66 (29.2%) from a survey carried out in Salah – Adden government on 226 pregnant women had Toxoplasmosis. Anti-*Toxoplasma* IgG was 59 (26.1%) of cases while IgM antibody was 7 (3.1%) of cases (ADdory, 2011). Also the result of study roughly consistent with the result of Al-Harhi *et al.* (2006) in Makkah, Saudi Arabia when he determined seroprevalence of *T. gondii* infection using 197 pregnant women and showed that the seroprevalence of anti-*Toxoplasma* IgG was 29.4%, whereas IgM seropositivity was 5.6%. However, the present result is lower than results which were reported in Sudan 34.1% (Elnahas *et al.*, 2003), in Jordan 47.1% (Jumaian, 2005) and in Zanjan, Northwest of Iran 38.6% (IgM and IgG were positive in 1.4% and 37.2% respectively) (Hajsoleimani *et al.*, 2012). This variation might be attributed to climate, cultural differences regarding hygienic and feeding habits.

The result from this study revealed that there was statistically significant association ( $P= 5 \text{ E-}05$ ,  $P=0.00057$  and  $P=4 \text{ E-}06$  for IgG , IgM and total respectively) between gestational age of the fetus and seropositivity. However, mixed IgG and IgM positive cases did not show any significant association ( $P=0.8$ ) with gestational age of fetus. Comparable total result were obtained in all trimesters; 1st trimester (41.05%), 2nd trimester (19.15%) and 3rd trimester (42.69%) (Table 2). However, seropositivity of anti- *T.gondii* antibody is highest in the 3<sup>rd</sup> trimester. Also IgG concentration is highest in the 3rd trimester (159.61 U/l) in seropositive IgG pregnant women when compare with first and second trimesters (Fig 5). This variation might be attributed to the changes in levels of pregnancy-associated hormones during trimesters of pregnancy, and it directly influence on the immune system of pregnant women and thus susceptibility to disease. In particular immunity to selective protozoan parasitic diseases such as Toxoplasmosis, this hypothesis is support by Roberts *et al.*(2001). Hajsoleimani *et al.*(2012) showed no significant association of *Toxoplasma* infection with gestational age of the surveyed pregnant women at their first, second and third gestational trimesters in Iran.

Gelaye (2011) revealed that there was no statistically significant association between gestational age of the fetus and seropositivity in Ethiopia, 1st trimester (77.8 %), 2nd trimester (88.1 %) and 3rd trimester (85.3 %). However, seropositivity of anti- *T.gondii* antibody is highest in the 2nd trimester. Similar study in agreement with Ethiopian study reported from pregnant women in Saud Arabia (Al-Harhi *et al.*, 2006). Ertug *et al.* (2005) in Turkey found that seroprevalence of *Toxoplasma* specific IgG among pregnant women was highest in the 2<sup>nd</sup> trimester (66.1 %) as compare with 1<sup>st</sup> trimester (30.1%) and 3<sup>rd</sup> trimester (31.9%) of their pregnancy.

## CONCLUSION:

Significant relationship was found between the seroprevalence of *T. gondii* infection and gestational age, the total prevalence was more in third trimester of pregnancy (42.69%). IgG were more concentration in third trimester(159.61 U/l).

## RECOMMENDATION:

Antibodies determination IgG, IgM, and mixed antibodies during pregnancy is very important in parasite identification.

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