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Seroprevalence of Toxoplasma gondii among pregnant women in Tikrit city-Salahaldeen Province

ABSTRACT:

Background Toxoplasmosis is a parasitic disease caused by the an obligatory intracellular protozoan Toxoplasma gondii, which is widely distributed around the world . Infection is acquired by ingestion of viable tissue cysts in meat or Oocytes excreted by cats that contaminate food or water. Congenital transmission may occur when an uninfected mother acquired primary infection during pregnancy.

The aim of this study was to determine the seroprevalence of Toxoplasma gondii among pregnant women in Tikrit city-Salahaldeen Province.

Pateints & Methods: Blood samples from 290 pregnant women were collected. Samples were collected during the period from October 2010 to July 2011. Serum was separated and tested for T. gondii IgG and IgM antibodies using a chromatographic immunoassay.

The Results The seroprevalence of IgG antibodies to T. gondii was 30% while IgM was 20.68%. The seroprevalence of T. gondii increased with age, the highest IgG and IgM were among participants aged (36 – 45) years 40.74% and 30.55% respectively. The analysis showed that the seroprevalence of Toxoplasmosis is positivity correlated with the age, pregnancy trimester and the occupational of the women **The conclusion** of this study the women in their 1st trimester of pregnancy were significantly at high level of infection with T. gondii 32.08% and 22.44% of IgG and IgM respectively, while in the 2nd trimester showed the same result to some extent for IgG 32.25%, but showed low rate for IgM 9.67% in the same trimester while no recorded any infection in 3rd trimester in the study.

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Introduction

Toxoplasmosis is a parasitic disease caused by the an obligatory intracellular protozoan *Toxoplasma gondii*, which is widely distributed around the world⁽¹⁾. Infection is acquired by ingestion of viable tissue cysts in meat or Oocytes excreted by cats that contaminate food or water⁽²⁾. Congenital transmission may occur when an uninfected mother acquired primary infection during pregnancy⁽³⁾. Even though, pregnant women are often asymptomatic or have only mild symptom, infection may cause spontaneous abortion, still birth, or serious foetal damage. *Toxoplasma gondii* infections can cause to a more serious progression when accompanied with some other infection. For example, in pregnant women having human immunodeficiency virus (HIV), *T. gondii* infections may lead to extreme complications such as miscarriage, support the transmission of Hepatitis B virus (HBV), HIV and birth defect⁽⁴⁾. Therefore, toxoplasmosis is a serious clinical and public health problem. The gestational age at which the infection is contracted is a key variable affecting the clinical foetal outcome^(5,6). More than 90% of pregnant women who acquired a primary infection during gestation are asymptomatic⁽⁷⁾.

Identifying the gestational age at primary infection is crucial for the clinical management of pregnant women, since the severity of toxoplasmosis for the foetus decreases and the transmission rate increases with increasing gestational age⁽⁸⁾.

To Toxoplasmosis is usually diagnosed based on the laboratory detection of specific IgG and IgM antibodies; however, the inclusion of other parameters such as IgG avidity, IgA, IgE tests and polymerase chain reaction (PCR) is a fundamental for a conclusive diagnosis of toxoplasmosis during pregnancy⁽⁹⁾. Generally, the toxoplasma IgG antibodies appear within one to two weeks of infection, peak in six to eight weeks, decline over the next two years, and remain detectable for life. The IgM antibodies may appear within the first week of infection, generally decline within a few months, and some times persist for years after the initial infection. Thus the presence of IgM antibody should not be used to confirm a recent or acute infection without pursuing other tests and scrutinizing the clinical history⁽¹⁰⁾.

In addition to diagnosis, these toxoplasma IgG antibodies are also used for seroprevalence determination of the disease, an important information for epidemiological and control purposes. Studies have

indicated that the toxoplasma seroprevalence varies among different countries and even within the same population, and is related to various factors such as age, sociocultural and nutritional habits and contact with domestic cats⁽²⁾.

Diagnosis of toxoplasmosis based on clinical sign and supporting laboratory analysis including blood and urine tests and visualization of the organism in body tissues⁽¹¹⁾. The frequency of severe congenital infections can be limited by early screening for specific antibodies to *T. gondii* in the serum of pregnant women⁽¹²⁾.

The high *T. gondii* seroprevalence among pregnant women has been reported as reaching 71% in France, 37% in Slovenia, 42% in Italy and 43.4% in Saudi Arabia, 47.1% in Jordan⁽¹³⁾. 34.1% in Sudan⁽¹⁴⁾, 25% among five areas of the east region in Saudi Arabia⁽¹⁵⁾, 22.9% in the United Arab Emirates⁽¹⁶⁾. 21.8% in Bahrain⁽¹⁷⁾ and 30.1% in Turkey⁽¹⁸⁾. High prevalence ranging from 58.2% to 95.5% were reported from Kuwait^(19,20).

This study was conducted to identify the seroprevalence of anti-toxoplasma IgG and IgM antibodies among pregnant women in Tikrit city.

Materials and Methods

The present study represented 290 pregnant women in different stages of

trimesters of pregnancy attended Tikrit Teaching Hospital and some private gynecological clinics in Tikrit city during the period from October 2010 till to the July 2011 to investigate for IgG and IgM antibodies. Their ages were between (16 – 45) years.

Serological tests are very important in the diagnosis of toxoplasmosis, because of the common occurrence of antibodies to the parasite in the general population, diagnosis by serological means requires demonstration of a significant increase in antibody titers⁽²¹⁾.

Recently diagnosis had been done traditionally by detecting specific immuno-globulin G (IgG) antibody or by specific immunoglobulin M (IgM) or both, other reports have emphasized the value of detecting specific IgA or IgE antibodies of *Toxoplasma gondii* for diagnosis of early phase of toxoplasmosis⁽²²⁾. IgG and IgM antibodies to *T. gondii* were measured using a commercial kit (On Site Toxo IgG/ IgM Rapid Test-Cassette (Serum/Plasma) CTK Biotech, Inc) according to the manufacturer's instructions which is a lateral flow chromatographic immunoassay⁽²³⁾.

Results

The prevalence of *T. gondii* IgG was 30% and IgM was 20.68%. The both IgG and IgM were increased with age reaching its highest level in the oldest age group among participants aged (36 – 45) years, 40.74% and 30.55% respectively. There was statistically significant to the different age groups $P > 0.05$, (Table 1).

In relation to the gestational age of the women there was statistical significant in correlation to the

different type of antibodies (IgG & IgM) in the same trimester (1st & 2nd trimester) $P > 0.05$, but IgM tended to be higher in the 1st trimester clearly (Table 2). The association of the occupational state of the women and distribution of toxoplasmosis looked like to be housewives had a higher IgG seropositively, 35.48% in compared with IgM 7.52% and official women IgG 27.41% and IgM 5.07%, but not statistically significant $P < 0.05$, (Table 3).

Table 1. Distribution of IgG and IgM antibodies of *Toxoplasma gondii* in relation to age groups of examined pregnant women.

Age group/ year	IgG			IgM			Total
	-ve	+ve	+ve %	-ve	+ve	+ve %	
16 - 25	49	14	22.22	57	6	9.52	63
26 - 35	90	29	24.36	98	21	17.64	119
36 - 45	64	44	40.74	75	33	30.55	108
Total	203	87	30	230	60	20.68	290
$(\chi^2 = 9.541, P > 0.05)$				$(\chi^2 = 11.862, P > 0.05)$			

Table 2. Distribution of IgG and IgM antibodies of *Toxoplasma gondii* in relation to gestational period of the women.

Gestational period	Antibodies						Total
	IgG			IgM			
	+ve	+ve %	-ve	+ve	+ve %	-ve	
1 st . Trimester	77	32.08	177	57	22.44	197	254
2 st . Trimester	10	32.25	21	03	9.67	28	31
3 rd . Trimester	00	00	05	00	00	05	05
Total	87	30	203	60	20.68	230	290

Table 3. Distribution of IgG and IgM antibodies of *Toxoplasma gondii* in relation to the occupational state of the women.

Occupational state	IgG			IgM			Total
	+ve	+ve %	-ve	+ve	+ve %	-ve	
Official	54	27.41	143	22	11.16	175	197
House wife	33	35.48	60	38	40.86	55	93
Total	87	30	203	60	20.68	230	290

Discussion

Seroprevalence of toxoplasmosis varies throughout the world depending on age, socioeconomic conditions, eating and hygiene habits, climate and geographic location. The infection is more common in societies with low socioeconomic level, lack of hygiene during feeding and frequent contact with soil and cats. The seroprevalence increase with age⁽²⁴⁾. Older women are more susceptible to the parasite than younger women as a result to longer exposure time⁽¹³⁾. This fact is in agreement with that showed by Bobic *et al.*, which recorded that toxoplasmosis increased with age from 57% at 18 years to 93% at 50 years⁽²⁵⁾.

The present study showed that the seroprevalence of anti-Toxoplasma IgG and IgM antibodies in pregnant women in Tikrit city are 30% and 20.68% respectively. In general the results of this study were in agreement with that showed by previous founded and with results of⁽²⁶⁾, in Tikrit city 42.6%. The present study showed the highest level of seroprevalence was among (36 – 45) years age group (40.74% IgG, 30.55% IgM seropositivity); a result disagree with that⁽²⁷⁾ recorded the highest level among (21 – 25) years age group 56.2% .

This study showed that the women in their 1st trimester of pregnancy were significantly at high level of infection

with *T. gondii* 32.08% and 22.44% of IgG and IgM respectively, while in the 2nd trimester showed the same result to some extent for IgG 32.25%, but showed low rate for IgM 9.67% in the same trimester while no recorded any infection in 3rd trimester in the study.

Because that the high rate 35.48% IgG and 40.86% IgM of the positive women in this study were housewives might increase the seroprevalence of toxoplasmosis since they are usually in direct contact with meat and vegetables during food preparation that may be contaminated with the infective stage of the parasite (Table 3). These results in agreement with⁽²⁷⁾ 77.14%,⁽²⁸⁾ 29.3% IgG and 18.3% IgM.

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