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# Serodiagnosis in pregnant women with toxoplasmosis in Khartoum state- Sudan

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***Abstract***

***Background:*** *Approximately one-third of all humanity has been exposed to Toxoplasma gondii, but the seroprevalence varies considerably between countries from less than 10% to more than 90%.*

*Objectives: To conduct sero-diagnosis on Toxoplasma. gondii in pregnant women in Khartoum state, Sudan.*

***Methods****: It's cross-sectional one designed to diagnose toxoplasma gondii in pregnant female. Serum samples for toxoplasmosis was investigated and screened using the Toxo-latex test, Ict for toxoplasmosis and ELISA*

***Results:*** *The results showed 90(30%) serum samples were positive by the routine latex agglutination test while ICT and ELISA detected 46(15.3%) and 68 (22.6%) positive cases respectively. 65(21.7%) serum samples were found to have IgG while IgM was showed only 3(1%) IgM. high rate of infection was encountered in age group 21-30 years, and third trimester showed the highest rate of infection. In this study, meat consumption and cat contact have no role in disease transmission as no statistically association. Also no association between T. gondii sero-prevalence and history of miscarriage.*

***Conclusion:*** *Findings show the need for an integrated control program against toxoplasmosis because the frequency of specific IgM and IgG antibodies is considered high among pregnant women investigated for Toxoplasmosis.*

***Keywords*: Toxoplasmosis, ICT, ELISA TOXOLATEX, Sudan.**

## 1. Introduction

Toxoplasmosis is a zoonotic disease caused by the protozoan parasite Toxoplasma gondii. Humans and other warm blooded animals are intermediate hosts (Steven, et al., 2008).The. Infection has a worldwide distribution. Toxoplasmosis in human was identified in Sudan when Carter and Fleck in 1966 used the Dye test (DT). Sevgili, et al; 2005). T. gondii infects humans via ingestion of undercooked meat containing trophozoites or tissue cysts, or through ingestion of sporulated oocysts found in food, soil, and water recently contaminated with cat feces (Dubey; 2010). When oocysts are ingested by an intermediate host such as humans (Hill and Dubey; 2002), they migrate in the host's body and form pseudocysts in various organs and tissues, but most commonly in the brain (Webster, et al; 2006). Primary infection of toxoplasmosis in immunocompetent subject is usually asymptomatic or associated with self limited symptoms such as fever, malaise, and cervical lymphadenopathy. Infection acquired during pregnancy is frequently associated with transmission of *T.gondii* to the fetus, resulting in congenital disease. In immunocompromised patients, T. gondii infection causes severe manifestation, including splenomegaly, chorioretinitis, pneumonitis, encephalitis, multisystem organs failure, and even (Montoya and Liesenfeld, 2004)..T. gondii infection has great importance in public health. Women in initial stages of gestation may undergo miscarriage, premature birth, neonatal death (Jones, et al; 2001; Soares, et al; 2011).This parasite may also cause behavioral changes (Lafferty, 2005).

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## 2. Material And Methods

### 2.1 The Study area and population:

The study was conducted in Khartoum state targeting the pregnant women attending ante-natal clinics and hospitals. The targeted women were categorized according to age groups (15- 20, 21-30, 31-40 and 40-45 year) and stage of pregnancy (1st, 2nd and 3rd trimesters).

### Sample size

The sample size is 300 sera from pregnant women as calculated by formula.

### 2.2 Sample collection and examination:

The blood samples were collected from 300 pregnant women under direct medical supervision. Blood samples collected by 5 ml venipuncture into plain tubes, after clotting of blood .Serum was by centrifugation at 5000 rpm for 10 min. Serum samples was kept in -20°C till performance of serological tests.

**Methods:** Serum samples for toxoplasmosis was investigated and screened using the Toxo-latex test, Ict for toxoplasmosis and ELISA.

**Tools of data collection**:

A questionnaire was designed to collect data related to human behavior.

**Data analysis:**

A statistical software package of SPSS and Exel were used for data analysis.

## 3. Result And Discussion

Toxoplasmosis is widely spreading around the world affecting human and animal (Buxton, 1990). Although the first report of human toxoplasmosis in Sudan was done in 1966 by Carter and Fleck, the situation of the disease is not clear and its risk cannot be excluded. In this study anti *T.gondii* antibodies were screened in 300 sera from pregnant women by three different methods (latex agglutination, ICT for toxoplasmosis and ELISA).The results showed that the overall sero-prevalence of toxopasmosis was 30% by latex agglutination test (LAT) in the study population, this rate is rather high which indicate that the individuals were subjected to conductive risk factors, although such factors discussed by authers are not quite confirmed. This result is similar to a previous study done in Philippines in which the prevalence was 27.1 % (Salibay et al 2008). However it was lower than that reported by Dumas (1990) who reported 43.6% in Senegal by the LAT, Han et al, (2008) in Korea who found only 3.4%. In Sudan, Elnahas (2003) found a rate of 34.1% in Khartoum. Using enzyme linked immunosorbent assay (ELISA) technique the prevalence in this study was 22.6%. Several studies were done over the world using ELISA IgG, some of them disagree with these results .Some showed a high prevalence rate than the results obtained for example in Turkey 77% was recorded (Ozcelik et al., 1996), and in Togo 75% were reported by Deniau et al, (1991). Also the results obtained by Satti, 2011 showed that the prevalence was 38.9% by ELISA IgG in Khartoum state; also Khalil (2014) was found 73.1% by using ELISA IgG in rural areas in Sudan. It may also disagree with result obtained in 2006 by Maha et al who showed that the prevalence using ELISA was 35.1% positive IgG antibodies to T. gondii in Sudanese pregnant women. The result however, agreed with Musa (2014) who showed that 20.2% of pregnant women were positive for IgG. (Table 1).

When the surveyed women were categorized into 4 groups, the results indicated that the higher rate was encountered in the age group of 21-30 years, followed by the next group 31-40 years.(Table2). Risk factors that most strongly predicted acute infection in pregnant women were eating raw or undercooked meat. Exposure to cats has been considered a major risk factor for acquisition of infection (Weigel et al., 1999). In the present study, it appears that cats have no direct role in transmission of the disease and there is no statistically association between cat contact and infection (P= 0.88 and 0.1 with IgM and IgG respectively).(Table 3). The role of consumption of

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raw meat in the acquisition of T. gondii infection has not always been clear In this study, meat consumption has no role in disease transmission as no statistically association that may due to people recently stop that habit of eating raw or uncooked meat. (Table 4).

The role of toxoplasmosis in women with history of miscarriage is still unsettled, Women with previous history of miscarriage in the study group showed *T. gondii* sero- prevalence rate of 42 and 3 using ELISA IgG and IgM respectively compared to 23 and 0 among others with no past history of miscarriage with no significant difference between them (P =0.76 and 0.18) respectively. Several studies found no association between *T. gondii* sero-prevalence and history of miscarriage. Similarly result of Al Hindy and Elnahas, (1997) in Khartoum showed no strong association between toxoplasmosis and women with history of miscarriage. (Table5).

Lastly high level of sero-prevalence of Toxoplasma gondii in pregnant women worldwide, One hundred thirty-eight eligible studies with a total sample size of 135,098 pregnant women individuals were selected for data extraction and analysis, the global seroprevalence of Toxoplasma gondii in pregnant women was reported at 36.6% (95%CI:33.7–39.6). the highest prevalence reported was reported in Africa with 46.8% (95% CI:39.5–54.3).which is conducted bu Nader, et al in (2025).

**Table 1:** Prevalence *of T. gondii* in study population by various serological methods**.**

| Method | Number of examined samples | Number of positive cases | Percentage (%) | P.value |
|---|---|---|---|---|
| Latex | 300 | 90 | 30% | |
| ELISA | | 68 | 22.6% | |

**Table 2**: prevalence of *T.gondii* immunoglobulin according to age groups.

| Immunoglobulin by ELISA | Age group(years) | | | | Total |
|---|---|---|---|---|---|
| | 15- 20 | 21-30 | 31-40 | 41-45 | |
| IgM | 1 | 1 | 1 | 0 | 3 |
| IgG | 9 | 36 | 19 | 1 | 65 |

**Table 3:** Antitoxoplasma antibodies in pregnant women who had contact with cats**.**

| Cat contact | Number examined | IgG positive | IgM positive |
|---|---|---|---|
| Yes | 153 | 39(25.5%) | 3(2%) |
| No | 147 | 26(17.7%) | 0 (0%) |

**Table 4:** Anti Toxopasmal antibodies (IgM, IgG) in pregnant women who consume raw meat using ELISA**.**

| Consuming raw meat | Number examined | IgG positive | IgM positive | p.value |
|---|---|---|---|---|
| Consume | 123 | 32 (26%) | 1 (0.8%) | 0.127 |
| Not Consume | 177 | 33 (18.6%) | 2 (1.1%) | 0.786 |

**Table 5:** The rate of cytokines profile (IL8 and IL17) according to history of miscarriage.

| History of miscarriage. | Number examined | IL8 positive | IL17 positive |
|---|---|---|---|
| Yes | 189 | 12 | 13(6.8%) |
| No | 111 | 15 | 11(9.9%) |

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## 4. Conclusion

As a general conclusion, it can be stated that the frequency of specific IgM and IgG antibodies using ELISA is considered high among pregnant women investigated for Toxoplasmosis.

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