



Seroprevalence of *Toxoplasma gondii* Infection among Pregnant and Aborted Women in Khartoum State, Sudan

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Abstract

Introduction: Congenital toxoplasmosis occurs in fetuses upon a primo infection of a pregnant woman with *T. gondii*. According to the trimester of infection, it does only cause miscarriage or stillbirth but also serious and progressive visual, hearing, motor, and cognitive complications in a born child. A crucial step in antenatal care is the detection of *T. gondii* infection in the pregnant mother and her fetes.

Objective: To determine the sero-prevalence of *Toxoplasma gondii* infection among pregnant and aborted women and other virile of risk factors studied.

Methods: One hundred pregnant women attending antenatal care in Khartoum State, Sudan collection of 3 ml ,centrifugation, save at 4c can be detected by Enzyme Linked Immunosorbent Assay test for IgM study was conducted from June 2022 to July 2022 screened for immunoglobulin (IgM) antitoxoplasma antibodies using ELISA technique.

Results: Total of 100 pregnant women test were seropositive for IgM was 47 (47%) and while 53 (53%) seronegative. None of the examined women had IgM antitoxoplasma antibodies. The highest rate of infection (25%) was detected among women aged 26-30 years. No statistically significant relation was observed between *T.gondii* sero-prevalence and other virile of risk factors studied(gestational age, aborted and non-aborted pregnant women, group age, educational level , occupation , demographic data) S (p.value > 0.05).

Conclusions: This study concluded a high seropositivity for *Toxopalsma gondii* indicating potential for abortion and congenital transmission. Women living in Khartoum higher risks for *T. gondii* infection. The higher prevalent was in age group (26-30) years. Educational level , occupation , demographic data was statistically significant.

Keywords: *Toxoplasma gondii*, pregnant women, abortion, Enzyme linked Immune Sorbent assay, IGM, seropositive ,seronegative, seroprevalance.

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Introduction: *Toxoplasma gondii* is an obligate intracellular protozoan parasite with a complex life cycle. This agent causes toxoplasmosis between humans and animals and is one of the most prevalent chronic infections, infecting one third of the globe population (1). It's an important cause of reproductive failure in humans and farm animals leading to significant socio-economic losses worldwide (2). Human infection with *T.gondii* causes toxoplasmosis postnatal toxoplasmosis is usually an asymptomatic disease, but often takes a severe course in immune compromised hosts (3). Congenital toxoplasmosis is acquired through vertical transmission of *T.gondii* to the fetus by transplacental transfer from the mother usually following acute maternal infection. If congenital

toxoplasmosis occurs early in pregnancy, it may lead to severe damage or abortion. (4)

Though the infection is frequently asymptomatic or mild and self-limiting (fever, agitation, lymphadenopathy), infection happening throughout pregnancy leads vertical transmission to the fetus (5). Earlier research has revealed that toxoplasmosis infection was more frequent between those with history of close contact with cats, raw meat and vegetable consumption, and low learning level. The most significant benefit in the serology of *Toxoplasma* is to detect whether the pregnant lady has acute infection or not, and if so, whether it happened before pregnancy (6). Primary infection with *T. gondii* during the third trimester of pregnancy carries a higher risk of congenital transmission than that acquired during the first trimester. (7)

In Sudan, the first report of human toxoplasmosis was dated back to 1966, with different prevalence rates according to the regions and the people's habits.(8). Around 65% of Sudanese domestic animal was infected with toxoplasmosis. (9)

Materials and Methods:

Study Design and Setting: The study was

Pipetting protocol:

	1	2	3	4	5	6	7	8	9	10	11	12
A	C	p6	p14	p22								
B	pos	P7	P15	P23								
C	nag	P8	P16	P24								
D	P1	P9	P17									
E	P2	P10	P18									
F	P3	P11	P19									
G	P4	P12	P20									
H	P5	P13	P21									

experimental study, descriptive study was conducted in antenatal care hospitals in Khartoum State, Sudan in between June 2022 to July 2022, from Pregnant and Aborted women in Khartoum State.

Specimen collection: Three ml of blood sample were collected in sterile container from each participant through venepuncture, the obtained blood samples were collected into plain vacutainer. Sera were separated after centrifugation for 15 minutes in 3000 rpm. Then were stored in -20 °C till used. (10)

ELISA for detection of *T.gondii* IgM Abs: Serological diagnosis was done following the ELISA technique (enzyme-linked immunosorbent assay) The ELISA test kit provides a semi quantitative in vitro assay for human antibodies of the immunoglobulin class IgM against *Toxoplasma gondii* in serum or plasma for the diagnosis of toxoplasmosis..

Procedure: Test performance using fully automated analysis devices Sample dilution and test performance are carried out fully automatically using an analysis device.

The above pipetting protocol is an example of the semi quantitative analysis of antibodies in 24 patient samples (P 1 to P 24). Calibrator (C), positive (pos.) and negative (neg.) control as well as the patient samples have been incubated in one well each. The reliability of the ELISA test can be improved by duplicate determinations of each sample. The wells can be broken off individually from the strips. This makes it possible to adjust the number of test substrates used to the number of samples to be examined and minimizes reagent wastage. Both positive and negative controls serve as internal controls for the reliability of the test procedure. They should be assayed with each test run.

Calculation of results: The extinction value of the calibrator defines the upper limit of the reference range of non-infected persons (cut-off) recommended by EUROIMMUN.

Semi quantitative: Results can be evaluated semi quantitatively by calculating a ratio of the extinction value of the control or patient sample over the extinction value of the calibrator. Use the following formula to calculate the ratio:

$$\frac{\text{Extinction of the control or patient sample}}{\text{Extinction of calibrator}} = \text{Ratio}$$

EUROIMMUN recommends interpreting results as follows:

Ratio <0.8: negative

Ratio \geq 1.1: positive

Statistical Analysis: Statistical analysis was performed using the statistical package for social sciences (SPSS version 20). Demographic data were categorized and means were compared using the student T test. Chi square test was used to test

the significance of risk factors associated with seropositive patients; results considered to be statistically significant if P value < 0.05.

Results: This study was conducted on 100 Pregnant and Aborted women in every stage of pregnancy the present study was conducted in Khartoum state. The overall prevalence rate of *Toxoplasma gondii* among case study groups the results by direct enzyme-linked immunosorbent assay (ELISA) technique, test were seropositive for IgM was 47 (47.0%) and while 53 (53.0%) seronegative .

The age of the subjects ranged between 20-39 years old; the age groups were divided into three groups, 20-25 years, 26-30 years and 31-39 years. The frequency of each groups as follow 20-25 years 17 sample, (17.0%), 26-30 years 58 sample, (58.0%) and 31-39 years is 25 sample, (25.0%), total 100 (100.0%) . The prevalence of *T. gondii* in different stage of pregnancy gestational age into three groups. First trimester, Second trimester and Third trimester, The frequency of each groups as follow First trimester 11 sample, (11.0%).Second trimester 15 sample, (15.0%) and Third trimester 74 sample, (74.0%) total 100 (100.0%) .Frequency of educational level among study population into three groups primary school. secondary school and university. The frequency of each groups as follow primary school 41 sample,(41.0%). secondary school 48 sample,(48.0%) and university 11 sample,(11.0%) total 100 (100.0%) .Frequency of occupation among study population into four groups house wife. student, teacher and nurse , The frequency of each groups as follow house wife 93 sample,(93.0%), student 3 sample, (3.0%), teacher

3 sample,(3,0%) and nurse 1 sample (1.0%) total 100 (100.0%) .

The frequency of each groups as follow 20-25 years seropositive with IgM 7 while seronegative 10 , 26-30 years seropositive with IgM 25while seronegative 33 , 31-39 years seropositive with IgM 15 while seronegative 10, p.value 0.190 .

The frequency of each groups as follow First trimester seropositive with IgM 4 while seronegative 7, Second trimester seropositive with IgM 8 while seronegative 7 and Third trimester seropositive with IgM 35 while seronegative 39, p.value 0.683 .

frequency of educational level among study population primary school seropositive with IgM 22,while seronegative 19, secondary school seropositive IgM 21,while seronegative 27 and university seropositive IgM 4 ,while seronegative 7, P.value 0.238 .

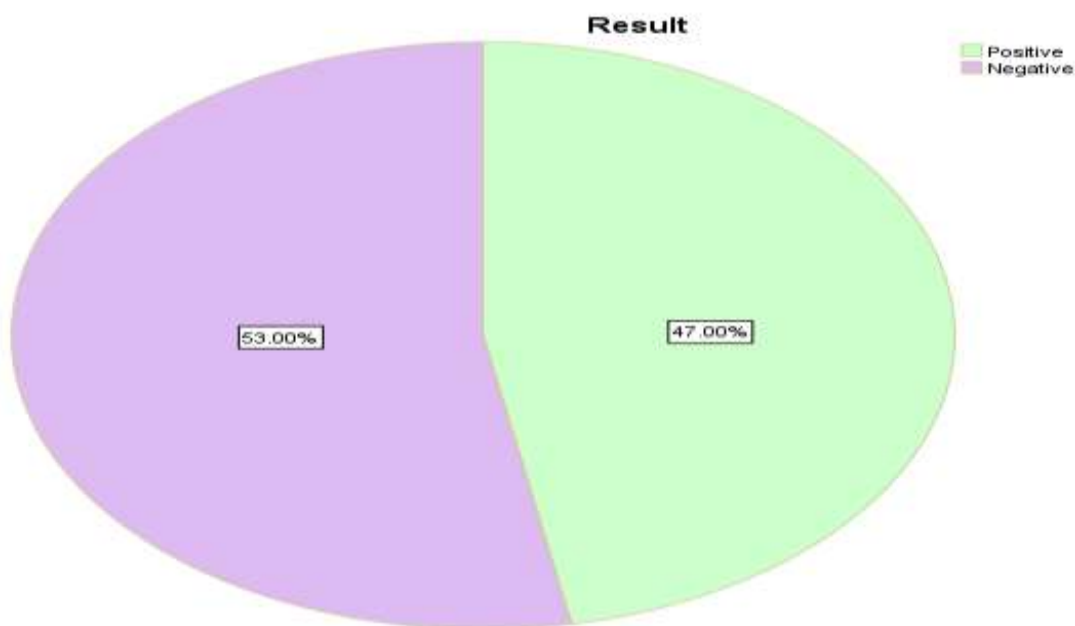
Frequency of occupation among study population house wife seropositive IgM 45, while seronegative 48, student seropositive IgM 1,while seronegative 2, teacher seropositive IgM 0, while seronegative 3, and nurse seropositive IgM 1while seronegative 0, P.vaule 0.494

Table 1: frequency of age group among study population

Age	Frequency	Percent
20-25	17	17.0
26-30	58	58.0
31-39	25	25.0
Total	100	100.0

Table 2: frequency of gestational age among study population

Gestational age	Frequency	Percent
First trimester	11	11.0
Second trimester	15	15.0
Third trimester	74	74.0
Total	100	100.0



Figur1: frequency of *Toxoplasma gondii* results among study population

Discussion: *Toxoplasma gondii* cause severe impairment and death to fetuses or to newborns through congenital infection. The current study is one of few studies in Sudan to explore the seroprevalence of *T. gondii* infection among one of the most important clinical categories of toxoplasmosis in immunocompetent hosts who are pregnant and aborted women. The study reveals that out one-handed sample they was seropositive of IgM (47%) and while sero-negative (53%), this study was agree with the study conducted by (Majda and his colleagues) in *Toxoplasma gondii* sero-prevalence among pregnant women in Rabat, Morocco, the sample size was 677sample, IgM anti-toxoplasma antibodies seropositive was rate in this study (43%),(13). and also agree with another study conducted by (Rayan and his colleagues) Seroprevalence of toxoplasmosis between aborted ladies in Atbara district, Sudan,the sample size was 152 sample ,while seropostive IgM (35%),(14) . This study was disagree with study conducted by

(Joy Nkain and his colleagues), Seroprevalence of Gestational and Neonatal Toxoplasmosis aswell as Risk Factors in Yaoundé, Cameroon, the sample size was 300 sample, IgM anti-toxoplasma antibodies seropositive was rate in this study (8%), (15), and This result was disagree with the study conducted by(Nijem and his colleagues),in Seroprevalence and associated aisk factor of toxoplsmosis in pregnant women in Hebron district, Palestine, the sample size was 204 sample, IgM anti-toxoplasma antibodies seropositive was rate in this study (17%) (16). comparisons with reports from different countries have to be interpreted cautiously this variation has been attributed to climate, cultural differences regarding hygienic and feeding habits.

This result was anti-IgM seroprevalence of *Toxoplasma gondii* increased within the age group of (26-30) years while (25%), this study was agree with the study conducted by (Majda and his colleagues) increased within the age in(16-25)

years was 25% and increased within the gestational age in third trimester while (35%) This in our opinion is highly risky, as it is the most fertile period of childbearing age and this also highlights the need to continue to educate women of childbearing age on prevention of toxoplasmosis. However, different studies reported an increase in seropositivity of anti-*T. gondii* antibodies with increasing age.

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Authors declare:

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