

Toxoplasmosis in pregnant Sudanese women

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ABSTRACT

Objective: The aim of this study was to conduct a sero-epidemiological survey of toxoplasmosis in pregnant Sudanese women.

Method: Four hundred and eighty-seven pregnant women attending antenatal clinics in Khartoum and Omdurman, Maternity Hospitals, Sudan during the period June through to December 2000 were counselled for socio-demographic and obstetrical risk factors for toxoplasmosis, and screened for immunoglobulin G (IgG) and IgM anti-toxoplasma antibodies using enzyme linked immunoassay.

Results: Immunoglobulin G anti-toxoplasma antibodies were positive (titre >11 IU/ml) in 166/487 (34.1%), while 321/487 (65.9%) were sero-negative. The sera of 35 women showed very high titres (>100 IU/ml), 5/35 (14.3%) were

IgM-positive. The risk factors for IgG anti-toxoplasma seropositivity were; Southern ethnic origin and consumption of raw meat. Thirty (18.1%) out of 166 women who were IgG anti-toxoplasma seropositive gave history of intrauterine fetal death, while 31 (9.7%) out of 321 women who were sero-negative gave history of intrauterine fetal death, the difference was statistically significant ($P < 0.05$).

Conclusion: Over 65% Sudanese women screened for anti-toxoplasma IgG antibodies were sero-negative and they were at risk of sero-conversion during pregnancy. Southerners and eating raw meat were the risk factors for toxoplasmosis in Sudanese pregnant women.

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Toxoplasmosis is a universal zoonotic disease; approximately 30-50% of the individuals throughout the world have antibodies to toxoplasma gondii.¹ Human infections are acquired through direct or indirect contact with cat feces. Thus, consumption of unwashed vegetables, undercooked meat and unpasteurized milk from infected animals are sources of the infection.²⁻⁴ Human-to-human transfer does not occur except from the primarily infected pregnant woman to her fetus,⁵ where transplacental transmission of the organism may lead to fetal infection and congenital toxoplasmosis.⁶ Congenital toxoplasmosis is manifested in a classic triad of chorioretinitis, hydrocephalus and cerebral

calcifications. Other features include; microcephaly, neurological sequelae, hepatosplenomegaly, jaundice, anemia and infantile nephrotic syndrome.^{7,8} In Sudan, toxoplasmosis was reported for the first time in 1966, with different prevalence rates according to the regions and the people's habits.⁹ Around 65% of Sudanese domestic animals were infected with toxoplasmosis.¹⁰ Maternal toxoplasmosis is usually asymptomatic and if the diagnosis is delayed, unavoidable and irreversible fetal damage may take place. A serological survey during pregnancy represents a valuable tool for the diagnosis in the neonate and may bring a rapid and effective treatment of an affected child. Thus, all

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pregnant women should be tested at booking and sero-negative women followed at intervals for evidence of sero-conversion. Basic data is important to develop an appropriate control strategy for prevention and treatment of toxoplasmosis. Such data is sparse in pregnant Sudanese women. Thus, the objective of this work was to conduct sero-epidemiological survey in pregnant Sudanese women.

Methods. All pregnant women attending antenatal clinics of Khartoum Teaching Hospital (Fath El-Rahman El-Bashir) and Omdurman Maternity Hospital, during the period June through to December 2000, were asked to participate in the study. After a verbal consent, questionnaire containing demographic, social (age, parity, education and ethnic group), obstetrical and gynecological history (history of abortion, preterm labor, low birth weight and congenital malformation) was filled. Special enquiries regarding habits and contact with cats was carried out (cat contact, eating raw liver and viscera, undercooked meat and raw milk). Five mls of venous blood were withdrawn in disposable syringes under sterile aseptic technique and centrifuged. Serum was tested for *T.gondii* specific immunoglobulin (IgG) using capture enzyme linked immunoassay. The reagents used were: 40 ml magnetic particles, dampened with toxoplasma gondii antigen and 40 ml AP conjugate: anti-human IgG labelled with alkaline phosphatase. Sera with a high IgG titre (>100 IU/ml) were tested for IgM anti-toxoplasma using enzyme linked immunoassay as described by the manufacturers (ETI-TOOK-M reverse, Sorin Biomedica, France). Reagents for IgM used were: 26 ml particles coated with monoclonal anti-IgM antibody and 34 ml immunocomplex consisting of rabbit anti-toxoplasma gondii antibodies labelled with alkaline phosphatase "AP-conjugate" and toxoplasma gondii antigen. Based on their anti-toxoplasma IgG serological status, subjects were mainly divided into sero-positive and sero-negative. The socio-demographic and obstetrical factors were tested according to sero-positive and sero-negative groups with respect to known risk factors (cat contact, eating raw liver, viscera, undercooked meat, raw milk, abortion, preterm labor, intra-uterine fetal death).

Data obtained were entered into a computer database. statistical package for social science) software was used for statistical analysis. Data were recorded as number and percentages. Percentages were compared using the X² test with risk estimated (odd ratio and confidence interval). P-value 0.05 was considered significant.

Results. During the 3 months period of the study, 487 pregnant women were recruited, the majority (70.4%) of whom were in the second trimester, 27.3% were in the third trimester and only 2.3% were in the first trimester. Thirty-four point one percent (166/487) were IgG anti-toxoplasma antibodies sero-positive (titre >11 IU/ml), 321/487(65.9%) were sero-negative for IgG

Table 1 - Comparison between obstetrical factors and immunoglobulin G anti-toxoplasmosis sero-positivity.

Variables	Sero-positive (N=166)	Sero-negative (N=321)	Odds ratio	Confidence interval
Abortion				
Yes	46 (27.7)	83 (25.9)	0.9	0.72-1.2
No	120 (72.3)	238 (74.1)	1.1	0.89-1.1
Preterm labor				
Yes	12 (7.2)	21 (6.5)	0.93	0.58-1.4
No	154 (92.8)	300 (93.5)	1.03	0.79-1.3
Intrauterine fetal death				
Yes	30 (18.1)	31 (9.7)	0.64	0.4-0.8
No	136 (81.1)	290 (90.3)	0.1.33	1.03-1.7
Data are given as n (%). Numbers in bold indicate significance				

anti-toxoplasma antibodies (titre <11 IU/ml). The titre in the sera of 35 women were found to be >100 IU/ml. Five of them (14.3%) were found to be IgM-positive. There was no statistical difference in age groups, parity and education levels and drinking raw milk, cat contact and under-cooked meat between the seropositive and seronegative groups. Southern ethnic group and eating raw liver were the risk factors for sero-positivity. There was no statistical difference between those who gave history of abortion and preterm labor and those who did not in the seropositivity rate. There was association between history of intrauterine fetal death and the seropositive rate, **Table 1**.

Discussion. Toxoplasmosis is one of TORCH infection group (*Toxoplasma gondii*, Rubella, Cytomegalo virus, Herpes simplex), which represents a worldwide obstetrical problem, where transplacental transmission of the infection may result in variable disabling congenital diseases in the newborn child.² The IgG anti-toxoplasma antibodies sero-positive rate in this study (34.1%) is almost near to the rate reported in Sudan by Adnan¹¹ (30.1%) in pregnant women using the same method, and similar to the rate from the neighboring country (33%).² The high sero-negative rate (65.9%) reflects the large number of pregnant women at high potential risk of sero-conversion during pregnancy or subsequently. Among women with high IgG titre (>100 IU/ml), 14.3% were found to be IgM sero-positive on rescreening. The negative anti-toxoplasma IgM may exclude cases with recent infection. This agreed with results obtained from Adnan's¹¹ study (13%) and similar to the findings of Griffin and Williams,¹² where no recent infections were found in a sample of Kenyans with 42% sero positivity using the dye test. However, comparisons with reports from different countries have to be interpreted cautiously, since different methods were used in the

screening. Generally, these high results of both IgG and IgM sero-positive rates (34.1% and 14.3%) may be due to different habits for example eating raw meat (liver or viscera). Thus, pregnant women who gave history of eating raw meat were found significantly sero-positive than those who did not. People in our community believe that raw or partially cooked Liver elevates the hemoglobin. This finding is supported by the previous studies in the Sudan, where high rates of toxoplasmosis were related to consumption of raw or partially cooked liver, viscera and undercooked meat.^{9-10,13,14}

In the present study, we did not find a strong association between IgG sero-positivity and drinking unpasteurized milk. This may be as most women denied drinking unpasteurized milk, due to their shyness at the time of the counseling, may be as actually most of the studied women boil milk before drinking, unlike Sudanese in the East where there is a cultural habit of drinking raw Camel infected milk.¹⁰ Although, cat contact is the leading cause of toxoplasma infection in various parts of the world, in this study, over 80% of women gave history of cat contact, but no statistical difference was shown between the seropositive and seronegative groups. The IgG sero-positive rate of toxoplasma antibodies was statistically high in the Southern in comparison to other different ethnic groups ($P < 0.05$). These findings could possibly be attributed to the traditional habits among Arabs and Southerners as far as eating raw liver and viscera are concerned. These results agreed with previous reports in Sudan by Carter and Fleck⁹ (Arab 71% versus Negroes 22%). A marked variation in prevalence of toxoplasmosis by ethnic groups was also observed in the Pacific Islands.¹⁵

In the present study, there was no significant difference between sero-positive and sero-negative pregnant women with respect to past history of abortion. As there were conflicting data concerning its relationship to abortion¹² leaving the role of toxoplasmosis as a cause of abortion unsettled.¹ There was no statistically significant IgG sero-prevalence rate in those who had previous history of pre-term labor ($p > 0.05$). Nevertheless, results from Taif Children's Hospital in the Kingdom of Saudi Arabia showed that the preterm labor was related to congenital toxoplasmosis.²

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