



High prevalence of anti-toxoplasma antibodies and absence of *Toxoplasma gondii* infection risk factors among pregnant women attending routine antenatal care in two Hospitals of Addis Ababa, Ethiopia



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SUMMARY

Objective: Toxoplasmosis is an infection caused by the protozoan parasite *Toxoplasma gondii*. It is acquired mainly by eating raw or undercooked meat containing *Toxoplasma gondii* tissue cyst, eating food or water contaminated with oocyst, and acquiring congenital infection through the placenta. This study was conducted to determine the prevalence of toxoplasmosis and assess possible risk factors associated with the infection among pregnant women in Addis Ababa, Ethiopia.

Method: Cross sectional study was designed, and 288 serum samples were collected from November 1st 2010 to January 2011. The serum samples were tested for anti-*Toxoplasma gondii* antibodies using latex agglutination test. The risk factors were tested for significance using Bivariate and multivariate analysis. P-value <0.05 was considered statistically significant.

Result: 85.4% were positive for anti *Toxoplasma gondii* antibody. No significant association was observed between seroprevalence and age, gestational age, socio demographic characters, history of abortion, consumption of raw or undercooked meat, consumption of raw vegetable, owning of cat, and blood transfusion. **Conclusion:** Prevalence of toxoplasmosis among pregnant women in Addis Ababa, Ethiopia is higher than that reported from other countries. Efforts to describe risk factors for toxoplasma infection among Ethiopians should focus in children.

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1. Introduction

Toxoplasmosis is an infection caused by the obligate intracellular protozoan parasite *Toxoplasma gondii* [1]. People typically become infected by three principal routes of transmission [2]. The first one is food borne transmission where people become infected by eating raw or undercooked meat contaminated with cyst [3]. The second route is from animal to human transmission where people get infected by ingestion of oocysts through close contact with infected cat or cat's faeces, contact with contaminated soil and ingestion of water or food contaminated with the oocysts [4]. The third one is mother-to-child (congenital) transmission by which a woman who is newly infected with *Toxoplasma* during pregnancy can pass the infection to her unborn child [5]. There are

rare instances of transmission when tachyzoites contained in blood products, tissue transplants, or unpasteurized milk, and laboratory workers who handle infected blood can also acquire infection through accidental inoculation [6].

T. gondii Infection leads to an asymptomatic infection in immunocompetent persons. However; 10% to 20% of patients with acute infection may develop cervical lymphadenopathy [7]. Latent *T. gondii* infection may be reactivated in immunodeficient pregnant women and result in congenital transmission of the parasite [5]. Exposure of an individual to *Toxoplasma* will not necessarily result in infection. Infection will occur only if the stages of the parasite, the route of infection, the virulence of the strain and the infectious dose have occurred in the susceptible individual [8]. Infection with the protozoan *Toxoplasma gondii* has been found worldwide in nearly one third of the human population and varies greatly among different countries, geographical areas within the same country, and ethnic groups living in the same area [2].

The age-specific prevalence has been decreasing in Europe over the past three to four decades [9]. In sub-Saharan Africa the

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prevalence of *T. gondii* increased in association with HIV. Toxoplasmosis prevalence has been documented in different African countries; 75.4% in Nigeria [10]; 60% from AIDS patients in Cote d'Ivoire [11], 58.4% in Yopougon, Tunisia [12]; 53.6% in Benin [13]; 40.2% in Dakar, Senegal [14]; and 34.1% from pregnant women in Sudan [15].

The prevalence of *T. gondii* infection in Ethiopia has been reported in some populations; 90% from HIV infected and HIV uninfected individuals [17], 75% from a survey carried out in general population [18]; 83.6% among pregnant women in Jimma town [19], 81.4% among child bearing age women [20] and 41% among children aged 1 - 5 years [25]. However; the information on seroprevalence of toxoplasmosis among pregnant women is still limited in Ethiopia [21]. Serological screening for *T. gondii* infection in routine antenatal care units is not practiced. The prevalence estimates and possible risk factors among pregnant women in urban areas of the country especially in Addis Ababa, the capital city of Ethiopia has not yet been documented. Therefore, we conducted this study to determine the prevalence of *T. gondii* infection and assess the possible risk factors among pregnant women in Addis Ababa.

2. Method

2.1. Study population

The study was conducted in Addis Ababa, the Capital city of Ethiopia at 2 hospitals; Tikur Anbesa General Specialized Hospital which is the largest referral Hospital in the country and Gandhi Memorial Hospital which is the only public maternal Hospital. The study design was cross sectional. The sample size was calculated as 288 based on a prevalence of 25% taken from a study conducted in Burkina Faso [22] since there was no data from Ethiopia regarding pregnant women at the time of data collection, $d = 0.05$ at a confidence level of 95%. Convenient sampling method was used in the selection of the study group and the response rate was 96%.

2.2. Data collection

Venous blood samples were collected from study participants by strictly following the standard procedure from November 2010 to January 2011. The blood samples were centrifuged at 2000 rpm for 10 minutes. The serum samples were separated and kept at -20°C in the Microbiology and parasitology laboratory department of Addis Ababa university until serological tests were carried out. Socio-demographic characteristics were documented for each study participant. Using a structured questionnaire, data on exposure to possible risk factors were collected, and included consumption of raw meat, consumption of unwashed raw vegetables, presence of domestic cat at home, history of abortion, organ transplantation, and blood transfusions. The questionnaire was pretested prior to data collection and administered orally before blood samples collection. Six nurses from the two hospitals were selected and oriented regarding how to collect the data.

2.3. Serological method

Serological tests were carried out by Latex agglutination slide test. The test reagent is standardized to detect more than 10 IU/ml of anti-*Toxoplasma* antibodies. The test is global for IgM and IgG. The test was done according to the manufacturer's instruction (Linear chemicals, Spain).

2.4. Ethical consideration

The study protocol was approved by the ethical clearance committee of Addis Ababa University. Official permission was also

obtained from the two Hospitals: Tikur Anbesa General Specialized Hospital and Gandhi Memorial Hospital. Written informed consent was obtained from each participant. Any information was kept confidential and tests were performed anonymously. For those participants whose laboratory result was positive and clinically significant, the investigator communicated a physician for further management.

2.5. Statistical Analysis

Data was entered and analysed using SPSS version 20. After data entry, the database was checked against the source documents for completeness. Bivariate and Multivariate analyses were used to identify variables associated with *Toxoplasma* infection. P-value less than 0.05 was considered as statistically significant.

3. Results

3.1. Sociodemographic characteristics

A total of 288 pregnant women were included in the study, all of whom resided in Addis Ababa. The mean age of the study participants was 28.41 ± 4.21 with age range of 18 - 42. Of the 288 study participants, 6.2% were at 1st trimester, whereas 20.5% and 73.3% respectively were in their 2nd trimester and 3rd trimester of pregnancy. The majority of the participants (68.7%) had at least primary education. The majority were married ($n=276$); and 52.8% were housewives (Table 1).

3.2. Seroprevalence of *T. gondii*

Overall sero-prevalence of *T. gondii* infection was **85.4%** (246/288). Seroprevalence of *T. gondii* infection in relation to demographic characteristics of the pregnant women is given in Table 1.

Table 1

Distribution of *T. gondii* infection along with demographic characteristics of the pregnant women ($n=288$), Addis Ababa, 2011

Demographic Characteristics	Seroprevalence		Total n(%)
	Negative n(%)	Positive n(%)	
Age group (Years)			
15-24	8 (19)	34 (81)	42 (14.6)
25-34	32 (14.7)	186 (85.3)	218 (75.7)
>35	2 (7.1)	26 (92.9)	28 (9.7)
Residence			
Addis Ababa	0 (0)	288 (85.4)	288 (85.4)
Out of Addis Ababa	0 (0)	0 (0)	0 (0)
Education status			
Illiterate	1 (4.2)	23 (95.8)	24 (8.3)
Read and write only	0 (0)	3 (100)	3 (1)
Grade 1-8	10 (15.9)	53 (84.1)	63 (21.9)
Grade 8-12	19 (15.8)	101 (84.2)	120 (41.7)
>12+	12 (15.4)	66 (84.6)	78 (27.1)
Marital status			
Married	40 (14.5)	236 (85.5)	276 (95.8)
Single	2 (16.7)	10 (83.3)	12 (4.2)
Occupation			
Government employee	4 (12.5)	28 (87.5)	32 (11.1)
House wife	23 (15.1)	129 (84.9)	152 (52.8)
Private sector employee	13 (14.9)	74 (85.1)	87 (30.2)
Other	2 (11.8)	15 (88.2)	17 (5.9)
Gestational period			
1st trimester	4 (22.2)	14 (77.8)	18 (6.2)
2nd trimester	7 (11.9)	52 (88.1)	59 (20.5)
3rd trimester	31 (14.7)	180 (85.3)	211 (73.3)

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