

## Seroprevalence and Risk Factors for *Toxoplasma* Infection among Pregnant Women in Ethiopia: A Review Article

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**Abstract:** The *Toxoplasma gondii* is an intracellular protozoan parasite which can infect almost all warm-blooded animals, including humans. Around 30% of the world's population is expected to be infected with *T. gondii*. Humans become primarily infected by ingesting raw or undercooked meat containing viable tissue cysts, or by ingesting water or food contaminated with oocysts from infected cat feces. Primary infections in pregnant women are normally asymptomatic in the mother; but there is a low risk of transmission to the fetus. Although rare, congenital toxoplasmosis (infections in the infant) can cause severe permanent neurological or ocular disease (retinochoroiditis) leading to blindness, as well as cardiac and brain anomalies.

The importance of estimating *T. gondii* infection in human has a great significance because of the risk of the infection of fetus, immune compromised hosts and newborns [16]. Sero-prevalence anticipated for human population varies greatly among different countries, among different geographical areas within one country, and among different ethnic groups living in the same area. Public education on identified risk factors and screening of pregnant women during their antenatal care should be given and further study is recommended in other parts of the nation.

**Keywords:** *Toxoplasma gondii*, seroprevalence, pregnant women, Ethiopia

### 1. INTRODUCTION

The *Toxoplasma gondii* is an intracellular protozoan parasite which can infect almost all warm-blooded animals, including humans [1,2]. Because *T. gondii* has large number of intermediate hosts including all warm blooded animals and humans. The feline species is the definitive host for this parasite. Cat complete the coccidian life cycle with intestinal replication and passage of oocysts in the feces [3]. Around 30% of the world's population is expected to be infected with *T. gondii* [4]. Humans become primarily infected by ingesting raw or undercooked meat containing viable tissue cysts, or by ingesting water or food contaminated with oocysts from infected cat feces [5,6]. In healthy humans, the infection with *T. gondii* is usually asymptomatic, but it can be fatal in the immune compromised individuals, such as HIV/AIDS patients, cancer patients, organ transplant recipients, and pregnant women [1,7]. It causes severe encephalitis and neurologic diseases, and can affect the heart, liver, inner ears, and eyes (chorioretinitis).

Primary infections in pregnant women are normally asymptomatic in the mother; but there

is a low risk of transmission to the fetus. Although rare, congenital toxoplasmosis (infections in the infant) can cause severe permanent neurological or ocular disease (retinochoroiditis) leading to blindness, as well as cardiac and brain anomalies. Knowing when infection occurred during pregnancy is important in evaluating the risk of congenital transmission, initiating antibiotic therapy and ensuring appropriate prenatal counseling. The IgG avidity test has been prescribed for such utility. The IgG avidity measures the strength of IgG binding to the organism. Avidity, in most cases but not all, shifts from low to high after about 5 months. If the avidity is high, this suggests infection occurred at least 5 months before testing. Transmission to fetus occurs predominantly in women who acquire primary infection during pregnancy [8].

### 2. RESULT

From a total 263 pregnant women, 68.4% were found to be sero-positive for anti-toxoplasma antibody. Being of age group  $\geq 36$  years, cannot read and write were significantly associated with seropositivity of *T. gondii* infection [9]. While other study in in Mizan Aman General Hospital indicated that sero-

prevalence for *T.gondii* infection was 85.3 and also similar findings also reported in other parts of the nation. About 82.3 % of the pregnant women were reactive only for IgG anti-bodies. While about 3.0 % of them were seropositive for both IgG and IgM anti-bodies. None of the mothers were positive for IgM anti-bodies exclusively. Contact with cat and gardening soil were significantly associated with *T.gondii* infection[10]. Seroprevalence of *T. gondii* in Jima town was 83.6%. One hundred and sixty-three (81.1%) of the pregnant women were IgG seropositive, five (2.5%) were IgM seropositive. Three of the 5 pregnant women were positive for both IgG and IgM. Presence of domestic cat at home showed significant association with anti-*T. gondii* seropositivity[11].

Anti- *T. gondii* IgG antibodies were detected in 81.4% of the samples of which 78.4% were positive for only IgG and 3.06% positive for both IgG and IgM antibodies in central Ethiopia. Seroprevalence of IgM antibodies to *T. gondii* 4.0% was suggestive of recent infections. Of the 213 pregnant women 9 (4.2 %) were IgM reactive. Significant association of *T. gondii* infection with study area, age, pregnancy status, raw vegetable consumption, source of water, presence of cats at home, contact with cats, HIV status and precaution during cats' feces cleaning[12].

Seroprevalence of *T. gondii* in pregnant women was 23.9% in southern Ethiopia. The women who were aware of the risk of toxoplasma infection on the fetus had fewer *T. gondii* antibodies. Drinking unsafe water was associated with a higher risk of toxoplasmosis. But they didn't find any significant risk factors associated with seropositivity in relation with participants' level of education; occupation; contact with cats; consumption of raw or uncooked meat, vegetables, or milk; or type of flooring (soil versus cement) at home[13].

From a total of 270 HIV-infected women within the reproductive age group of study participants, 255 (94.4%) were found to be seropositive for *T. gondii* anti-immunoglobulin G (IgG) antibody, and 6 (2.2%) for anti-immunoglobulinM (IgM). All the anti-IgM positive samples were also positive for IgG. Being age within 28–37 years level of education with unable or only able to read and write and substance abuse were significantly associated with seropositivity of *T. gondii* infection.

The overall seroprevalence of *T.gondii* infection in pregnant women at Bonga Hospital, Southwestern Ethiopia was 75.7%. *T.gondii* infection was higher in pregnant women between age range of 36–44. Associated risk factor was observed in those eating raw meat, in those eating raw vegetables, in those who have history of abortion, in women who drink river/streams water and in those who didn't handle raw meat[15].

### **3. DISCUSSION**

The importance of estimating *T.gondii* infection in human has a great significance because of the risk of the infection of fetus, immune compromised hosts and newborns[16]. Seroprevalence anticipated for human population varies greatly among different countries, among different geographical areas within one country, and among different ethnic groups living in the same area [17]. Seroprevalence of *T.gondii* infection in women at childbearing age is found to be between 4%-100%. Incidence of primary maternal infection during pregnancy varies in a range of 1 to 310 per 10.000 pregnancies in the populations in Europe, Asia, Australia, and the Americas [15]. The serological screening of pregnant women for toxoplasmosis and the follow-up until delivery are not routine procedures in Turkey. In a few studies performed in our country, seroprevalence of *T.gondii* infection in women at childbearing age is found to be between 19.2% to 85%; and it is estimated that incidence of congenital toxoplasmosis is 0.1%[18-20].

The difference of seroprevalence of *T.gondii* infection in pregnant women in different studies could be attributed to variation in climatic conditions and living standards of the people in the defined areas. Furthermore, sampled populations, serological tests used, genetic background of the parasite and the host and the type of immune response elicited by the parasite[33,34] culture of the society and different feeding habits[35] are some factors contributing for the variation of seroprevalence of anti-*T.gondii* antibodies in pregnant women across the globe.

### **4. CONCLUSION**

Public education on identified risk factors and screening of pregnant women during their antenatal care should give and further study is recommended in other parts of the nation.

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