

Toxoplasmosis & Risk Factors Among Female Students of Medical Colleges

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Toxoplasma gondii is of great concern in public health because it affects a lot of people in the globe. However, in the clinical setting, it rarely causes serious disease. The current research was performed on university students in Basra province to estimate the prevalence of toxoplasmosis and its risk factors. It is the first time research was done in Basra province. Venous samples of blood were obtained from 177 women in the higher institution of learning of Basra in 2018. The participants were aged between nineteen to twenty-four years. The samples were analyzed if they had anti-*T.gondii* IgM & IgG antibodies that would show evidence of *T.gondii* infection. The participants were also given questionnaires to determine risk factors. The mean age of the participants was 21.24 years, and a majority of them were aged between twenty-two to twenty-four years. The differences between contact with an animal and age that has examined positive for toxoplasmosis were not statistically significant. Among the 177 participants only two, who are about 1.13% tested positive for *T. gondii* IgM which is considered as recent infection while, 20 of them with positive IgG antibodies was detected as a past infection. The only variable that had a positive association with testing positive to *T. gondii* was contacting with soil (garden at the house) the level of significance for the association was less than 0.05.

Keywords: Toxoplasmosis, IgM, Antibodies, IgG Antibodies, Risk Factors, University students.

Toxoplasmosis is among the most famous parasitic zoonosis in the globe; it is due to a complex protozoan *Toxoplasma gondii*¹. The definitive hosts for the parasite are cats; the warm-blooded creature is its intermediate host. It happens in three kinds, which are bradyzoites, sporozoites, and tachyzoites². The parasite is found in the lungs, brain, at most of the times in the lymph nodes and the heart^{3,4}. The sickness influences about 33% of the worldwide populace⁵ it is an opportunistic parasitic disease

that affects people whose immune system is deficient⁶. It found that childbearing aged ladies and women who are pregnant have a high rate of infection with the disease⁷. The disease is wide, and variety relies upon social and cultural mores, geographic components, and mode of transmission. The pervasiveness of the disease is more in warm and humid areas⁸, which is caused by an obligate intracellular protozoan parasite. Individuals can be infected after ingestion of raw or undercooked meat, by ingestion of oocysts shed from cat in the taint soil,

water or food; or by trans-placental transmission of tachyzoites^{9,10}. Women infected with *T. gondii* at the pregnancy can result in neonatal death or different inborn imperfections, like nervous, sensory system anomalies, hydrocephalus, and chorioretinitis^{9,10-11}.

After ingested, the parasite changes to a quick replicating structure referred to as the tachyzoite which invades host cells and produce three successive waves of proteins are secreted from parasite organelles. These proteins can alter host cell function and inhibit the immune response directed towards the parasite¹². by forming a parasitophorous vacuole [PV]. Which preventing lysosomal fusion and killing of the parasite¹³. In immunocompetent individual the infection cleared from the host by the immune system^{14,15}. The parasite at that point changes to a stage that replicates slowly referred to as the bradyzoite that persists in the neural and muscle tissues of the host for the entire life¹⁶. In parasitic attacks, the cytotoxic action of white blood cells is increased due to the effect of cytokines (TNF- α and IL-5)¹⁷. The lymphocytes Th2 produce some cytokines like (IL-4, IL-5, IL-6, and IL-10) that assume a major part in the formation of the pathogen for the disease^{18,19}. Disturbance of immune response associated with toxoplasmosis may explain the success of parasite in escaping from discrimination and elimination by the immune system then supporting its survival and replication²⁰. Treatment of this disease is often only recommended for people with serious health problems, such as people with HIV, because the disease is most serious when one's immune system is weak. Clinically, acute toxoplasmosis is usually treated with a combination pyrimethamine and sulfadiazine although sometimes may be replaced with trimethoprim, and the latter with the clindamycin.²¹ Other studies show that triple combination of PYR-SDZ-levamisole could be an alternative treatment option in case of infections caused by *T. gondii*.²² The drug combinations also the usual choice for prophylaxis. However, because none of the inhibitors commonly used for the treatment of primary disease is able to penetrate tissue cysts and thus clear the bradyzoite form of the parasite, lifelong prophylaxis is essential if recrudescence disease is to be prevented in immunosuppressed patients²¹. Female university students are close to childbearing age, and their status of *T. gondii* infection is important. The

current research was structured to give recent data about the *Toxoplasma* infection of a female university student who was studying at Basra University, in Iraq.

METHODS

Blood tests were gathered from 177 healthful female understudies at the college of medicine & college of pharmacy University of Basra, Iraq, in 2018. Ethical endorsement was acquired from the University of Basra; a questionnaire was organized to collect & analyze the importance factors influencing toxoplasmosis.

Three to five millilitres of blood were collected from female students. The blood samples were given time to clot totally before centrifugation at 2000 rpm for 10 minutes to obtain serum. Serum was isolated from the clot and stored in too tightly screwed tubes and stored at "20 °C. This frozen serum was then tested for the availability of anti-*Toxoplasma* IgM & IgG antibodies, using linked Immunosorbent Assays (ELISA) kit (Rapid Labs, United Kingdom). The steps to test the samples were according to the manufacturer's instructions. The questionnaires' data along with the findings of the serological assay were entered in SPSS software (version 22) and analyzed.

RESULTS

A total of 177 female understudies going to college amidst of 19 and 24 years old; the mean age was 21.24 years. A majority of the participants were aged between 22 and 24 years; they were 78 accounting for 44.07%. Twelve of the participants, which is 6.78% had cats in their homes, and six of them, which is 3.39% indicated that they drank unpasteurized milk. Only two who accounted for 1.13% consumed undercooked meat while 93.79% indicated to wash their hand after contact with raw meat. That appear in table (1), about 58.2% of the study populations lived in the urban area, and about 41.8% who is lived in rural areas.

This table shows that two of the participants had positive *T. gondii*- IgM antibodies which show acute infection and 20 (11.3%) of them had a positive *T. gondii*-specific IgG antibodies which indicate previous infection. While 1 (0.6) of samples had both acute and chronic infection

which is indicated by the presence positive of both IgM and IgG antibodies. The statistical analysis showed significant differences between them ($p < 0.05$).

This table demonstrates that just contact with soil (garden at the house) from those factors had significant differences with seropositivity ($P < 0.05$).

DISCUSSION

Toxoplasmosis is a curable but potentially deadly sickness²³. The parasite has the ability to

crosses the blood–brain barrier and establishes persistent infection in a drug-resistant bradyzoite stage²⁴. From the past, has been considered to be one of the most common parasitic diseases of human and other blood warm animals². In this research, we sought to detect recent or past infection, by using antibodies against *Toxoplasma gondii* in the serum of females on childbearing age at Basra University in Iraq. In view of previous study done in Iraq which indicated that type II strains often associated with human toxoplasmosis and dominant among Iraqi female²⁵ and this result was going well with the results of studies in other countries^{26,27}.

Table 1. Characteristics features of study participants

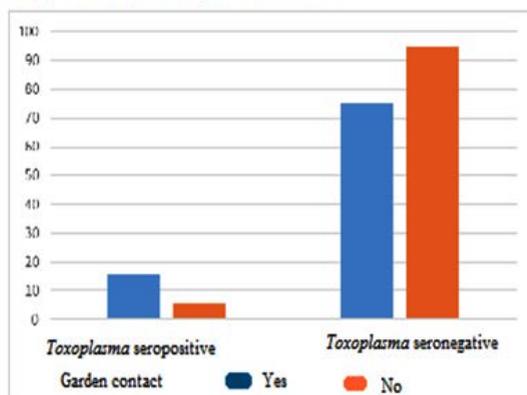
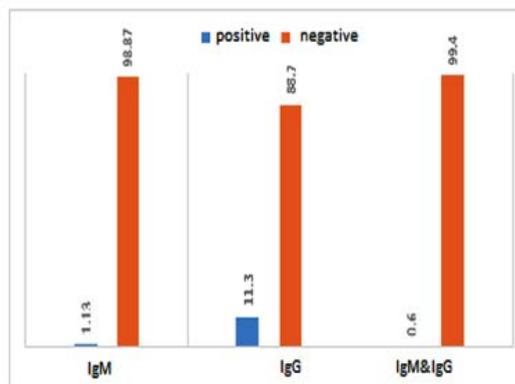
Variable	Category	Number (%)
Age years	> 20	38/177
	20–22	61/177
	22–24	78/177
Place of residence	Rural/Urban	74/177 103/177
Ownership of cat	Yes/No	12/177 165/177
Changing cat litter	Yes/No	5/127 12
Ingestion raw or undercooked meat	Yes/No	2/177 175/177
Washing hand after contact with raw meat	Yes/No	166/177 11/177
Contacting with soil/Garden at house	Yes/No	65/177 112/177
Drinking unpasteurized milk	Yes/No	6/177 171/177

Table 2. Toxoplasmosis in female of child-bearing age in Basra

ELISA test	Number of women tested				Total	
	Positive		Negative		No.	%
	No.	%	No.	%		
IgM	2	1.13	175	98.87	177	100
IgG	20	11.3	157	88.7	177	100
IgM&IgG	1	0.6	176	99.4	177	100
X ² = 17.5	P<0.05					

Table 3. Toxoplasma seropositivity & Risk factors

Variable	Toxoplasmosis seropositivity		p-value
	Yes n=22 (12.4%)	No N=155 (87.6%)	
Contacting with soil (Garden at house)	16 (24.6%)	49 (75.4%)	P < 0.05
Yes	6 (5.4%)	106 (94.6%)	
No			

Toxoplasma seropositivity & Risk factors**Toxoplasma antibodies**

Most investigations led on the seroprevalence of toxoplasmosis are centered around childbearing age, pregnant ladies and immunodeficient patients^{28, 29}. Moreover, the seroprevalence rate of *T. gondii* IgG in the Basra pregnant women has been reported to be 43.07% (30). Female university students are close to childbearing age, and their status of *T. gondii* infection is important. In the present investigation, among 177 female college understudies, 1.13% were seropositive for *Toxoplasma* IgM, & 11.3% seropositive for *Toxoplasma* IgG which are less than the seroprevalence already found in different nations in or close to the Middle East, including Yemen (45.4%), Jordan (47.1%), Iran (75.7%), and Ethiopia (85.4%). (31-34). It could be as a result of higher education, as shown to be a decreasing factor in *T. gondii* infection (35). Another reason for a lower prevalence rate of toxoplasmosis among the female students in the current study might be the lower age of the participants, which in turn lowered the exposure to *T. gondii* and the subsequent infection. A new systematic review of studies detection seroepidemiology and *T. gondii* increased with age^{36,37}. One probable explanation behind this finding is the extra-long periods of potential exposure with age. However, like to our detection, a few studies didn't detect a significant connection between *Toxoplasma* infection and age.

In the present investigation, contact with animals for example cats was not related with *Toxoplasma* seropositivity. It likewise has been reported in some past studies^{38,39}.

Among the different risk factors analyzed by our examination, contact with soil (garden at the house) was the only one positively associated with toxoplasmosis. This factor was also identified significantly by different analysts⁴⁰⁻⁴². Sporulated oocyst can hold viable for a considerable length of time in moist soil, and poor sanitation. Therefore, it is essential that awareness of how *Toxoplasma* infections are caused is raised so that ladies can find a way to avoid contracting this parasitic infection.

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