

## Relationship Between Toxoplasma Gondii Antibodies And Blood Group Inuniversity students.

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### Abstract

**Background:** Toxoplasma gondii is an obligate intracellular protozoan that may infect nearly all warm-blooded animals, including humans. T. gondii is thought to infect one-third of the human population. The symptoms depend on the adequacy of the immune antiparasitic response. In humans, the main source of infection is through contact with the feces of infected cats, the final host in which the T. gondii completes its life cycle. Other source of infection occurs when drinking raw milk, ingestion of contaminated meat.

**Aim:** This descriptive study estimated the seroprevalence and risk variables for Toxoplasma gondii infection for undergraduate students of a college of Pharmacy who were studying at University of Baghdad.

The frequency rate of Toxoplasma was 23.8% for IgG and 5.97% for IgM antibodies. The frequency of the parasite 804-3811 in male were higher than female, but with non-significant difference (P-value was greater than 0.05). The differences between the Toxoplasmosis infection and the contact with an animal were also not statistically significant. The only variable that had a positive association with seropositive T. gondii was the blood group; the association considered significance with level > 0.05. Attention is better to be taken to this important part of the community to grantee a healthy offspring capable of building the country.

**Keywords:** toxoplasmosis, animals contact, blood groups system.

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### Introduction

Toxoplasma gondii is a parasite of worldwide distribution present in every climates and countries. It can survive in a wide variety of vertebrate hosts. Cats and other Felidae are the final hosts, while human and wide range of animals, birds and rodents are intermediate hosts (1). The susceptibility to T. gondii infection is variable depending on parasite strains, environmental conditions, and genetic traits of the human hosts (2).

Geographical variations in the seroprevalence of T. gondii could be attributed to changes in food consumption habits between countries, as well as regional diversity in T. gondii

prevalence in animals raised or hunted locally for human consumption, or varying levels of oocyst contamination in the environment across the region (3).

*T. gondii* IgG antibodies were detected in 66.5% of the females by undergraduate female university students in Jordan. Only one sample was positive for both IgG and IgM(4), while in Saudi Arabia, 9.4% of females enrolled at a university in Northern Saudi Arabia were seropositive for *T. gondii* IgG, and none tested positive for IgM antibodies exclusively(5).

From Kirkuk University students, the overall incidence of *Toxoplasma* was 21.5%, with an equal rate (11%) for both IgG and IgM antibody (6), while. in Thi-Qar province, the prevalence of toxoplasmosis among university students were 21.94% (7).

The overall seroprevalence of *T. gondii* infection has been reported in a variety of locations around the world and in Iraq's neighboring countries: 24.1 percent from seroepidemiological analysis among Brazilian college students,(8) 27.63 percent in Ethiopia,(9) 5.87 percent in pregnant women attending an antenatal clinic at a university teaching hospital in Zambia,(10) 66.5 percent among Jordanian undergraduate university female students;(11) ; 43.3percent , 43.3 percent in Saudi Arabia diabetic patients and Iranian blood donors respectively(12,13) .

The infection remains latent until when the hosts' immune responses are challenged where tissue cysts rupture causes release of the quiescent parasite that rapidly divide (14).Current studywas structured to give the frequency rate and the effect of some demographic variables on the *Toxoplasma* infection in college of Pharmacy/ University of Baghdad in Iraq.

### **Materials and Methods**

one hundred and thirty four serum samples were collected from students under studies at the college of pharmacy, University of Baghdad, aged between twenty one to twenty five years. The mean age of the participants was 21.25 years, and a majority of them were aged twenty-two years. A cross-sectional study from November 2019 to March 2020 analyzed 134 blood samples for IgG and IgM antibodies. The readily available enzyme-linked immunosorbent assay (ELISA) kit purchased from (ACON laboratories, San Diego, USA) and the calibration curve was drawn to obtain serum anti-*Toxoplasma* IgG and IgM levels from their absorbance. For qualitative assessment of anti-*Toxoplasma* IgG and IgM seropositivity, Index value >1.1 was interpreted as positive, also according to the manufacturer recommendations.

Blood groups .anti- A and anti- B slide test (ABO blood grouping ) were identified by using commercial monoclonal anti sera Anti – A and Anti – B , (Atlas Medical , UK ) as recommended by the manufacture . The results were interpreted as positive if agglutination appears and negative if no agglutination observed.

A semi-constructed questionnaire was completed by participants to gather information about Toxoplasma infection risk factors.

### Sample collection

A five millilitres venous blood samples were collected from the patients tested for blood group and then left at room temperature to clot, then the samples were centrifuged at 3000 rpm for 15 minutes to obtain sera. Sera were separated and kept frozen at (-20 °C) for anti-Toxoplasma IgM and IgG assay.

### Statistical Analysis:

Microsoft Office Excel 2016 was utilized to generate percentages and other results. The Statistical Analysis System- SAS (2012) program was used to effect of difference factors in study parameters. Chi-square test was used to significant compare between percentages in this study,  $P < 0.001$  was considered as significant association.

### Results

The seroprevalence of toxoplasmosis was 23.8% for students from both sexes. It was analyzed for 134 students in relation to gender, cats contact and ABO blood groups as reported in tables 1,2 and 3.

**Table1:** The seroprevalence of toxoplasmosis in relation with gender.

Gender	Number	Positive cases (no. and %)	Negative cases (no. and %)	Chi-square	P-value
Male	32	10 (31.25%)	22 (68.75%)	1.256	0.262*
Female	102	22 (21.5%)	80 (78.4%)		
Total	134	32 (23.8%)	102 (76.11%)		

\* The mean difference is significant at the 0.05 level.

**Table 2:** The relationship of contact with cats and the seroprevalence of toxoplasmosis

Contact with cats	number	Positive cases (no. and %)	Negative cases (no. and %)	Chi-square	P-value
yes	22	8 (26.6%)	22 (73.3%)	4.433	0.109*
Little	8	0 (0.0%)	8 (100%)		
No	104	24 (23%)	80 (76.9%)		
Total	134	32 (23.8%)	102 (76.11%)		

\* The mean difference is significant at the 0.05 level.

**Table 3:** The relationship of blood groups and the seroprevalence of toxoplasmosis.

Blood group	Number of Positive cases and %	Number of negative cases and %	Chi-square	P-value	Contingency Coefficient*
A	8 (25%)	20 (19.6%)	8.848	0.031	0.249
B	14 (43.75%)	22 (21.5%)			
O	6 (18.75%)	44 (43.1%)			
AB	4 (12.5%)	16 (15.6%)			
Total	32 (100%)	102 (100%)			

\*Contingency Coefficient: (0.01-0.4) weak relationship, (0.4-0.6) intermediate relationship, (0.6-0.95) strong relationship, (0.95 - 1) perfect relationship

### Discussion:

*Toxoplasma gondii* is a protozoan that leads to toxoplasmosis in humans and other animals. Because of its wide range of hosts, it is regarded one of the most common parasitic diseases on the world.(15). It is a curable but potentially deadly sickness(16).

*T. gondii* antibodies were detected in 23.8% of students from both sexes. The positive cases for IgM (5.97%) were positive for IgG antibodies concurrently. From 32 male there was 31.25% seropositive for *T. gondii*, while from 102 female there was 21.5% (table 1).

There is no relationship between gender and the seropositivity, where P-value was greater than 0.05. However, the percentage of infection was higher in male than female. This result is similar to a study performed in Thi-Qar province, during the period from October 2013

to April 2014, which found that 21.94% of students were exposed positive for anti-Toxoplasma antibodies, and 5.33% of them had IgM. But in contrast to our results, the same study showed significant difference between males and females in rate of positive for anti-Toxoplasma antibodies, which recorded 7.52% and 14.42% respectively (7). Another study among 112 Brazilian students, was agree with our percentage, it found that 24.1% of them were seropositive by ELISA method (17).

Accidental ingestion of oocysts from the environment, in water, or on inadequately washed vegetables, or consumption of raw or undercooked meat items containing *T gondii*, causes human infection. (18). This may explain the higher percentage in male, as they more contact with fast food restaurants that may not be healthy.

Contact with animals, such as cats, was not linked to Toxoplasma seropositivity in the present study. (table 2), this means that there are other risk factors that cause a high rate of infection; as a consumption of undercooked meat, and this confirm the reason of higher percentage of infection in males than females. It likewise has been reported in a study among female students of medical colleges at Basra University (19).

There is no relationship between contact with cats and the seropositivity, where P-value (0.109) greater than 0.05. However, those with cat contact showed higher percentage of infection. This result was in line with a study done among female university students in Shiraz University of Medical Sciences, in Fars province, southern Iran, which found the difference between animal contact with seropositivity to toxoplasmosis was not statistically significant (20).

Current study found a relation between blood group and the positive cases, where P-Value (0.031) less than 0.05 (table 3). Blood group B showed highest percentage (43.75%) followed by group A (25%). So the person with blood group B may have the higher probability to get toxoplasmosis.

Our result was agree with nested PCR study on tissue and blood samples which showed that percentage were higher in blood group B for tissue (50.0%) and the lower number and percentage were in blood group O (4.16%). In spite of their results were non-significant at the level p value  $>0.05$  (21). In contrast, Al-Mosawi found an association between blood group and Toxoplasma infection with lowest prevalence in blood group B (17.44%) and highest prevalence among blood group A (30.65%), in a study for students of Thi-Qar University (22).

From the value of the Contingency Coefficient, which was 0.249. It can be revealed that the relationship between the blood groups and seropositivity was weak.

Conflicting results obtained from a number of studies investigate the link between *T. gondii* infection and the blood groups system (2). Other findings show no link between *T. gondii* infection and the ABO blood group system, and so disagrees with researches that proposed in AB & B blood groups, the antigen B works as a possible parasite receptor in the gastrointestinal tract. . The conflict between these findings and those of other studies could be due to a variety of variables. May be the antigen B influence on the adherence of *T. gondii* to the gastrointestinal mucosa in a minor way, so the contribution of *T. gondii* is masked by the high prevalence of infection with these parasites. (23).

In conclusion, the study showed that the prevalence rate of *Toxoplasma gondii* was 23.8% of students from both sexes. There was a relatively no relationship between gender and the seropositivity of toxoplasmosis, males have higher percentage of infection. About the contact with cat, there was also no relation with the infection by toxoplasmosis, the blood group have a relation with positive cases especially with blood group B, which have a higher probability to get toxoplasmosis .

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