



## Original Article

**Seropositivity and awareness of Toxoplasmosis among University students**

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**Abstract:** *Toxoplasma gondii* is an obligate intracellular parasite that is infecting about one-third of the world population. Awareness about toxoplasmosis and its transmission can help reduce its prevalence. We examined the degree of awareness about toxoplasmosis among female university students. A total of 127 samples were collected, including 44 samples from health colleges students and 83 samples from other colleges. A questionnaire was used to measure the level of awareness about *Toxoplasma gondii*. Serum samples were analyzed for the presence of anti-*Toxoplasma gondii* antibody using ELISA technique. Ninety-four (74%) participants were 18-20 years, 27 (21%) were 21-24 years, and 6 (5%) were above 24 years. Only 11 (9%) students eat raw meat and 21 (17%) students had a tendency to eat undercooked meat. Furthermore, only 6 (5%) students received blood transfusion and 33 (26%) students owned a cat at home. Forty-two (33%) students answered that they know about the disease. The majority of participants (n=121, 95%) used bottled water as a source of drinking water. Among the 127 samples collected, only 6 (4.7%) had IgG anti-*Toxoplasma gondii* antibody. There was statistically significant positive correlation between the level of awareness about toxoplasmosis and the participant's answers about previous knowledge about the disease and a statistically significant negative correlation between the level of awareness about toxoplasmosis and the student's faculty. We recommend that this study is repeated with a larger sample size and a modified questionnaire to include more detailed questions to reveal the true level of awareness.

**Keywords:** *Toxoplasma gondii*, awareness, prevalence, Jeddah.

## 1. Introduction

*Toxoplasma gondii* is an obligate intracellular protozoan parasite that is infecting about one-third of the world population [1-3]. Infection with this parasite is acquired either prenatal or postnatal. Postnatally acquired toxoplasmosis is usually asymptomatic. However, clinical disease is greatly confined to risk groups, including infants and immunocompromised individuals. Congenital toxoplasmosis is seen in cases of the mother acquiring the infection for the first time during pregnancy. The incident of prenatal toxoplasmosis is estimated to vary from 1 to 100 per 10,000 births. Toxoplasmic encephalitis and disseminated toxoplasmosis have been reported in immunocompromised patients [2]. If the mother acquired the infection during the first trimester the risk of fetal infection is 25%, and the risk increases to 65% if the infection is during the second trimester, while the

mother has only temporary parasitaemia without any symptoms. The fetus becomes infected when focal lesions develop into the placenta. That infection can cause a wide spectrum of clinical disease either mild or severe such as slightly diminished vision or retinochoroiditis, hydrocephalus, convulsion and intracerebral calcification due to the localization of the infection in the central nerves. Congenital toxoplasmosis may cause abortion, neonatal death, or fetal abnormalities with detrimental consequences for the fetus. It may also significantly reduce the quality of life in children who survive a prenatal infection [3].

Level of seroprevalence for toxoplasmosis ranged from 8-77% worldwide. High seroprevalence for toxoplasmosis has been reported among pregnant women and women of childbearing age from different parts of the world, including the Middle East [2,4]. The prevalence of infection in Saudi Arabia showed wide variations as revealed by previous studies. The highest

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positivity rate was reported in Jeddah 61.4% [5], Al-Hassa of 51.4% [6,7], 41% in Aseer [8], 38% in Riyadh [9], and 35.6% in Makkah [10].

Awareness about toxoplasmosis and its transmission can help reduce its prevalence. Moreover, awareness about toxoplasmosis among females at a childbearing age not only helps in reducing its prevalence but also in decreasing the undesired outcomes of congenital toxoplasmosis.

The aim of this study is to examine the degree of awareness about toxoplasmosis among female university students in Jeddah, Saudi Arabia and its association with different factors.

**2. Materials and Methods**

An ethical approval was issued by the ethics committee of the faculty of applied medical sciences to collect blood samples from King Abdulaziz University female students in Jeddah city. A questionnaire was used, written in the Arabic language, to measure the level of awareness about *Toxoplasma gondii* and includes questions about previous pregnancy, abortion, the source of drinking water and how they prefer to eat meat. A total of 127 samples were collected including 44 samples from health colleges students and 83 samples from other colleges. Each sample tube was labeled with a serial number and samples were centrifuged to separate serum from the whole blood. The serum was stored in a deep freezer at -40°C.

Serum samples were analyzed for the presence of anti-*Toxoplasma gondii* antibody of the IgG and the IgM classes using ELISA technique using DAI-PRO kit as described by the manufacturer.

Results together with demographic data and answers to awareness questions were entered into SPSS (ver. 16) for further statistical analysis.

**3. Results**

Serum samples from 127 female students at King Abdulaziz University were collected as described above. Of these, 94 (74%) participants were 18-20 years, 27 (21%) were 21-24 years, and 6 (5%) were above 24 years as shown in Fig. 1. Participants of this study were from different colleges. Twenty-nine (23%) students were from the preparatory year, 23 (18%) students from Applied Medical Sciences, 16 (13%) students from Science College, 14 (11%) students from Arts & Humanities College, 12 (9%) students from Business & Administration College, 8 (6%) students from Dentistry College, 7 (6%) students from Nursing College, 5 (4%) from Home Economic College, 4 (3%) from Pharmacy College, 3 (2%) from Medicine, 2 (2%) Art & Design College and 2 (2%) students from Communication & Media College as shown in Fig. 2.

The majority of students (n=122, 96%) were single and only 5 (4%) students were married as shown in Fig. 3.

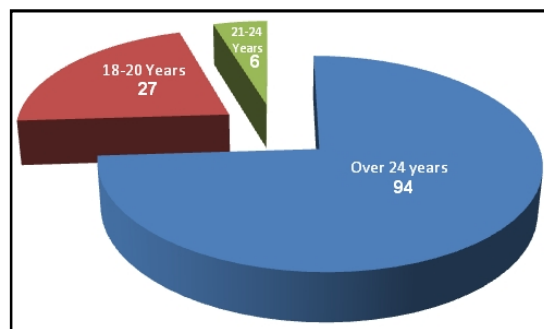


Fig. 1. Participant's age.

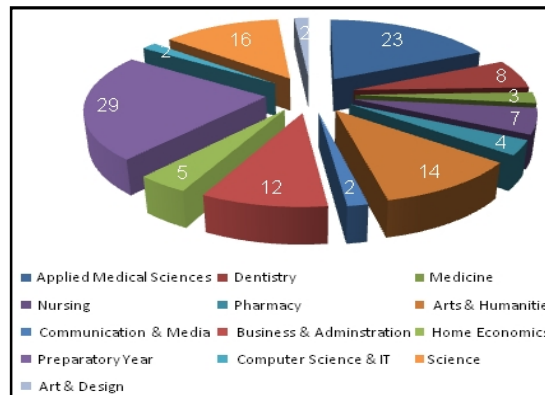


Fig. 2. Participant's faculties.

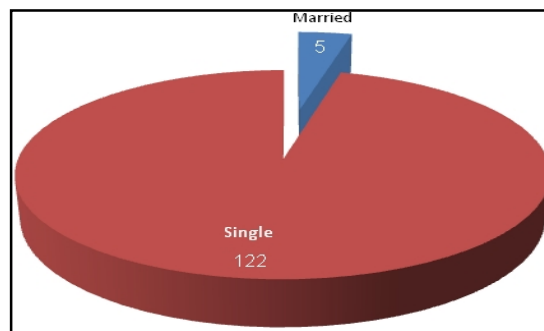


Fig. 3. Participant's marital status.

When asked about their eating habits, only 11 (9%) students eat raw meat and 21 (17%) students had a tendency to eat undercooked meat. Furthermore, only 6 (5%) students received blood transfusion and 33 (26%) students owned a cat at home (Figs. 4-7).

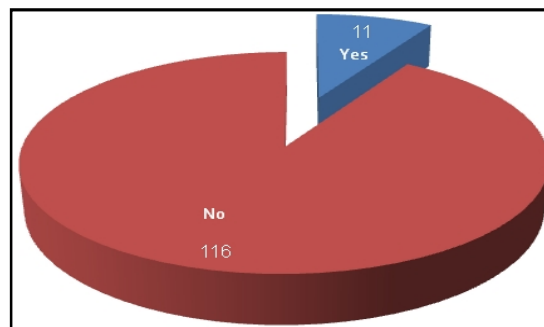


Fig. 4. Tendency to eat raw meat.

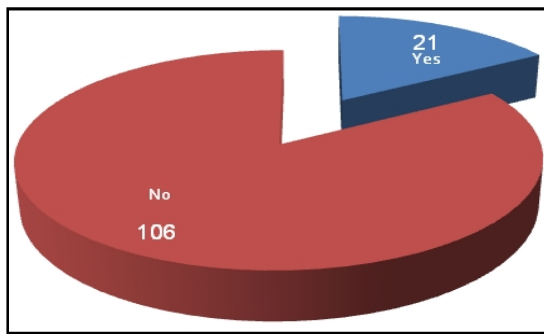


Fig. 5. Tendency to eat undercooked meat.

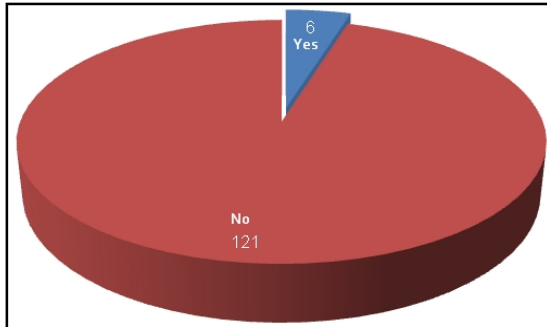


Fig. 6. Participants received blood transfusion.

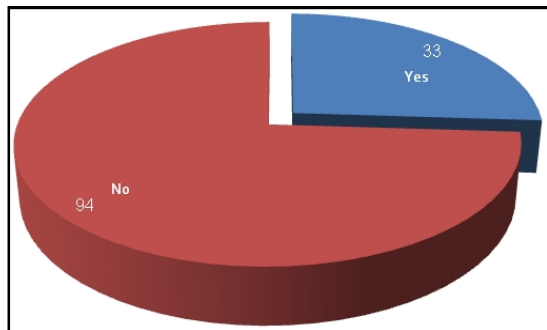


Fig. 7. Participant's ownership of a Cat at home.

When asked if they knew about toxoplasmosis, 42 (33%) students answered that they know about the disease (Fig. 8). The majority of participants (n=121, 95%) used bottled water as a source of drinking water (Fig. 9).

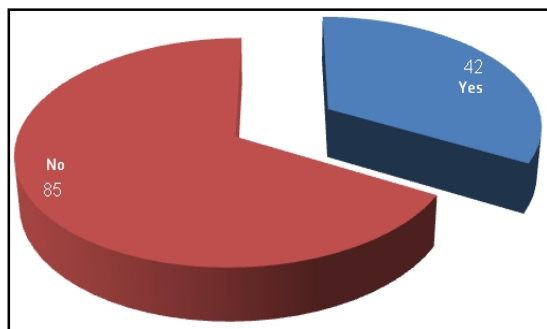


Fig. 8. Participant's self-knowledge about toxoplasmosis.

Serum samples were examined for the presence of IgG and IgM anti-*Toxoplasma gondii* antibodies using ELISA technique as described above. Among the 127 samples collected, only 6 (4.7%) had IgG anti-*Toxoplasma gondii* antibody and none were positive for IgM antibody.

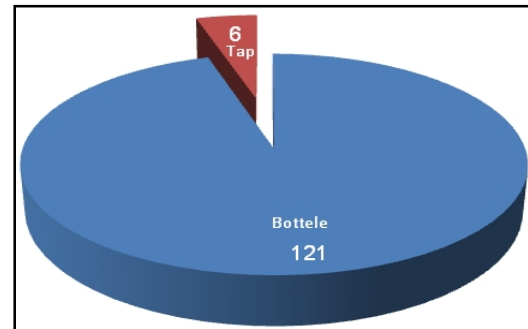


Fig. 9. Source of drinking water.

The questionnaire distributed to participants included questions to estimate the level of awareness about toxoplasmosis among participants. After data analysis, 32 (25%) have low awareness while 56 (44%) have medium awareness and 39 (31%) have high awareness as shown in Fig. 10.

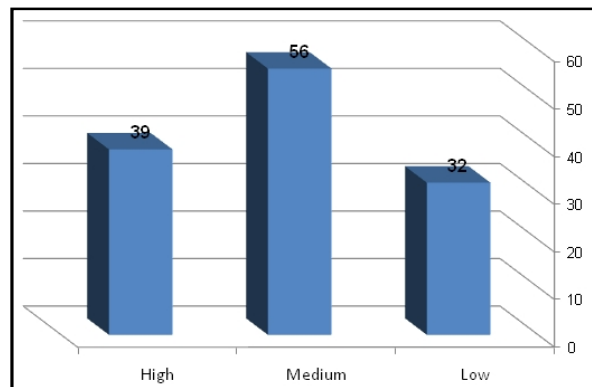


Fig. 10. Level of awareness about toxoplasmosis as calculated from answers to different questions.

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 16 as described above. Correlation between the level of awareness about toxoplasmosis and age, faculty, marital status, tend to eat raw and/or undercooked meat, receiving a blood transfusion, having a cat at home, the source of drinking water and the seropositivity to IgG using a Pearson correlation test.

The results revealed that there were statistically significant positive correlation between the level of awareness about toxoplasmosis and the participant's answers about previous knowledge about the disease. Students who answered that they know about toxoplasmosis scored higher scores in questions used to estimate the level of awareness about toxoplasmosis.

Moreover, there was statistically significant negative correlation between the level of awareness

about toxoplasmosis and the student's faculty. Students from health faculties had less awareness about toxoplasmosis than students from non-health faculties.

#### 4. Discussion

*Toxoplasma gondii* is considered a neglected parasite among parasitologists since it causes very little disease in immunocompetent individuals. However, it can cause severe morbidity and mortality in immunocompromised patients. In pregnant females, as it may lead to serious morbidity to the fetus from retinochoroiditis, mental and physical disability abortion, stillbirth, and death of the fetus. Seropositivity to toxoplasmosis ranged from 8-77% worldwide. High seroprevalence for toxoplasmosis has been reported among pregnant women and women of childbearing age from different parts of the world, including the Middle East [2,4].

In this study, we investigated the seroprevalence of IgG antibodies to *Toxoplasma gondii* among female university students at childbearing age. A low seroprevalence is reported among the study group compared to other studies reported higher seroprevalence in Saudi Arabia [5-10]. The low sample size could explain the difference between our results and that of others. Moreover, the selectivity of other studies to pregnant and/or hospitalized patients could have led to a falsely higher seroprevalence. Another important factor that has to be considered is that there is no standardized diagnostic method used as a referral method to investigate seroprevalence for toxoplasmosis in a community.

Raising the awareness about toxoplasmosis and its mode of transmission is considered as a powerful tool to prevent congenital toxoplasmosis. From this prospectus, this study investigated the level of awareness about toxoplasmosis among childbearing-aged university students in Jeddah, Saudi Arabia. Calculated awareness level among this study group revealed that almost three-quarters of students had medium to high level of awareness. Surprisingly, about one-quarter of the study group answered that they have previous knowledge about toxoplasmosis. Moreover, students who study at health faculties had lower awareness about toxoplasmosis than students in non-health faculties. The conflict in such findings could be explained by the fact that most of the study group were hesitating when filling the questionnaire, especially that the questionnaire was filled on one-to-one basis by the research team. Such data collection methods may overlook the psychological and sociological issue of trying to be perfect among peers.

None of the participants who have a tendency to eat raw and/or undercooked meat were positive for toxoplasmosis. This could be due to the vigorous rules applied in respect of meat inspection in Jeddah area. Furthermore, none of the participants who owned a cat were positive for toxoplasmosis. This could be explained by the fact that most cat owners strive to keep

their cats healthy by following up regularly with a veterinarian to make sure that they are infection free.

We recommend that this study is repeated with a larger sample size and a modified questionnaire to include more detailed questions to reveal the true level of awareness.

#### Acknowledgment

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