

## Seroepidemiology evaluation of Toxoplasma IgG values in women at their marriage age and pathogenesis factors

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**Abstract:** Protozoan *Toxoplasma gondi* is an important cause of serious infections spreading among the human population and domestic animals in the world and the chronic phase in animals is after asymptomatic syndromes. What's disease, acute infection, asymptomatic? In all cases of acute infection due to the persistence of parasite cysts observed, the disease is caused by the reactivation of cysts. Married women exposed to the disease could predispose them to disease, This study aimed at determining the level of IgG antibodies at the time of their marriage counseling has been done in Zahedan. During this descriptive – analytical study, 280 women referring to the Razmjoo moghaddam central laboratory of Zahedan from February 2009- to December 2009 were measured for IgG by ELISA method. Then blood samples were taken from them and the level of blood IgG antibody was measured by ELISA method and the results with obtained IgM measurement and their relationship with demographic issues, including those of residence, education level, were noted. Home cat care and pet at home, and how the meat is cooked were surveyed. 28.2% of patients with type IgG antibodies were having significant positive correlation with the maintenance of home cats and how the meat was cooked. In other words, women who kept cats in their home and had half-cooked or raw meat to eat, showed increased positive antibody. The results of these studies indicated that a high percentage of susceptible women of childbearing in Zahedan city, were without a note of antibodies against *Toxoplasma* and thus they are susceptible to infection. Thus in order to prevent infection of susceptible pregnant women and prevent problems that may arise during pregnancy, awareness and control of pathogens associated with disease, education and health care practice, are recommended.

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### Introduction:

*Toxoplasma gondi* was found for the first time in 1908 at the Pasteur Institute in Tunis by Nicolle and Manceaux in a North African rodent, called *Clendactylus gondi* and was named after it(1). The condition of the intracellular protozoan is one of the main causes of serious infections in humans and in domestic animals with worldwide distribution.

Remember this is a chronic disease after disappearance of the acute phase of

infection and also because of the persistence of the parasite to form cysts is observed and hence the reactivation of the disease is seen (2, 3). That cats are definite veintraepithelial host and protect the sexual cycle of the parasite. Other contaminated domestic animals have non-sexual cycle outside intestine, and are also considered as secondary hosts (4, 5). This disease

transmits in different ways such as gastrointestinal, placenta to the fetus during pregnancy, transmit randomly to laboratory workers, organ transplantation, through skin abrasions and conjunctivae tissue wounds and blood transfusion (6, 7). Contamination, especially in women during pregnancy can cause health problems. Their fetus is contaminated and susceptible to infection and miscarriage, premature birth and congenital anomalies, and the disease such as corioretinitis is caused (8, 9, and 10). There is fetal risk of congenital infection, depending on the time of mother's pregnancy. If it happens at the last period of pregnancy, most of the symptoms of disease occurred in child are seen as subclinical (11, 12). In order to prevent the effects of disease before pregnancy, giving counseling before marriage about awareness of routine laboratory tests can benefit them. Whether they are susceptible to acute or chronic infection therapeutic measures can be linked in the treatment so that non-immune individual can be benefited from special health care facilities before pregnancy (13).

#### Methods:

Women referred to Central Laboratory for marriage consultation during October 2010 –January 2011 were studied by descriptive and cross-sectional study. Given the prevalence of disease with 35 percent, obtained by studies conducted in different parts of the country and with regard to statistical formulae, the accuracy of samples as 0.07, and with 95% confidence interval, 280 samples were determined. Demographic data collected through questionnaires were completed by each person and then 2ml of peripheral blood samples was collected with heparin and IgG levels were measured by ELISA method, using commercial kits. Results obtained were analyzed and evaluated by using SPSS 17 statistical software and chi-square Test was used to find out the significant relationship among results.

#### Results:

The average age of women who were referred to University Central Laboratory, for marriage counseling was 21.73 years, and the highest age frequency calculated was 20 years. Education level of most of them (41.1%) was high school degree, and the least had primary school qualifications, if not uneducated, that no statistical significant relationship between antibody reactivity with the educational level was observed ( $P=0.65$ ). Serum test results, of them determined showed that 28.2 % individuals, had IgG antibody and 71.8% of them had no antibodies. Therefore, the prevalence of IgG antibody positivity among women who are going to be married was estimated as 28.2%. Those who (50%) kept cats in their home, have had positive IgG. The statistical analysis

revealed statistically significant positive relationship between the two variables. This means that the group that was dealing with cats, the likelihood of positive IgG was approximately 3.5 times equal to the groups that had no dealings with cats ( $P=0.014$ ) (Table and Figure 1). While 18.1% of people who have had their home domestic animals, were IgG positive that showed no significant statistical correlation between the maintenance of pet at home and test IgG responses ( $P=0.93$ ) (Figure 2). In addition, 57.1% of people, who ate half-cooked meat, were IgG positive with the positive relationship between these two variables was statistically significant ( $P=0.002$ ) (Figure 3).

#### Discussion:

Toxoplasma infection is relatively common parasitic disease between humans and warm-blooded animals. This is a wide spread disease worldwide and its prevalence in different parts of Iran is different, and the exposure to different people, especially women, the possibility of miscarriage, premature delivery and congenital malformations in children who are born is imminent. It is necessary to obtain a level of awareness for safety of women and girls susceptible and non-immune to Toxoplasmosis at the age of marriage. Using this method, it was found that 28.2% of them have anti-Toxoplasma IgG antibodies have confirmed that this is the point, that 28.2% of women in Zahedan already "been infected with Toxoplasma and there is no need to re-evaluate and follow up them during pregnancy. In addition, 71.8% of these are such individuals, who were not safe at the age of marriage, and are not safe during pregnancy, stand for the chances of acute toxoplasmosis infection. If these women decide to marry after getting their test results and within short time after they are pregnant, they have to take urgent action to prevent pregnancy complications to make sure that their baby remain immune to congenital toxoplasmosis. In a research similar to that of marriage on women in different areas of country, the reports vary according to geographical and environmental conditions, and predisposing environmental factors provided the results of these investigations, and these results are consistent.

In a similar study conducted on women during marriage in different areas of Iran, the reports provided varied, according to geographical and environmental conditions, and predisposing environmental factors, and these results are in consistent with our present study. In many countries, studies conducted on pregnant women, no global study was done on IgG-positive cases prior to marriage, and Globally, only one study is available through Medline, Mr. Hashemi and his colleagues study conducted on Ghazvin unmarried women, in 2010, showed that 34% of them have had positive IgG (15) and

in studies similar to these results, in women at the age of marriage in Ardabil City 3.42%, and in high school girls in Julfa 21.8% (17), in women of reproductive age 25% in Ahvaz City (18), in girls at Ahvaz University of Medical Sciences 4.6% (19), in girls at girls high school in the six areas City of Isfahan 18.4% (20), In unmarried women of the total population of Isfahan Province 41.4% (21), girls among different regions of area 10 to 21 percent pro rata to age, dietary habits, and exposure to domestic cats (22), this rate in Mazandaran women introduced to laboratory before marriage, 74.6% (23), and girl students in different fields of Kerman University of Medical Sciences, 16% (24), have been reported, and these results suggest that differences are due to climatic conditions, socio-economic status and literacy levels and other environmental predisposing factors such as, living with cat and pets, and how to cook meat are some of data involved in the study of the researchers are consistent with the present study results. In this study the relationship between IgG positive IgM results obtained in previous measurements in the study population was found (14) and it was shown that 10 people who were IgM positive, had IgG positive titers. (Table 1).

In other words, one third of study population who have had positive IgM, were IgG negative, that this suggests that in recent weeks they have been affected by disease, and if pregnancy occurs during this time follow up and further investigations are needed and may be based on reports of researchers, about 50% of untreated pregnant women, can spread infection through the placenta to their fetus (2, 20)

In the study of Mr. Baillargeon JP similar findings in women referred Health Center in Urmia City this level was 32% for IgG and 6% for IgM (25).

In Oormiye city these levels on women on the verge of marriage were reported as 32.8% for IgG and 4% for IgM (26) and among unmarried women aged 35-14 years in Kashan, 96.4% for IgG and 3.6% for IgM were positive, and of those infected with the parasite were detected (27). Girls in Ardebil referred to Ardabil laboratory health centers for tests before marriage, in 1381, 34% were reported to have a positive IgM and 4% of them have anti-Toxoplasma IgG positive for Gondii, that these differences in the reports are relating to different methods of disease transmission, climate, cultural traditions and food, and laboratory methods (28).

In this study the age range of study subjects between 13-43 years with a mean age of 21.73 was achieved among the positive IgG levels, and age relationship was not statistically significant. Because the people may be infected by parasites in the body after two to three weeks, in the chronic form, cysts formed for a long time even to end of life in the heart, brain and other tissues, including muscle are likely to gain strength. In addition

to among the factors of educational level and the residency status due to which IgG was positive, significant relationship was not observed. Non-significant relationship of amount of IgG with demographic factors dealing with the toxoplasma epidemiology has been reported by many studies. (16-18, 21, 25, 28). This in some studies a significant relationship with age, occupation, education level, place of residence is reported that with increasing age, contamination has been common. Hashemi and colleagues study the highest risk to people without jobs (38.3%) and lowest (22.6%) were allocated to High School students (15). In another study carried out in the city of Ahvaz, the lowest IgG level (6.4%) was observed in educated girls with high health behavior (19). Similar findings, among high school girls aged 14-19 years from different parts of the city of Isfahan were observed. This rate increased with age and the results were proportionally variable to urban defined range. So in some areas of town IgG positive rate was up to the border of 27.5% and the lowest was 14.5% (20). The situation among girls of different areas of the city the age varied proportionally from 10 to 21 percent (21) and in different cities of Mazandaran Province this amount, was 74.6% that infection rate increased with increasing age and it was more in illiterate women, and major difference among the rate of positive cases in rural and urban residents, and also in employed and unemployed was not seen (23). In girl students of different subjects at Kerman University of Medical Sciences, Kerman, a positive serologic test for significant relationship between living and not living in dormitories was observed (24).

The above results obtained are similar to this study results. The survey on predisposing factors of pollution in the study cases show 28.2% of women in Zahedan, have been infected maybe due to factors such as stray cats in the city because of this reason city is contaminated by pollution and to have a need for further investigation on population and rate of contamination with parasite and contact with cats.

In this study 50% of the subjects were keeping cats in their home. Similar findings in women referred to the city of Urmia health centers (25) and high school girls in Julfa were also observed (17). While this relationship has not been established in other studies (18, 19). Tourkan and colleagues study (30) done over rate of infection in owners of domestic cats and others without contact with cats showed some of both groups had a positive IgG, it shows that they were previously infected with this parasite, and none of them were negative for IgM and significant interface between Toxoplasma main infection and a history of keeping cats at home was not observed. Thus we can say that somehow infected cats often frequented their homes and the excreted oocysts by cat led to pollution of water, vegetables, cooking utensils

and food in their home and individuals in our study had a similar situation. Differences resulting from various studies conducted in Iran indicate that climatic condition, socioeconomic status and educational level and abundance of cats and how to live well, are associated with them. So through train in gand raising their awareness we can prevent them from getting infected.

About people who ate raw vegetables or vegetables were not properly cleaned and disinfected, possible contamination of cat oocytes was increased (29), and in the city of Zahedan, according to its desert condition improper growing of vegetables and imported ones, are possible. The vegetables were imported from neighboring provinces or vegetables were not well disinfected and cleaned, contamination was possible by means of cat oocytes. The research also found that 18.1% of subjects had domestic animals like sheep and cats, at their home, with positive IgG, which is similar to studies made by other researchers (16-19, 25, 28) and in all studies, no statistical significant relationship between maintenance of domestic pet animals at home and level of IgG positive was seen. Although it was possible that these animals had no direct role in pollution and because of the supply of water and forage contaminated accidentally by soil contaminated with oocytes, the disease has spread.

In this study it was found that 57.1% of people who consumed half-cooked meat had IgG positive with a statistically significant relationship between these two variables. These results are similar to other similar studies that have been reported (16, 20, 22, 24, 25, and 27). While other studies that have been conducted (17-19, 24), did not reveal such relationship.

The difference in these reports may be related to several demographic factors including low levels of awareness about the way they spread disease, buy contaminated meat from itinerant people, lack of hand washing and be cyst attached to it and eat it when contact with contaminated hands, lack of sufficient heat to cooking a meal and consuming half cooked and get used to tasting the food before cooking is complete. Thus, adopting practices that promote health and raising the level of awareness about the occurrence and prevention of infection are recommended. Further studies on predisposing factors of disease are under way. Screening the women during marriage for infection should be given serious health priorities.

#### Conclusion:

The results of this study indicate that a large number of Zahedanian women during marriage did not show a note of antibodies against *Toxoplasma* and as result, they are susceptible to infection during pregnancy. Therefore, by adopting correct and improved practices we can

improve their living conditions, and prevent infection and awareness and control of pathogens associated with disease is recommended. Education and health care should be exercised in them.

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Table 1 - Relationship between Anti-Toxoplasma IgG and IgM levels in the population studied.

Total	negative	positive	IgG
			IgM
15	5	10	positive
245	186	59	negative
20	10	10	suspicious
280	201	79	population

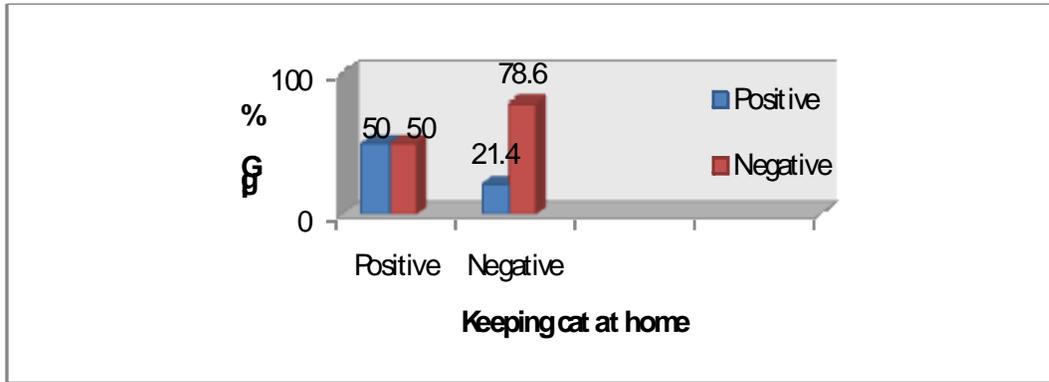


Figure 1: Relationship between positive and negative for IgG and maintenance of cats at home

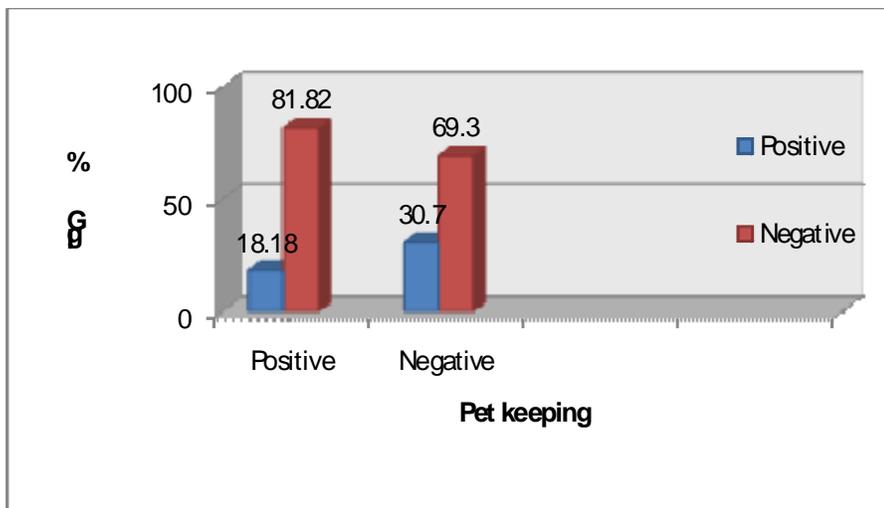


Figure 2 : Relationship between the rate of positive and negative IgG and individuals who maintain domestic pet animals at home

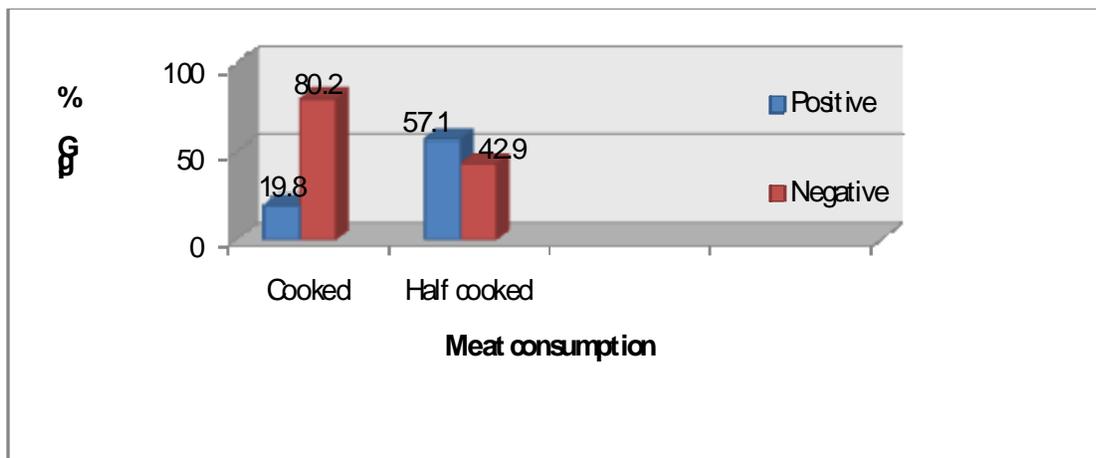


Figure 3 : Relationship between positive and negative IgG and method of meat consumption