



AN EPIDEMICAL STUDY ON THE TOXOPLASMA PARASITE IN IRAQ

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Abstract

One of the prevention ways is to prevent the contamination of at-risk groups, especially women of reproductive age (14-45 years old) with health education. One of the specific goals of this research is to identify seronegative girls in Iraq so that by using it, we can plan the necessary training and actions to prevent this parasite. 1000 blood samples were collected randomly from high school students all over Iraq for 10 months and tested by indirect immunofluorescence method. Also, a questionnaire was organized and available to the public, and information such as history of contact with cats, history of eating semi-cooked meats, eating raw liver was collected. The χ^2 statistical method was used to correlate the epidemiological findings of the infection and the antibody titer, and the results were analyzed using SPSS software. A significance level of 0.05 was considered. The level of IgG antibody against Toxoplasma was positive in 8.21% of the studied subjects by indirect immunofluorescence method. In 198 people (8.91%), the antibody titer by indirect immunofluorescence method was 1:20 to 1:100, and in 20 people (2%) the antibody titer was more than 1:100. The highest percentage of infection was determined in people who kept cats at home (5.37%) and students who had general symptoms (fever, lymphadenopathy, and skin rashes) (7.37%). The χ^2 statistical test showed that there is a significant relationship between infection and contact with cats, eating raw liver, and disease symptoms. Based on the results, it is observed that the antibody titer was negative in 2.78% of the people of the considered society; That is, these people lack any acquired immunity against this infection. Therefore, there is a possibility that the children of these people will become toxoplasma.

Keywords: Epidemiology, Toxicology, Toxoplasma, parasite, Iraq.

Introduction

Therefore, IgM is a useful step to determine the prevalence and measure the titer of antitoxoplasmic antibodies before pregnancy to determine the number of positive cases of antitoxoplasmic antibodies and IgG, as well as the relationship of these positive cases with a number of epidemic variables. Biological factors of infection, including age, keeping a cat, consuming undercooked meat, the amount of education... should be determined in order to reduce the incidence of congenital toxoplasmosis and its complications. Considering the significant prevalence of the Toxoplasma parasite in the world and the possibility of abortion, premature birth and congenital anomalies in children who are born from mothers infected with this parasite, information about the population of women who are not immune to the Toxoplasma Parasite of course, it is considered necessary. Due to the multiple symptoms of toxoplasmosis, including abortion, premature birth, pathological changes in the central

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nervous system, etc., prevention of congenital infection is necessary. Toxoplasma infection is one of the most common infections of humans and other warm-blooded animals, it has a global distribution and is also remarkably prevalent in Iraq (Adem and Ame, 2023; Dini et al., 2023; Yang et al., 2022; El-Ashram et al., 2023). Infection with this single cell in people with a healthy immune system usually has no clinical symptoms; However, the infection of pregnant women with toxoplasmosis during pregnancy in some cases leads to the death of the fetus, premature birth, and congenital toxoplasmosis (Wang et al., 2021; Zhang et al., 2020; Zhao et al., 2020). The number of children infected with maternal toxoplasmosis in Iraq is estimated between 1200 and 5250 (on average 3200) (Ahmed and Mustafa, 2020; Shaker et al., 2018; Abdul-hussein and Al-Marsomy, 2020). Despite the reports of multiple cases of miscarriage and fetal death caused by Toxoplasma in Iraq, the exact percentage is not known (Al-Azzawy et al., 2022; Kadhim and Rahi, 2019; Ali and Al-Hamadany, 2019). Toxoplasmosis following the consumption of raw or undercooked meat contaminated with Toxoplasma parasite or through contamination with contaminated cat feces and also maternally through Fat is transferred to the fetus (Wehbe et al., 2022). Areas where cats are more accessible to humans or where people eat rawer and undercooked meats have high levels of pollution (Ahmed et al., 2021). In the United States of America and Britain, it is estimated that 16-40% of the population is infected with this disease. In the maternal form, the disease agent is transmitted to the fetus through the placenta (Chan and Smith, 2018). Acquired infection is caused by eating the oocysts that the infected cat expels with Toxoplasma Disease or it is done through contaminated meat (Dubey, 2021). Maternal infection may cause fetal death, pathological changes in the central nervous system, or eye discomfort (Megli and Coyne, 2022). The acquired form of the disease is often symptomless and is accompanied by discomfort, lymph node swelling, and chorioretinitis (Šimeková et al., 2019). Prevention methods are not considered necessary in people with a healthy immune system; However, due to the damage caused by congenital toxoplasmosis in pregnant women, as well as people who have a cellular immune deficiency and lack anti-parasite antibodies in their serum, prevention is mandatory (Auriti et al., 2021). In 1993, the American College of Obstetricians and Gynecologists suggested serological screening before pregnancy. In some countries where the pollution is severe, it is recommended to observe the health standards and standards to prevent pollution during pregnancy (Picone et al., 2020). However, in Iraq, there is no coordinated and specific way to prevent the infection of pregnant mothers (Lafta et al., 2016). Finding out the population of girls and women who are not immune to Toxoplasma can be a good measure to find out the population of women at risk of miscarriage or death of the fetus due to Toxoplasma as well as the rate of Decan's exposure to congenital toxoplasmosis and helps to take the appropriate prevention method (Rostami et al., 2020). Therefore, determining the prevalence and measuring the titer of anti-toxoplasmosis antibodies before pregnancy and in high school age in different regions of Iraq is a useful step to measure the positive cases of IgG and Antitoxoplasmic IgM and also the relationship of these positive cases with several variables including age, keeping a cat, consuming raw or half-cooked meat, level of education, place of residence and keeping other domestic animals will be determined. It is suggested that the toxoplasmosis test be turned into one of the mandatory tests before pregnancy, and health





education for mothers to prevent the birth of children with congenital abnormalities is also emphasized.

Material and Method

This descriptive-analytical study in the country of Iraq on 1000 female high school students with a 95% confidence limit and a 31% prevalence of toxoplasmosis (from previous studies) and with a random selection among the students. were selected. This category of people is due to the simultaneous access to a large number of qualified people, the ease of studying and tracking the target groups, the unity of the studied group, the reduction of research costs, and most importantly, the placement of this group in the reproductive age at which preventive measures and Health education can be very cost-effective and effective - were selected. First, by one of the colleagues, an explanatory plan was presented to all the students in the field of toxoplasmosis infection and its importance, and in case of refusal, The student was replaced by another person by chance. Then, the questionnaire was completed by all the students personally, and after that, 5ml of blood was taken from the concerned people in the order of the questionnaire number by two female laboratory scientists. Blood samples were centrifuged at 2000 RCF for 5 or 10 minutes and kept at -20°C. The serum samples of these students were tested by the indirect immunofluorescence method with a Nikon-ECLIPSE-E400-079178 microscope (Immunofluorescence Japan). In this study, as in most studies done with indirect immunofluorescence, titers above 1:20 of the IgG antibody class were considered positive. To determine the relationship between the variables, the test was used SPSS software was used for analysis, and p<0.05 was considered significant.

	0		20,100		100 :			
Symptoms	0		20-100		100<		Percent	Number
	Percent	Number	Percent	Number	Percent	Number	reicent	TAUIIDEI
No	02.00	504	14 45	100	0.66	4	(0.4	(00
contact	82.89	504	14.45	100	0.66	4	60.4	608
As far as								
random	70.46	198	25.98	73	3.56	10	28.1	281
calls								
High								
traffic of	72 60	70	20	10	0.22	6	0.5	05
cats in the	/3.08	70	20	19	0.22	0	9.5	95
residence								
Keep	62.5	10	27.5	6	0	20	1.6	16
aside	02.5	10	57.5	O	U	-20	1.0	10
Total	78.2	782	19.8	198	24		100	100

 Table 1- Distribution of absolute and relative frequency of antibody titers based on contact with cats in students in Iraq.

Results

Indirect immunofluorescence test on the blood serum of the subjects showed that 21.8% of the 1000 people examined had an anti-toxoplasma antibody titer equal to or higher than 1:20 and 198 people 19.1% having antibodies with a titer of 1: 20 to 1:100 and 20 people (2%) also had antibodies above 1:100. Among the 16 students who kept the cat near the family, there were 6

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(5.37%), and among the students who had no contact with the cat, there were 104 (17.11%) out of the total 608 students. Far (17.11 %), had a positive antibody titer against the infection (Table 1). In general, most of the positive cases were in people who used half-cooked food and raw liver with a dilution of 1:20 to 1:100, respectively, in 141 people (52.15%) and 41 people (5.4%). observed (Table 2). Among the students who used semi-cooked food more than 6 times during the month, 10 people out of 38 people (3.26%) had a positive antibody titer against Toxoplasma; While this rate was found in students who used semi-cooked food about 1-5 times per month, the number of 131 people out of 647 people (20.2%) was obtained (Table 2). As mentioned before, the highest percentage of positive titer of Toxoplasma was found in girls using raw liver, 41 out of 115 (6.35%) students, in the case that The positive rate of Toxoplasma antibody in students who are infected with liver did not use raw materials, the number of 160 people out of 776 people (6.20%) was determined (Table 2). The number of students who had an antibody titer higher than 1:100 and did not use raw liver was 18 out of 776 (32.2%). Out of 45 people with general disease symptoms (fever, lymphadenopathy, skin rashes), 17 people were positive in terms of antibody titer (7.37%) (Table 3). Female students with disease symptoms (37.7%) compared to students without disease symptoms (20.6%)showed a positive antibody titer against Toxoplasma (Table 3), which shows that this issue is a statistical, significant relationship showed. The χ^2 statistical test showed that there is a significant relationship between positive antibody cases with age, students' familiarity with the Toxoplasma parasite, use of semi-cooked food, keeping pets, and parents' occupation. However, there is a significant relationship between infection and contact with cats, consumption of raw liver, and disease symptoms.

Symmetry		0		20-100		100<		Doroon	Numbo
Symptom		Percen	Numbe	Percen	Numbe	Percen	Numbe	t	r
8		t	r	t	t r	t	r	ι	1
	No								
	consumptio	71.3	159	25.56	57	3.14	7	24.5	223
	n								
Eating	Use 1-5								
half-	times a	79.75	516	18.55	120	1.7	11	71.3	647
cooked	month								
food	Use more								
	than 6 times	73.68	28	23.68	9	2.63	1	4.2	38
	a month								
	Total	77.42	703	20.48	186	2.9	19	100	908
Using raw liver	Not used	79.38	616	18.3	142	2.32	18	87.9	776
	Used	64.35	74	34.78	40	0.87	1	12.91	115
	Total	77.44	690	20.43	182	2.13	19	100	891

Table 2- Distribution of absolute and relative frequency of antibody titer against Toxoplasma gondii based on consumption of food in Iraq.



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Table 3- Distribution of absolute and relative frequency of antibody titer	rs based on
disease symptoms in female high school students in Iraq.	

Symptoms	0		20-100		100<		Doroont	Number
	Percent	Number	Percent	Number	Percent	Number	reicent	Nulliber
No symptoms	79.35	711	18.86	169	1.79	16	95.5	896
Has symptoms	62.32	28	28.89	13	8.89	4	4.8	45
Total	78.53	739	19.34	182	2.13	20	100	941

Discuss

In the present study, the rate of positive cases of anti-toxoplasma antibody titers in high school girls across the country of Iraq by indirect immunofluorescence method, 21.8% was determined. Therefore, 21.8% of girls across the country of Iraq are infected with toxoplasma and do not need re-examinations and follow-ups during pregnancy. On the other hand, 78.2% of high school girls across the country of Iraq are negative for the presence of antibodies and have a chance of contracting acute toxoplasmosis during marriage and pregnancy. Environmental conditions are effective on the rate of natural spread of Toxoplasma infection, and due to the climatic location of Iraq, there are suitable conditions for sporulation and survival of oocysts in this region; Therefore, compared to the percentage of prevalence obtained in different points, the amount obtained in this area is acceptable. The prevalence of Toxoplasma infection in humans varies according to age, and the number of positive serological cases increases with age. In this research, the studied group was high school girls (15-19 years old), which means that due to the limited age group in this study, there is a significant statistical relationship between the number of positive cases of antibodies and the age of conception. Med. Another investigated variable in this study was the relationship between the level of education of the student's parents and the positivity of anti-toxoplasma antibodies, which did not show a significant statistical relationship between the level of education and the incidence of infection. One of the factors whose effect on the level of contamination has been confirmed in all studies is contamination by oocysts through contact with a cat infected with the parasite or by consuming raw vegetables contaminated with the parasite. Cat feces is contaminated; Because infected cats are the keepers of the Toxoplasma enter epithelial sex cycle and are definitive hosts. In case other infected animals are considered secondary hosts and have an extra-intestinal asexual cycle.

Several reports have been presented about toxoplasmosis caused by consuming contaminated meat, and some serological examinations of contaminated meat have been more than contact with cats as the source of infection. They have appointed people. Therefore, the prevalence of Toxoplasma infection among slaughterhouse workers and people working in meat transportation is higher than in the general population. In this study, the χ^2 statistical test showed that there is a significant relationship between the positive cases of Toxoplasma antibody and the use of raw liver among female students. Also, the amount of antibodies in people who use semi-cooked foods is more than in people who do not use these foods. In general, in this study, it was concluded that the blood serum of 78.2% of high school girls in Iraqi cities is negative in terms of anti-toxoplasma antibodies, and these girls are highly





susceptible to tuberculosis. Acute-acquired toxoplasmosis occurs during pregnancy and its transmission to the fetus. Also, there is a positive and clear relationship between keeping a cat and consuming raw or semi-cooked liver, and also between the symptoms of the disease and the degree of contamination. Therefore, if a person has general symptoms of the disease (fever, lymphadenopathy, etc.), it is necessary to consult an infectious disease specialist and It should be examined from the point of view of toxoplasmosis. Considering the high prevalence of Toxoplasma infection in the world and the fact that the acute stage of the disease is asymptomatic, and especially the importance of this disease during pregnancy and the adverse effects of this infection on the fetus, it is considered necessary to investigate Anti-toxoplasma antibodies in women during education High school, university and during marriage counseling is routinely included in the health programs of the country. From the point of view of the issue of teaching the ways of disease transmission to the general public (especially the age group studied in this study), it is recommended that this important thing be of special importance in reducing the prevalence of congenital toxoplasmosis. According to the results of this study, 78.5% of the studied women were seronegative before marriage, which means that they lack acquired immunity against this infection. Therefore, there is a possibility of getting toxoplasmosis in the children of these people in case of pregnancy and contracting the parasite during that pregnancy. It is suggested that the toxoplasmosis test is one of the mandatory tests before pregnancy, as well as health education for mothers to prevent the birth of children with congenital abnormalities.

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