AUSTRALIAN JOURNAL OF BASIC AND APPLIED SCIENCES

ISSN:1991-8178 EISSN: 2309-8414
Journal home page: www.ajbasweb.com

Prevalence of Toxoplasmosis among High Risk People at Karbala City

Mohammed A. Merzah

Community Health Department, Al-Furat Al-Awsat Technical University- Technical Institute of Karbala, Karbala, Iraq,

Address For Correspondence:
Mohammed A. Merzah, Community Health Department, Al-Furat Al-Awsat Technical University- Technical Institute of Karbala, Karbala, Iraq,
E-mail: merzah.karbala@gmail.com

ARTICLE INFO

Article history:
Received 19 September 2016
Accepted 10 December 2016
Published 31 December 2016

Keywords:
Toxoplasmosis; Karbala city; Prevalence rate; Parasite.

ABSTRACT

Background: Numerous cases of abortion have been seen during the previous six years among pregnant women in Iraq. Specialists attribute the reason of the high number of abortions to the infection with *Toxoplasmosis gondii*. Two hundred and forty blood samples and some demographic information were collected from people who are at high risk of having this disease (pregnant women, butchers, and veterinarians). ***Objective:*** Due to the high rate of abortion, this study was conducted to evaluate the prevalence rate of *T. gondii* among high risk people and assess some factors that may contribute in transmitting the infection. ***Results:*** The results of this study show that the prevalence rate of *T. gondii* was highest in Karbala (58.8%) as compared with other cities sharing the same culture and living habits. Women are more likely to have toxoplasmosis more than men (X^2 (5, 240) = 13.191, and P < 0.05 = 0.001). A Chi-square test shows a highly significant difference between marital status and the Elisa-test of toxoplasmosis immunoglobulins with X^2 (5, 240) = 24.00, and P < 0.05 = 0.001. ***Conclusion:*** Pregnant women who were in their first trimester of pregnancy were at high risk of having a recent infection with a positive IgM type of antibody. The likelihood of having toxoplasmosis among housewives women is high as compared with others. Efforts of health departments should be concentrated on educating the population, especially young women, on how to prevent spreading the parasite.

INTRODUCTION

Toxoplasmosis gondii is a parasite that is highly distributed worldwide (Holand *et al*., 1996). The prevalence rate of the infection from this parasite in Europe and other countries in 2012 was between 50-80% (Flegr *et al*., 2013; Bustillo *et al*., 2015). Infection with this type of parasite, especially during pregnancy, may lead to serious problems like blindness or fetal death if the abortion does not happen before giving birth (Vasconcelos-Santos, 2009; Elmore *et al*., 2010). Giving birth to a child with a neurological impairment or blindness may be due to untreated toxoplasmosis during the pregnancy (Hasson, 2004; Sumi *et al*., 2016). Locally, numerous cases of abortions have been seen during the previous six years among pregnant women in the Middle Euphrates region of Iraq including Karbala City (Elmore *et al*., 2010). Specialists attribute the high number of abortions to the infection of t*oxoplasmosis gondii*. This study was done to evaluate the prevalence rate of toxoplasmosis among high risk people, and to assess some factors that may contribute in spread of the infection.

Method:

From October to December of 2015, 240 blood samples were collected from different people who are at high risk of having this disease (pregnant women, butchers, and veterinarians). Two hundred pregnant women who came for a check-up at Al-Hussein Medical City, 20 veterinarians who were working at the Veterinary

To Cite This Article: Mohammed A. Merzah., Prevalence of Toxoplasmosis among High Risk People at Karbala City. ***Aust. J. Basic & Appl. Sci.,*** *10(18): 257-260, 2016*

Clinic of Karbala, and 20 butchers who were working at Karbala Butchery were asked to participate in this study.

A 5 ml sterile serum tube was used to collect a 3 ml-blood sample from each participant. Each blood sample was centrifuged (for 5 minutes with 300 rotation / minute) in order to separate the serum. After that, each serum-sample was marked with a specific number. All samples were stored at -20 C◦. All stored samples were tested with an Elisa test using a bio check Toxoplasma Gondii- kit to detect anti- toxoplasma immunoglobulins (IgG & IgM). An assay was designed based on the kit instructions. Elisa was calibrated as positive, negative and cut-off calibrator, and read by Elisa reader at 450 nm. The IgG cut-off value of the assay was 32 IU/ml, and the IgM cutoff value was 1 IU/ml. The final results were drawn based on the cutoff value in which any result greater than cutoff value was directed as a positive sample; whilst, lower than the cutoff value was directed as a negative sample. Any result between the values was directed as a vague result.

Results:

Out of 240 participants, a little more than 8% (n=20) were males and about 91% (n= 220) were females. Twenty percent of males were discovered to have been infected with the toxoplasmosis parasite in the past because they have a positive IgG type of antibody. a positive reaction for both IgG (n=43) and IgM (n=98) antibodies was shown in 58.7% (n= 141) of blood samples (see table 1). A significant difference was detected between the gender and the result of the types of antibodies of the toxoplasmosis with X^2 (5, 240) = 13.191, and P < 0.05 = 0.001.

Table 1: Elisa Toxo-test results according to the gender of participants.

Gender	Elisa Toxo-test Result				X^2	P-value
	IgG		IgM			
	+ve (%)	-ve (%)	+ve (%)	-ve (%)		
Male	4(1.7)	12 (5.0)	0 (0)	4 (1.7)	13.191	0.001
Female	39 (16.3)	37 (15.3)	98 (40.8)	46 (19.2)		
Total	43(18.0)	49 (20.3)	98 (40.8)	50 (20.9)		

The majority of participants were aged between 15 and 25 years old, they represent 45.5% (n=109) of the participants. Fourty point four percent (n=44) of them were had a positive IgM type of antibody. A significant difference with X^2 (7, 240) = 49.029, and $P < 0.05 = 0.005$ was found between the age groups and the Elisa-test of toxoplasmosis immunoglobulins. See table 2 for more details.

Table 2: Elisa Toxo-test results according to the age groups of participants.

Age Groups (years)	Elisa Toxo-test Result				X^2	P-value
	IgG		IgM			
	+ve (%)	-ve (%)	+ve (%)	-ve (%)		
15-	8 (3.3)	30 (12.5)	44 (18.3)	27 (11.3)	46.080	0.005
25-	18 (7.5)	12 (5.0)	35 (14.6)	15 (6.3)		
35-	15 (6.3)	7 (2.8)	18 (7.5)	8 (3.3)		
≥45	2 (0.9)	0 (0)	1(0.4)	0 (0)		
Total	43(18.0)	49 (20.3)	98 (40.8)	50 (20.9)		

Most of the participants were married and have a positive IgM type of antibody. Chi-square test shows a highly significant difference between marital status and the Elisa-test of toxoplasmosis immunoglobulins with X^2 (5, 240) = 24.00, and P < 0.05 = 0.001 (table 3).

Table 3: Elisa Toxo-test results according to the marital status of participants.

Marital Status	Elisa Toxo-test Result				X^2	P-value
	IgG		IgM			
	+ve (%)	-ve (%)	+ve (%)	-ve (%)		
Married	43(18)	39 (16.1)	98 (40.8)	44 (18.3)	24.000	0.000
Single	0 (0)	10 (4.2)	0 (0)	6 (2.6)		
Total	43(18.0)	49 (20.3)	98 (40.8)	50 (20.9)		

Table four shows a highly significant difference between the Elisa-test of toxoplasmosis immunoglobulins and the places that participants lives in with X2 (7, 240) = 41.280, and P < 0.05 = 0.000. Most of participants were living in the urban area of Karbala City, which represents 75% of participants (n= 180).

Table 4: Elisa Toxo-test results according to the residency of participants.

Residency	Elisa Toxo-test Result				X^2	P-value
	IgG		IgM			
	+ve (%)	-ve (%)	+ve (%)	-ve (%)		
City Center	41(17.2)	48 (19.9)	44 (18.3)	47 (19.6)	41.280	0.000
Hindyia	2 (0.8)	1 (0.4)	26 (10.8)	3 (1.3)		

Hussaynia	0 (0)	0 (0)	24 (10.0)	0 (0)		
Eain Altamer	0 (0)	0 (0)	4 (1.7)	0 (0)		
Total	43(18.0)	49 (20.3)	98 (40.8)	50 (20.9)		

The majority of positive IgM type of antibody was among pregnant housewives, which represent a little more than 35% (n=85) of participants, while the highest positive IgG type of antibody was among women who have a job (employee). A significant difference was detected between the Elisa-test of toxoplasmosis immunoglobulins and the occupation of participants with X^2 (7, 240) = 49.029, and P < 0.05 = 0.004 (table 5).

Table 5: Elisa Toxo-test results according to the occupation of participants.

Occupation	Elisa Toxo-test Result				X^2	P-value
	IgG		IgM			
	+ve (%)	-ve (%)	+ve (%)	-ve (%)		
Housewife	0 (0)	39 (16.2)	85 (35.4)	24 (10.0)		
Employee women	35(14.6)	1 (0.4)	13 (5.4)	3 (1.3)		
Butcher	4 (1.7)	4 (1.7)	0 (0)	12 (5.0)	49.029	0.004
Veterinary	4 (1.7)	5 (2.0)	0 (0)	11(4.6)		
Total	43(18.0)	49 (20.3)	98 (40.8)	50 (20.9)		

Most of participants, who have either a positive IgG or IgM type of antibody, had a direct contact with pets like cats or dogs. About 54% (n=80) of housewives reported having a direct contact with pets and most of them have a cat at home. All of them have a positive IgM type of antibody.

Discussion:

20% (n=4 out of N=20) of males were infected with the parasite; all of them are butchers, which means they already has a direct contact with animals such as cattle. Studies have shown that cattle may be infected with toxoplasmosis parasite and may spread the parasite to the humans (Jittapalapong *et al*., 2007; Bawm, 2016; Dubey, 2016). Also, the researcher noticed that the disinfecting and the slaughter procedures at Karbala Butchery were not ideal, which may contribute in transmitting the parasite to those butchers.

Eighty point six percent (n=79 out of N=98) of females were young, between 15 and 35 years old, and in their first trimester of pregnancy who fall. All of them had a positive IgM type of antibody, which means they had a recent infection with *T. gondii* parasite (Achonduh-Atijegbe *et al*., 2016; Massa *et al*., 2016). All of those women are housewives. They reported having a direct contact either with pets or their feces at home through owning pets or through gardening. This finding corresponds with the outcomes of other studies (Kodjikian *et al*., 2004; Kijlstra and Jongent, 2008; Nasir *et al*., 2015).

Regarding residency, even though women who live at the city center are more educated than those who live at rural areas (Wirth, 2015), this study shows urban women are more likely to be infected with *T.gondii* than rural women. This might be due to the culture of nurturing pets at home (Jones *et al*, 2001; Andiappan, 2014). Furthermore, the more educated women are quicker to have a check up as soon as any bizarre sign appears during pregnancy.

Conclusion:

The prevalence rate of T. gondii was high (58.8%) in Karbala as compared with other cities sharing the same culture and living habits. Pregnant women who were in their first trimester of pregnancy were at high risk of having a recent infection with a positive IgM type of antibody. The Efforts of health departments should be concentrated on educating young women on how to prevent spreading the parasite.

Future studies should be conducted and take in care female who are planning to having babies. Female students of high school and universities should be tested to *T.gondi* as a preventive way.

REFERENCES

Achonduh-Atijegbe, O.A., K.O. Mfuh, A.H.M bange, J.P. Chedjou, D.W. Taylor, V.R. Nerurkar and R. Leke, 2016. Prevalence of malaria, typhoid, toxoplasmosis and rubella among febrile children in Cameroon. BMC Infectious Diseases, 16(1): 658.

Andiappan, H., V. Nissapatorn, N. Sawangjaroen, W. Chemoh, Y.L. Lau, T. Kumar and V. Chandeying, 2014. Toxoplasma infection in pregnant women: a current status in Songklanagarind hospital, southern Thailand. Parasites & vectors, 7(1): 1.

Bustillo, J.L., J.D. Diaz, I.C. Pacheco and D.C. Gritz, 2015. Cuban Ocular Toxoplasmosis Epidemiology Study (COTES): incidence and prevalence of ocular toxoplasmosis in Central Cuba. British Journal of Ophthalmology, 99(3): 382-386.

Dubey, J.P., 2016. *Toxoplasmosis of animals and humans*. CRC press.

Elmore, S.A., J.L. Jones, P.A. Conrad, S. Patton, D.S. Lindsay and J.P. Dubey, 2010. Toxoplasma gondii: epidemiology, feline clinical aspects, and prevention. Trends in parasitology, 26(4): 190-196.

Flegr, J., 2013. Influence of latent Toxoplasma infection on human personality, physiology and morphology: pros and cons of the Toxoplasma–human model in studying the manipulation hypothesis. Journal of Experimental Biology, 216(1): 127-133.

Holland, G.N., R.R. O'Connor, Jr, J.S. Remington, 1996. Toxoplasmosis. In: Pepose JS, Holland GN, Wilhelmus KR, editors. Ocular Infection and Immunity. St. Louis: Mosby-Year Book, Inc., pp: 1183-223.

Jittapalapong, S., B. Nimsupan, N. Pinyopanuwat, W. Chimnoi, H. Kabeya and S. Maruyama, 2007. Seroprevalence of Toxoplasma gondii antibodies in stray cats and dogs in the Bangkok metropolitan area, Thailand. Veterinary.Parasitology, 145(1): 138-141.

Jones, J.L., D. Kruszon-Moran, M. Wilson, G. McQuillan, T. Navin and J.B. McAuley, 2001. Toxoplasma gondii infection in the United States: seroprevalence and risk factors. American journal of epidemiology, 154(4): 357-365.

Kodjikian, L., I. Hoigne, O. Adam, P. Jacquier, C. Aebi-Ochsner, C. Aebi and J.G. Garweg, 2004. Vertical transmission of toxoplasmosis from a chronically infected immunocompetent woman. The Pediatric infectious disease journal, 23(3): 272-274.

Massa, N.M., E. Duncan, T. Jovanovic, K. Kerley, L. Weng, L. Gensler and C.F. Gillespie, 2016. Relationship between Toxoplasma gondii Seropositivity and Acoustic Startle Response in an Inner-City Population. *Brain, Behavior, and Immunity*.

Nasir, I.A., A.H. Aderinsayo, H.U. Mele and M.M. Aliyu, 2015. Prevalence and Associated Risk Factors of Toxoplasma gondii Antibodies among Pregnant Women Attending Maiduguri Teaching Hospital, Nigeria. Journal of Medical Sciences, 15(3): 147.

Singh, S., 2003. Mother-to-child transmission and diagnosis of Toxoplasma gondii infection during pregnancy. Indian journal of medical microbiology, 21(2): 69.

Sumi, M., K. Norose, K. Hikosaka, H. Kaiume, W. Takeda, T. Kirihara and H. Kuraishi, 2016. Clinical characteristics and computed tomography findings of pulmonary toxoplasmosis after hematopoietic stem cell transplantation. International Journal of Hematology, 104(6): 729-740.

Vasconcelos-Santos, D.V., D.O.M. Azevedo, W.R. Campos, F.O réfice, G.M. Queiroz-Andrade, É.V.M. Carellos and A.C.D.A.V. Carneiro, 2009. Congenital toxoplasmosis in southeastern Brazil: results of early ophthalmologic examination of a large cohort of neonates. Ophthalmology, 116(11): 2199-2205.

Wirth, L., 2015. Urbanism as a way of Life. The City Reader, pp: 115.