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Prevalence of anti-*Toxoplasma* IgG and IgM in hemodialysis patients comparing to healthy individuals in Sistan area, Iran

Mohammad Dorri[1], Mansour Dabirzadeh[1*], Yahya Maroufi[1], Mahdi Afshari[2], Milad Badri Chokamy[3]

[1]Department of Parasitology, Zabol University of Medical Sciences, Zabol, Iran
[2]Department of Epidemiology, School of Health, Zabol University of Medical Sciences, Zabol, Iran
[3]Department of Parasitology, Faculty of Medical Sciences, Tarbiat-Modares University, Tehran, Iran

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ABSTRACT

Introduction: Toxoplasmosis is a parasitic disease caused by the protozoan, *Toxoplasma gondii.* In people with healthy immune system, generally, the infection is asymptomatic, but for the people with immune deficiency severe disease can be observed in case of the acute infection or activation. Determination of prevalence of anti-*Toxoplasma* antibodies is indicative of exposure to the infection in on-dialysis patients, since they are susceptible of many diseases.
Objectives: This study aimed at determination of prevalence of anti-*Toxoplasma* IgM and IgG in on-dialysis patients comparing to the healthy people in Sistan area.
Patients and Methods: This study was of a case control type. Subjects included all of the on-dialysis patients in Sistan as a case group, 76 persons, and healthy people as the controls, 76 persons, who referred to Imam Khomeini hospital of Zabol and Seyyed-Al-Shohada hospital of Zahak, from which 85 were male and 67 were female. Simple sampling was used. The materials were demographic information and enzyme linked immunosorbent assay (ELISA) was used for determination of anti-*Toxoplasma* IgM and IgG. The obtained data were then analyzed with SPSS v. 16 using chi-square test.
Results: Anti-*Toxoplasma gondii* IgG was observed in 56 (73.7%) cases of the on-dialysis patients and 33 (43.4%) cases of healthy individuals. Anti-*Toxoplasma* IgM was not detected in the patients in either groups. The difference in IgG antibodies among two groups was statistically significant ($P<0.001$)
Conclusion: The prevalence of IgG antibodies against *Toxoplasma* in the on-dialysis patients is higher compared to healthy group, thus these patients are at the higher risk of infection with *Toxoplasma gondii.*

Implication for health policy/practice/research/medical education:
Toxoplasma is a single cell parasite, flourish in immunosuppression, with the worldwide distribution. The current study was done to determine anti-*Toxoplama* antibodies (IgM and IgG) in hemodialysis patients, in Sistan area. IgG antibodies were more significant to compare with the controlled healthy people.
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Introduction

The protozoan, *Toxoplasma gondii,* is globally prevalent and causes toxoplasmosis, which is an important parasitic disease. A wide range hosts including humans, domesticated mammals, and birds could get infected. Felid family and cats are the final hosts and humans and most vertebrates are taken as the intermediate hosts. The sexual cycle of this parasite is completed in cat's intestine and results in producing and excretion of oocytes in their feces. Humans and other warm-blooded animals can be infected by indirect ingestion of these oocysts or by ingestion of tissue cysts in the undercooked meat. This protozoan can cause infection in humans through ingestion of contaminated water and vegetables, raw or partly cooked meat, direct contact with the infected cat, blood and leucocyte transfusion, and organ transplantation (1,2). Toxoplasmosis can be seen in healthy adults as an asymptomatic chronic infection and in people with weakened immune system as a severe and fatal disease (3). Infection in people with healthy immune system is

***Corresponding author**: Mansour Dabirzadeh, Email: mdabirzadeh20002000@yahoo.com

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generally without clinical symptom, but for those with immune deficiencies it can cause plenty of symptoms. The risk of activation and relapse of the disease is high in immunocompromised patients. Patients suffering from cancer, patients with organ transplant, on-dialysis patients, and patients who take immunosuppressants are at risk of toxoplasmosis (4-6).

Many studies on patients with renal disorders have shown that these patients also suffer from immune system impairment (7,8). Thus, they are at risk of many infections (7). On the other hand, the most prevalent opportunist protozoan is toxoplasmosis, as the infection may invade central nervous system and cause encephalitis and encephalopathy (5,9).

Determination of prevalence of anti-*Toxoplasma* antibodies can be an indicative for their risk of acquiring the infection. Nowadays, serological method such as enzyme linked immunosorbent assay (ELISA) is easily convenient and can be done in any laboratory. In ELISA test, the concentrations of anti-*Toxoplasma* IgG and IgM can be determined.

Objectives

This study aimed to determine the prevalence anti-*Toxoplasma* IgG and IgM seropositivity in on-dialysis patients comparing to the healthy people among who referred to Imam Khomeini hospital located in Zabol and Seyed-Al-Shohada hospital located in Zahak, Iran.

Patients and Methods

In this case control study the patients were 76 on-dialysis patients in Sistan and 76 healthy individuals. These samples were chosen during May to July 2014. The healthy people were chosen with normal blood urea nitrogen (BUN) and creatinine (Cr) tests. The blood samples of exposed and non-exposed people were taken. During the sampling, a questionnaire which includes some questions about their demographic information and dialysis time was filled by the participants. From each taken blood, 2 cc was obtained and the sera were separated by centrifuge with 2000 rpm for 1 minute. The sera were put in suitable micro-tubes and were numbered and kept frozen at -20°C. ELISA test was used for determination of the serum concentrations of anti-*Toxoplasma* IgG and IgM. The BUN and Cr tests were done by Pars Azmoon kits (Iran) with calorimetric method applied in BT3000 device, for both exposed and non-exposed people.

Ethical issues

The research followed the tenets of the Declaration of Helsinki. Informed consents were obtained. All patients took part in this study voluntary. This study has the ethical code zbmu.1.rec.1393.2 issued by the ethic committee of Zabol University of Medical Sciences.

Statistical analysis

This study is a quasi-experimental study that we used all on-dialysis patients as cases and equal number as control. A $P < 0.05$ was assumed to be significant.

Results

The anti-*Toxoplasma gondii* IgG was positive for 56 (73.7%) of exposed patients and 33 (43.4%) of non-exposed ones. All of the people in case and control groups were negative anti-*Toxoplasma gondii* IgM. The IgG difference among the two studied groups was statistically significant ($P<0.001$) (Table 1), but there were no differences regarding age, gender, and education since they were conformed.

Discussion

Toxoplasmosis is a relatively prevalent infection and is among the opportunist infections in patients with deficiencies in immune system. The rates of the infection in countries or in different areas of the same country may vary regarding different factors such as age, gender, occupation, geography, culture, social behaviors, and diet (10-12).

Toxoplasmosis is an intracellular infection in which the cellular immunity is responsible for activation against the infection. The cellular immunity is weakened in on-dialysis and uremic patients, as the number of T cells in patients suffering from renal disorders are reduced and suppressors are increased. It should be noted that dialysis does not obviate this problem. Also, the reduction of phagocytic activity and reduction in the number of natural killer cells have been reported in these patients (8,13-15)

In some studies in Turkey and Egypt, it is reported that the prevalence of anti-*Toxoplasma* antibodies in the on-dialysis patients is higher than the controls and there was a significant positive relationship between the duration of treatment with dialysis and positive cases of anti-*Toxoplasma* antibodies (16,17). The present study showed higher prevalence of *Toxoplasma gondii* infection in on-dialysis patients. The prevalence of anti-*Toxoplasma* IgG in the patients group was significantly higher compared to the healthy group, while IgM was negative in the both groups.

Ocak et al showed that 76.5% (195 cases) of on-dialysis patients and 48% (42 cases) of controls were infected by *Toxoplasma*, which were similar to the results of the present study (18). In another study done by Yazar et al in Turkey, from a total of 173 on-dialysis patients, 56.06% (79 cases) and among 40 cases of control group, 20% (8

Table 1. Anti-*Toxoplasma* seropositivity among the two studied groups

Seropositivity	Studied people		*P* value
	On-dialysis No. (%)	Healthy controls No. (%)	
IgG			<0.001
Positive	56 (73.7)	33 (43.4)	
Negative	20 (26.3)	43 (56.6)	
IgM			-
Positive	0 (0)	0 (0)	
Negative	76 (100)	76 (100)	

cases) were positive for anti-*Toxoplasma* IgG, which both groups showed lower prevalence than ours, but similarly they found higher seropositivity in the on-dialysis patients (17).

In a study conducted by Maraghi et al in Abadan and Khoramshahr cities, from 150 patients, 40.67% and from 250 healthy people, 26% were IgG seropositive, which is similar to the results of the present study (19). In another similar study done by Ebrahimzadeh et al, in 2013, from among a total of 37 on-dialysis patients, 56% (21 cases) and from the 37 healthy people, 26% (11 cases) were positive for *Toxoplasma* infection (13). Additionally, in a study done by Solhjoo et al, in Jahrom in 2008, from among 44 patients, 59.10% (26 cases) and among 44 healthy people, 36.40% (16 cases) reported to be positive for anti-*Toxoplasma* IgG (20).

The results of the present study showed that on-dialysis patients should be taken as an at-risk group regarding *Toxoplasma* infection. It is also showed that anti-*Toxoplasma* IgG in these patients is relatively higher compared to healthy people. Reactivation of bradyzoites can cause active toxoplasmosis in patients with deficiency in immune system and since on-dialysis patients have a weakened immune system, this infection can cause severe problem. Therefore, treatment and prevention of toxoplasmosis seems necessary to give attention in these patients.

Conclusion

Toxoplasmosis is more common in hemodialysis patients in comparison with healthy ones and they must be considered as a risk group for toxoplasmosis

Limitations of the study

Due to emigration or death, we excluded some patients contributing to study.

Authors' contribution

Collecting data; MoD. Statistical analysis; MA. Study supervision; MaD and YM. Drafting the manuscript; MBC.

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Conflict of interests

None.

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References

1. Robert-Gangneux F, Darde ML. Epidemiology of and diagnostic strategies for toxoplasmosis. Clin Microbiol Rev. 2012;25:264-96. doi: 10.1128/CMR.05013-11.
2. Tenter AM, Heckeroth AR, Weiss LM. *Toxoplasma gondii*: from animals to humans. Int J Parasitol. 2000;30:1217-58.
3. Galvan-Ramirez ML, Troyo R, Roman S, Calvillo-Sanchez C, Bernal-Redondo R. A systematic review and meta-analysis of *Toxoplasma gondii* infection among the Mexican population. Parasit Vectors. 2012;5:271. doi: 10.1186/1756-3305-5-271.
4. Weiss LM, Dubey JP. Toxoplasmosis: a history of clinical observations. Int J Parasitol. 2009;39:895-901. doi: 10.1016/j.ijpara.2009.02.004
5. Nissapatorn V. Toxoplasmosis in HIV/AIDS: a living legacy. Southeast Asian J Trop Med Public Health. 2009;40:1158-78.
6. Kervan U, Ozdamar Y, Yurdakok O, Kucuker SA, Pac M. A rare ocular complication after a heart transplant: *toxoplasma* retinitis. Exp Clin Transplant 2014;12:78-80. doi: 10.6002/ect.2012.0303.
7. Mohammadi Manesh R, Hosseini Safa A, Sharafi SM, Jafari R, Bahadoran M, Yousefi M, et al. Parasites and chronic renal failure. J Renal Inj Prev. 2014;3:87-90. doi: 10.12861/jrip.2014.25.
8. Girndt M. Humoral immune responses in uremia and the role of IL-10. Blood Purif. 2002;20:485-8. doi: 10.1159/000063553
9. Ho EL, Marra CM. Central nervous system diseases due to opportunistic and coinfections. Semin Neurol 2014;34:61-9. doi: 10.1055/s-0034-1372343.
10. Fallah M, Rabiee S, Matini M, Taherkhani H. Seroepidemiology of toxoplasmosis in primigravida women in Hamadan, Islamic Republic of Iran, 2004. East Mediterr Health J. 2008;14:163-71.
11. Daryani A, Sarvi S, Aarabi M, Mizani A, Ahmadpour E, Shokri A, et al. Seroprevalence of *Toxoplasma gondii* in the Iranian general population: a systematic review and meta-analysis. Acta Trop. 2014;137:185-94. doi: 10.1016/j.actatropica.2014.05.015.
12. Rasouli S, Sadaghian M, Jafari R. Prevalence of human toxoplasmosis and related risk factors using Electrochemiluminescence (ECLIA) method in West Azarbaijan province, Iran, 2010. Int J Biosci. 2014;8:124-30.
13. Ebrahim Zadeh A, Bamedi T, Etemadi S, Shahrakipour M, Saryazdipour K. Toxoplasmosis as a complication of transfusion in hemodialysis patients. Iran J Ped Hematol Oncol. 2014;4:22-5. doi: 10.1007/s12639-014-0537-0.
14. Vanholder R, Dell'Aquila R, Jacobs V, Dhondt A, Veys N, Waterloss MA, et al. Depressed phagocytosis in hemodialyzed patients: in vivo and in vitro mechanisms. Nephron. 1993;63:409-15. doi: 10.1159/000187244.
15. Peraldi MN, Berrou J, Metivier F, Toubert A. Natural killer cell dysfunction in uremia: the role of oxidative stress and the effects of dialysis. Blood Purif. 2013;35:14-9. doi: 10.1159/000350839.
16. Abbas MM, Zaki M, Afify NA. Prevalence of *Toxoplasma gondii* and cytomegalovirus antibodies in patients with

chronic renal failure. J Egypt Soc Parasitol. 1996;26:671-6.
17. S Yazar, F Demirtas, S Yalcin, O Yaman, B Tokgoz. Anti-*Toxoplasma gondii* antibodies in haemodialysis patients with chronic renal failure. Yonsei Med J. 2003;44:288-92.
18. Ocak S, Duran N, Eskiocak AF, Aytac H. Anti-*Toxoplasma gondii* antibodies in hemodialysis patients receiving long-term hemodialysis therapy in Turkey. Saudi Med J. 2005;26:1378-82.
19. Maraghi S, Yadyad MJ, Sheikhi M, Shamakhteh F, Latifi SM. Study the anti-*Toxoplasma* antibodies (IgG and IgM) in hemodialysis patients of Abadan and Khoramshahr cities southwest Iran in 2011 using ELISA. Jundishapur J Microbiol. 2013;6:e7113. DOI: 10.5812/jjm.7113
20. Solhjoo K, Jahromi AS, Parnian-Rad A. Anti-*Toxoplasma gondii* antibodies in haemodialysis patients. Am J Infect Dis. 2010;6:13-7.