Prevalence of anti-\textit{Toxoplasma} IgG and IgM in hemodialysis patients comparing to healthy individuals in Sistan area, Iran

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\section*{Inception}
Toxoplasmosis is a parasitic disease caused by the protozoan, \textit{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-\textit{Toxoplasma} antibodies is indicative of exposure to the infection in on-dialysis patients, since they are susceptible of many diseases.

\section*{Objectives}
This study aimed at determination of prevalence of anti-\textit{Toxoplasma} IgM and IgG in on-dialysis patients comparing to the healthy people in Sistan area.

\section*{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-\textit{Toxoplasma} IgM and IgG. The obtained data were then analyzed with SPSS v. 16 using chi-square test.

\section*{Results}
Anti-\textit{Toxoplasma gondii} IgG was observed in 56 (73.7\%) cases of the on-dialysis patients and 33 (43.4\%) cases of healthy individuals. Anti-\textit{Toxoplasma} IgM was not detected in the patients in either groups. The difference in IgG antibodies among two groups was statistically significant ($P<0.001$)

\section*{Conclusion}
The prevalence of IgG antibodies against \textit{Toxoplasma} in the on-dialysis patients is higher compared to healthy group, thus these patients are at the higher risk of infection with \textit{Toxoplasma gondii}.

\section*{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-\textit{Toxoplasma} 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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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 opportunistic 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

<table>
<thead>
<tr>
<th>Seropositivity</th>
<th>On-dialysis No. (%)</th>
<th>Healthy controls No. (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IgG Positive</td>
<td>56 (73.7)</td>
<td>33 (43.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>IgG Negative</td>
<td>20 (26.3)</td>
<td>43 (56.6)</td>
<td></td>
</tr>
<tr>
<td>IgM Positive</td>
<td>76 (100)</td>
<td>76 (100)</td>
<td></td>
</tr>
<tr>
<td>IgM Negative</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
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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 shown 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
17. S Yazar, F Demirtas, S Yalcin, O Yaman, B Tokgoz. Anti-
Toxoplasma gondii antibodies in haemodialysis patients
gondii antibodies in hemodialysis patients receiving
long-term hemodialysis therapy in Turkey. Saudi Med J.
2005;26:1378-82.

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

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