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Comparison of *Toxoplasma gondii* seropositivity in hemodialysis and peritoneal dialysis patients

Faezeh Hamidi^{1,2}, Jalal Etemadi³, Nader Ghabouli Mehrabani^{1,2*}, Mahmoud Mahami Oskouei¹, Roza Motavalli³, Mohammad Reza Ardalan³

¹Department of Parasitology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

²Student's Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran

³Chronic Kidney Disease Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

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ABSTRACT

Objective: To compare the seropositivity of *Toxoplasma gondii* in a group of peritoneal dialysis patients with hemodialysis patients and a general local population as a control group in Tabriz, Northwest Iran.

Methods: A total of 176 individuals were participated in the present study. Among them, 42 were peritoneal dialysis patients, 84 were hemodialysis patients and 50 were healthy volunteers. Anti-*Toxoplasma* immunoglobulin G and immunoglobulin M serologic study was administered on the collected serums and then the obtained data were analyzed using statistical methods.

Results: In the present research, 70.2% of hemodialysis patients, 66.6% of peritoneal dialysis patients and 68% of control group had positive results for anti-*Toxoplasma* immunoglobulin G antibody. All individuals of the groups had negative serologic results for anti-*Toxoplasma* immunoglobulin M antibody. There was no significant difference between *Toxoplasma gondii* seropositivity in hemodialysis patients and peritoneal dialysis patients and general population ($P > 0.05$).

Conclusions: The findings showed that either peritoneal dialysis or hemodialysis doesn't increase the risk of *Toxoplasma* seropositivity in our region (Northwest Iran). It could be explained by the fact that the present research is carried out in a high seroprevalent area scale in which the majority of normal population had previous exposure to this parasitological infection.

1. Introduction

Chronic renal failure is a state of immune system suppression and this condition can be deteriorated by the progression of the disease and be exacerbated during dialysis[1,2]. *Toxoplasma gondii* (*T. gondii*) can cause a severe disease and even the death of immunologically deficient patient. The disease can be due to acquired infection or reactivation of a latent infection[3]. It has been confirmed in different epidemiological studies about several outbreaks of this infection in several populations worldwide[4]. In an Iranian collective report, the seroprevalence of the infection has been reported in a wide range between 18%–70% for *T. gondii*[5]. There are some reports about the existence of *T. gondii* in hemodialysis (HD) patients. Some studies suggested that exposure to hemodialysis is related to the seropositivity of *Toxoplasma*, but there is no evidence about the seroprevalence of *Toxoplasma* in peritoneal dialysis (PD) population[6-8]. The aim of present investigation was

to clarify *T. gondii* seropositivity in a group of PD patients and to compare it with HD patients results and the seropositivity of general population in a highly prevalent local in Northwest Iran.

2. Materials and methods

In the present work which was carried out in East Azerbaijan Province, Northwest Iran, we examined a group of PD and HD patients for seroprevalence of *T. gondii*. We also studied a group of control volunteers in similar geographic region. Patients' demographic features, history of regularly consumed undercooked meat (sausage, salami, burger and Kebab), history of frequent indoor contact with cat and having it as a pet, durations of dialysis, hepatitis B surface antigen (HBsAg), anti-hepatitis C virus antibody status and history of diabetes mellitus were all collected. Gathered sera were stored at -20°C till the time of serologic study. Anti-*Toxoplasma* immunoglobulin G (IgG) and anti-*Toxoplasma* immunoglobulin M (IgM) tests were applied (Acon ELISA kit) according to manufacturer's guideline. To obtain anti-*Toxoplasma* IgM result, we calculated index value by dividing the specimen absorbance by means of cut-off value according to manufacturer's recommendations. For anti-*Toxoplasma* IgG, calibration curve was drawn to obtain quantitative results from their

*Corresponding author: Nader Ghabouli Mehrabani, Department of Parasitology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran.

Tel: + 989124430139

Fax: +98-41-33373745

E-mail: ghaboulin@tbzmed.ac.ir

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absorbance. Statistical analyses were performed by Stata software (version 11), independent *t*-test and *Chi*-square test. *P* values less than 0.05 were considered to be statistically significant.

This study was approved by the committee of ethics (Tabriz University of Medical Sciences, Iran).

3. Results

Throughout the study, 70.2% of HD and 66.6% of PD patients were positive for anti-*Toxoplasma* IgG antibody subsequently. We also observed positive results in 68% of control group. All subjects were negative for anti-*Toxoplasma* IgM antibody ($P > 0.05$). There was no significant difference between HD and PD patients in terms of *Toxoplasma* seroprevalence. Dialysis duration factor also hadn't any effect on the seropositivity rate. None of the following risk factors, such as the history of indoor contact with cat, HBsAg and anti-hepatitis C virus antibody positivity (HCV Ab⁺), had any meaningful effect on the rate of *Toxoplasma* seropositivity in our studied patients. But diabetes mellitus factor was exceptional ($P > 0.05$) (Tables 1 and 2).

Table 1
Demographic features and statistical analysis results for the factors of study group.

Groups	Sex (%)	Mean age	DD (month)	Diabetes (%)	HBs Ag ⁺ (%)	HCV Ab ⁺ (%)
Hemodialysis patients	Male	48.8	54.3 ± 12.6	80	41	7.14
	Female	51.1				8.33
Peritoneal dialysis patients	Male	64.2	55.3 ± 17.9	28	40	2.38
	Female	35.7				2.38
Control	Male	50.0	55.5 ± 8.2	–	10	0.00
	Female	50.0				0.00

DD: Duration of dialysis.

Table 2
Seroprevalence of *T. gondii* according to the factors in patients group.

Risk factors	<i>Toxoplasma</i> seropositivity (%)	<i>P</i> value
Gender	Male	72.0
	Female	65.0
Place of residence	Rural	76.4
	Urban	67.9
Consumption of raw or undercooked meat		75.0
History of contact with cat		91.6
HBs Ag ⁺		71.4
HCV Ab ⁺		75.0
History of diabetes mellitus		56.1

4. Discussion

In the present work, the majority of HD and PD patients (70.2% and 66.6%) and 68% of control group are positive for anti-*Toxoplasma* IgG antibody. This picture of high prevalence of seropositivity in general population is also shown in two other reports from the north part of Iran[6,9]. This is the first report of seroprevalence of *Toxoplasma* in PD patients. We didn't find any association between seropositivity for *Toxoplasma* antibodies and exposure to HD and PD. As a result, there wouldn't be any increased risk of *Toxoplasma* infection by dialysis modalities.

In concordance with our study, Bayani *et al.* did not find association between seroprevalence of *Toxoplasma* and HD ($P > 0.05$)[6]. The seroprevalence of *Toxoplasma* IgG antibody among healthy subjects in their study was 76%. The high rate of prevalence of seropositivity in the general population could be the source of insignificant difference between general population and dialysis population seropositivity for *Toxoplasma*.

Opposite to our findings, there are several studies that depicted

significant and higher prevalence of seropositivity among HD patients and concluded that the exposure to HD is associated with more risk of toxoplasmosis[1,2,7,8,10,11]. The discordance between our results and other studies may be due to the higher prevalence of *Toxoplasma* seropositivity in control group when it compared to the studies which found a deleterious effect of the dialysis of seropositivity of toxoplasmosis. The seroprevalence of *Toxoplasma* IgG antibody among control group in those studies was 23.1%, 26%, 48%, 26.1%, 34% and 20% respectively and in our study it was 68%.

We didn't find any difference between HBsAg positive patients and negative patients in their seropositivity of toxoplasmosis. This could be against the person-to-person transmission during the dialysis session. In high prevalence areas, patients taken the infection from outside and dialysis or isolation type do not affect the seroprevalence of toxoplasmosis.

We can conclude that there is no significant difference between general population and dialysis patient and between two dialysis modalities in terms of toxoplasmosis seropositivity in high prevalence areas.

Conflict of interest statement

We declare that we have no conflict of interest.

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