Seroepidemiological Study of Toxoplasma gondii in Patients with Multiple Sclerosis in Ahvaz, Southeastern Iran

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Received : 11 Nov 2015
Revised: 01 Dec 2015
Accepted: 22 Dec 2015

ABSTRACT

Background and Objective: Toxoplasmosis is a common parasitic infection worldwide. The infection can be caused via consumption of contaminated meat and mother-to-child (congenital) transmission, causing changes in central nervous system tissue, eye irritation and sometimes death. The human form of the disease is often asymptomatic and may be accompanied with general discomfort and swelling of the lymph nodes when associated with chorioretinitis. Acute infection in immunocompromised individuals could lead to mortality. The purpose of this study was to determine the prevalence of anti-Toxoplasma gondii antibodies in serum of patients with multiple sclerosis (MS) referred to the MS Center in city of Ahvaz, southeastern Iran.

Methods: Blood samples were taken from 100 patients with MS and 100 healthy control participants. After separating the serum, presence of anti-Toxoplasma antibodies (IgG, IgM) was evaluated by enzyme-linked immunosorbent assay.

Results: Frequency of anti-Toxoplasma IgG was 38% and 21% in the patients and controls, respectively. Toxoplasma IgM antibodies were not detected in any of the study groups. Pearson correlation coefficient showed a significant association between Toxoplasma antibodies and MS.

Conclusion: Due to high prevalence of toxoplasmosis in MS patients, it is recommended to measure serum titers of the patients regularly, and placed them under antiparasitic therapy when necessary.

Keywords: Toxoplasma, Multiple sclerosis, MS, Ahvaz.

This paper should be cited as: Sabzevari M, Tavalla M [Seroepidemiological Study of Toxoplasma gondii in Patients with Multiple Sclerosis in Ahvaz, Southeastern Iran] .mljgoums. 2017; 11(3):6-9

INTRODUCTION

Toxoplasma gondii is an obligate intracellular protozoan and the most common cause of toxoplasmosis in humans and other warm-blooded animals (1, 2).

The parasite mostly causes infection in immunocompromised individuals including cancer patients receiving chemotherapy, organ transplant recipients, and HIV patients (3, 4). Studying toxoplasmosis is important due to its global prevalence, various risk factors, and the increasing incidence of immunodeficiency disorders (5, 6) .

Empirical studies of patients with autoimmune diseases and toxoplasmosis have shown a somewhat significant increase in antibody titer compared to normal individuals (7, 8). Serologic testing is the routine method of diagnosis. Comprehensive studies have been performed on the level of Toxoplasma antibodies in autoimmune diseases. Since Toxoplasma induces activation of inflammatory mediators, TH2 immune response is examined in autoimmune diseases. Therefore, it seems necessary to study the immune response to T. gondii infection in immunocompromised patients with MS .

MS is a chronic progressive disease of the central nervous system that damages myelin-forming cells and myelin, leading to nerve damage and axonal injury (9, 10). In the US, more than 500,000 people are estimated to have MS, with 8,000 new cases each year (11). It is also the third leading cause of disability in the US (12). The disease often affects young adults between the ages of 20–40 years (median age of 27 years) (13-15).

MS is often characterized by vague symptoms including visual disturbance, fatigue, tremor, impaired balance and pain (9, 16, 17). The purpose of this study was to determine the prevalence of anti-T. gondii antibodies in serum of patients with MS.

MATERIAL AND METHODS

This cross-sectional study was conducted to measure the level of anti-Toxoplasma antibodies Presence of anti-Toxoplasma IgM and IgG antibodies was evaluated in the samples obtained from 100 patients with MS (66 men and 34 women) and 100 healthy control individuals. The control participants were selected from healthy individuals with no symptoms of the disease. Diagnosis of patients with MS was made by a physician.

Demographic data including age, gender and place of residence and living conditions were collected from all participants.

Blood samples were taken and transferred to the serology laboratory at the Department of Parasitology, Ahvaz Jundishapur University of Medical Sciences. Serum was separated by centrifugation at 2000 rpm for 10 min at 37°C. The serums were then stored in a freezer at -20 °C. Enzyme-linked immunosorbent assay (ELISA) kits (Biocompare, Abcam, USA) were used for the evaluation of anti-Toxoplasma IgG and IgM antibodies according to the manufacturer's instructions. Results were obtained by comparing the absorbance values at 450 nm with a cutoff value. Amount of Toxoplasma-specific IgG and IgM antibodies were measured in IU/ml. Pearson's correlation coefficient was used to analyze the data at significance level of $P < 0.0001$.

RESULTS

Among the 100 patients with MS, 13 were living in rural areas, while 87 were living in urban areas. The results of the ELISA showed that 38% of the patients were positive for Toxoplasma IgG antibody, while none of the patients was positive for anti-Toxoplasma IgM antibody. In addition, 21% of the healthy controls were positive for anti-Toxoplasma IgG antibody. None of the controls had anti-Toxoplasma IgM antibody (Table1).

.Table 1- Frequency of anti-T. gondi IgG and IgM in patients with MS and control subjects

Group	Frequency of anti-*T. gondii* IgG (%)		Frequency of anti-*T. gondii* IgM (%)	
	Positive	Negative	Positive	Negative
Case	38	62	0	100
Control	21	79	0	100

DISCUSSION

Toxoplasmosis is a common parasitic disease that can infect most warm-blooded animals and humans. The prevalence of toxoplasmosis is associated with several factors including age, eating habits, diet, culture, and place of residence (18). In this study, 38% of the patients with MS and 21% of the healthy controls had the anti-Toxoplasma IgG antibody. T. gondii IgM was not found in any of the groups, indicating the absence of active infection in the two groups. Similar to our study, Shapira et al. investigated the frequency of anti-Toxoplasma antibodies in immunodeficient patients. Their result showed that the anti-Toxoplasma IgG was present in 42% of immunodeficient patients and 29% of healthy individuals (18). Mostafavi et al. also reported that 41.4% of participants were positive for anti-Toxoplasma IgG in Isfahan (Center of Iran) (19). Study of Petrikova et al. on the frequency of anti-Toxoplasma IgG antibody in patients with different autoimmune diseases reported that the highest prevalence was found in patients with MS (20).

In the present study, no one was found positive for anti-Toxoplasma IgM antibody. There was a significant correlation between the place of residence and presence of anti-Toxoplasma antibodies, which could be due to lifestyle and poor hygiene in rural areas. Studies of Shaddel et al. (21) and Razavi et al. (22) showed that women are more susceptible to infection with T. gondii , while we found no correlation between gender and toxoplasmosis. Our finding is consistent with the finding of Rostami et al. in this regard (23).

Study of Rostami et al. (23) reported a high prevalence for Toxoplasma antibodies in older patients, while we found no significant correlation between frequency of anti-Toxoplasma IgG antibody and age of the patients. This is in agreement with findings of Shaddel et al. (21) and Sedaghat et al. (24). This result may be due to recurrent exposure to the Toxoplasma antigens. According to this study, infection with T. gondii may be one of the several risk factors for MS (25).

CONCLUSION

According to our results, the prevalence of toxoplasmosis is high in patients with MS. Therefore, serum titers of these patients should be measured regularly, and antiparasitic therapy should be provided when necessary.

ACKNOWLEDGMENTS

The authors are grateful to the Department of Parasitology at Ahvaz Jundishapur University of Medical Sciences. The study has been supported by the Infectious and Tropical Diseases Research Center of Ahvaz Jundishapur University of Medical Sciences, Iran.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interests.

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