



## Original Article

# Comparison of serum level of toxoplasma gondii antibody between patients with multiple sclerosis and healthy people



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### ABSTRACT

**Introduction:** Multiple sclerosis (MS) is one of the chronic inflammatory diseases of the nervous system. The cause of the disease has not yet been clearly identified. Environmental factors and infections, including the toxoplasma, are hypothesized to be the cause of the disease. Toxoplasma has important effects in diseases related to the nervous system. Our goal was to compare the serum antibody level against toxoplasma in patients with MS and healthy people in Sanandaj, Iran.

**Methods:** In this case-control study, 100 patients with MS who were registered in the MS Society of Sanandaj and 200 matched healthy blood donors from the Sanandaj Blood Transfusion Organization (control group) were studied from 2015 to 2016. 5 ml blood sample was obtained from all subjects and then after isolation of patients' sera, IgG antibodies against toxoplasma -antigens were measured by ELISA method. Data were analyzed by SPSS software and Chi-square test.

**Results:** Toxoplasma antigen was found in 13% of patient group ( $P = 0.204$ ) and 14.5% of control group, there is no significant difference between the levels of anti-toxoplasma antibody in the 2 groups ( $P > 0.05$ ). The age of patients was between 20-40 years and the control group was also matched accordingly. The place of residence of all patients and all the control group was urban.

**Conclusion:** It seems that toxoplasma gondii has not relation with MS.

## Introduction

Multiple Sclerosis (MS) is a progressive autoimmune disease of the central nervous system, in which neuronal myelin sheath is degraded by the host's immune system, which causes permanent disability. Studies show that MS is caused by environmental factors in patients with a genetic predisposition (1-2). The cause of MS is unknown, but researchers believe that genetic factors and environmental factors such as infection (infection with viruses, bacteria and even parasites) are involved in the development of the disease. Environmental factors and infections, including the toxoplasma, are hypothesized to be the cause of the disease. The prevalence of familial multiple sclerosis in Iran is 11.4% (3)

Toxoplasma is a common intracellular parasite (zoonosis) between human and animals that enters into single-nucleus cells (4-5). Toxoplasma has been effective in diseases related to the nervous system, including schizophrenia, obsessive-compulsive disorder, suicide, etc (6-7). It is estimated that at least a third of the world human population is infected with *T. gondii*. Overall prevalence of toxoplasmosis in the general population of Iran has

been reported to be 40% (8-9). *T. gondii* transmitted to humans by eating raw or inadequately cooked infected meat, through ingestion of oocysts that cats have passed in their feces and women can transmit the infection *transplacentally* to their unborn fetus. Other infection pathways are transfusion transplantation and direct contamination (10). The consumption of meat contaminated with cysts of *T. gondii* or the ingestion of oocysts through contact with contaminated soil or water are the major risk factors for transmission of the parasite (11,12). Our goal was to compare the serum antibody level against toxoplasma in patients with MS and healthy people in Sanandaj, Iran.

## Methods

In this case-control study, 100 MS patients were selected from the list of registered multiple sclerosis patients in the MS Association in Kurdistan province, from 2012 to 2013. Patients were randomly selected. The study protocol was approved by the

University Ethics Committee (Proposed Code: MUK.REC.1394 / 202) and written informed consent was obtained from the samples. A total 200 healthy individuals who were matched with the patient group in terms of the age, gender, occupation and place of living, were selected from eligible blood donors who referred to the Sanandaj Blood Transfusion Organization. Blood samples were collected from the patient and control groups. No re-sampling was needed. Demographic data (age, gender, place of residence and occupation) were collected from patients and control group. In both groups, patient information was kept confidential. Blood samples were centrifuged and the extracted serum was stored in test tubes at  $-20^{\circ}\text{C}$  until ELISA tests were performed. ELISA test was performed on serum using anti-toxo IgG antibody. IgG antibody kits (Vircell toxoplasma IgG Kit). According to the manufacturer's instructions, 5ml of blood was taken from each sample and after serum isolation, the anti-toxoplasma antibody titer was titrated with ELISA method. The results of ELISA tests were entered into the statistical package for

social sciences (SPSS) software, version 21. The Chi-square test was used to analyze the data. The p value smaller than 0.05 was considered statistically significant.

## Results

A total of 300 subjects participated in this study. Overall, 96 (32%) subjects were male and 204 (68%) subjects were female. Among the 300 subjects, 100 (32 males and 64 females) were in the patient group (case group) and 200 (64 males and 128 females) were in the control group. The age of patients was between 20 and 40 years and the control group was also matched accordingly ( $P > 0.05$ ). The place of residence of all patients and all the control group was urban. According to Table 1, out of 300 samples anti toxoplasma antibody was positive in 13 cases (13%) in the patient group and 29 cases (14.5%) of the control group. There was no statistically significant difference between the patients and control group ( $P > 0.05$ ).

**Table 1.** Evaluation of the association between multiple sclerosis and the presence of IgG Antibody against toxoplasma

Variables		Test Result		Degrees of freedom	Test statistic	P value
		Negative	Positive			
Sex	Male	79 (26.3%)	17 (5.66%)	1	1.612	0.204
	Female	179 (59.66%)	25 (8.33%)			
Group	Case	87 (87%)	13 (13%)	1	0.498	0.779
	Control	171 (85.5%)	29 (14.5%)			

## Discussion

As seen from Table 1, there is no significant relationship between the presence of toxoplasma and MS. Recent researches have not investigated the direct relation between toxoplasma gondii and MS. But according to existing research in history of toxoplasma association with nervous system disease, the purpose of the present study has been focused on this.

In a study by Zafer Cetinkaya et al., the relation between schizophrenia and toxoplasma was assessed. The seropositivity rate for anti-toxoplasma IgG schizophrenia patients (66%) was significantly higher than among patients with depressive disorder or healthy volunteers (13).

In another study by Kussiki et al., the relation between Alzheimers disease (AD) and toxoplasma was assessed, there were no significant differences among the patients and the control participants with respect to age and sex. The sero positivity rate for anti-T. gondii IgG antibodies among AD patients and control groups were 44.1% and 24.3%, respectively, and there was significant difference between the serum anti-T. gondii IgG levels (14).

In a study by Ozelm et al., the relation between toxoplasma infection and Parkinsons disease (PD) was assessed. There were no statistically significant differences among the patients and control subjects with respect to age and gender. The sero-positivity rate for anti-T. gondii IgG antibodies in PD patients and control groups were 42.3 and 22.5%, respectively, and they were statistically significant. These results showed that toxoplasma infection may be involved in the pathogenic mechanisms of PD (15). Our results were not in line with previous studies, maybe the sample size or other technical test were different in these studies.

## Conclusion

The results of this study indicate that there was no significant difference in the presence of IgG antibody for toxoplasma between patients with multiple sclerosis and healthy controls. The results of previous studies in some cases was found a relationship between toxoplasma antibody and nervous system diseases including Schizophrenia, Alzheimer and Parkinson. Due to the high prevalence of toxoplasma infection in our country, further researchers needed to compare serum IgM antibody against toxoplasma by molecular techniques.

## Ethical disclosure

Before performing the research, it was explained to the participants. An informed consent was obtained from all participants included in the study.

## Acknowledgement

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## Author contributions

All authors contributed equally in planning and carrying out this project.

## Conflict of interest

There is no conflict of interest in this study.

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