Seroprevalence of toxocariasis in multiple sclerosis and rheumatoid arthritis patients in Shiraz city, southern Iran

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ABSTRACT

Background: Toxocariasis is a zoonotic disease in human with worldwide distribution. Recently a relationship between toxocariasis and some autoimmune diseases has been considered. We aimed to investigate the seroprevalence of toxocariasis among multiple sclerosis (MS) and rheumatoid arthritis (RA) patients in comparison with healthy persons.

Materials and methods: In the present study, 96 blood samples from MS patients, 50 blood samples from RA patients and 100 blood samples from healthy persons were collected. Collected samples were examined to detect anti-Toxocara antibodies using commercial ELISA kit.

Results: The most of the participants in present study were females (69.1%). The average age of MS patient, RA patients and healthy persons were 37.5, 47.6 and 42.1 years old, respectively. Anti-Toxocara antibody was detected in serum of 8 out of 96 (8.3%) MS patients and 3 out of 100 (3%) healthy persons while anti-Toxocara antibodies were not detected in serum of RA cases.

Conclusions: This study indicates that there was no significant correlation between IgG antibodies against Toxocara and variables such as gender and age. Based on the statistical analysis, there was no significant difference in Toxocara seropositivity between our control population with MS and RA patients.

1. Introduction

Toxocariasis is a soil-transmitted parasitic disease with worldwide distribution. This infection is caused by Toxocara canis and Toxocara cati, the parasitic roundworms in the intestine of dogs and cats, respectively.1 Contaminated soil with infective eggs is considered as the main source of human toxocariasis, but the consumption of raw meat of paratenic hosts, contaminated by Toxocara larvae is alternative source of infection. Humans get infected by ingestion of embryonated Toxocara eggs accidentally.2 The eggs hatch in the small intestine and the second stage larvae migrates to the organs and cannot mature. Depending on the infected organs, migrating Toxocara larvae results in several clinical forms of toxocariasis, namely, visceral larva migrans (VLM), ocular larva migrans (OLM), neurotoxocariasis and covert toxocariasis (common toxocariasis).3 The prevalence of toxocariasis in human has been reported from 1.4% to 34.5% from different parts of Iran.4–13

The relationship between toxocariasis and autoimmune diseases such as multiple sclerosis (MS) and rheumatoid arthritis (RA) has been reported in previous studies.14–20 In autoimmune disease, the immune system produces antibodies against the body antigens and then tissues are destructed due to Ab-Ag complex formation. Based on retrospective epidemiological data obtained in recent years, the increase in autoimmune disease has been in parallel with free from dirt environment.21 In the recent decades, the prevalence of autoimmune diseases has increased in industrial countries. Probably, the changes of lifestyle in these countries and the decrease of exposure to infectious agents in the early childhood have led to increase of autoimmune diseases in adulthood according to ‘hygiene hypothesis’.22,23

Multiple sclerosis is an inflammatory autoimmune disorder with unknown etiology that causes central nervous system (CNS) demyelination and axonal damage.24 An association between Toxocara infection and MS patients has been hypothesized. Some studies investigated the relation of Toxocara infection with MS patients and reported that the seropositivity rate of toxocariasis in MS patients is higher than the healthy control.16,19 Rheumatoid arthritis is also a chronic inflammatory autoimmune disease that its causes is still fully unknown. The seroprevalence of toxocariasis in patients with RA showed that Toxocara antibodies in patients with RA was significantly higher than that in the control group.17–25

Since some studies have reported that parasites can be a cause of autoimmune diseases and considering the prevalence of toxocariasis in Iran, the current study aimed to investigate the seroprevalence of
Table 1
Demographic data and seropositivity of toxocariasis in multiple sclerosis and rheumatoid arthritis patients and healthy persons.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>MS (n = 96)</th>
<th>RA (n = 50)</th>
<th>Control (n = 100)</th>
<th>Total Anti-Toxocara</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11–20</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>21–30</td>
<td>8</td>
<td>0</td>
<td>9</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>31–40</td>
<td>62</td>
<td>4</td>
<td>28</td>
<td>94</td>
<td>5</td>
</tr>
<tr>
<td>41–50</td>
<td>23</td>
<td>27</td>
<td>59</td>
<td>109</td>
<td>2</td>
</tr>
<tr>
<td>51–60</td>
<td>2</td>
<td>19</td>
<td>4</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>50</td>
<td>100</td>
<td>246</td>
<td>8</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24</td>
<td>18</td>
<td>34</td>
<td>76</td>
<td>3</td>
</tr>
<tr>
<td>Female</td>
<td>72</td>
<td>32</td>
<td>66</td>
<td>170</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>50</td>
<td>100</td>
<td>246</td>
<td>8</td>
</tr>
</tbody>
</table>

MS: multiple sclerosis. RA: rheumatoid arthritis.

Toxocara infection among multiple sclerosis and rheumatoid arthritis patients in comparison with healthy persons.

2. Materials and methods

2.1. Study design and setting

This case-control study was carried out on 96 patients with MS, 50 patients with RA and 100 healthy persons who were referred to health centers of Shiraz University of medical sciences, Shiraz city, Southern Iran, from April to June 2015.

2.2. Participants and samples

The 96 patients with MS in each age group were diagnosed according to the McDonald criteria (61 cases of relapse-remitting MS, 32 cases of primary progressive MS and 3 cases of secondary progressive MS). 50 rheumatoid arthritis patients with symptoms such as joint pain and swelling were enrolled in this study. The control group included 18 male (36%) and 32 female (64%) persons and the mean age was 47.6 ± 5.5 years, while the healthy persons (n = 100) included 34 males (34%) and 66 females (66%) with the mean age of 42.1 ± 6.6 years. ELISA test results revealed anti-Toxocara antibodies in 3 out of 100 (3%) healthy persons, while anti-Toxocara antibodies were not detected in the serum samples of 50 patients with RA.

This study indicates that there was no significant difference between MS (P = 0.168) and RA (P = 0.808) patients with control group in terms of gender (P > 0.05), but there was a significant difference in the mean ages of patients and healthy controls (P < 0.05). However, the results showed that there was no significant correlation between IgG antibodies against Toxocara and variables such as gender (P = 1.000) and age (P = 0.438).

Based on the statistical analysis, there was no significant difference in Toxocara seropositivity between the control group and patients with MS (P = 0.105) and RA (P = 0.551). Demographic data and seropositivity in patients and healthy persons is shown in Table 1.

3. Results

The patients with MS were 24 males (25%) and 72 females (75%) with the mean age of 37.5 ± 5.5 years. Anti-Toxocara antibodies were detected in 8 out of 96 patients (8.3%). The patients with RA (n = 50) consisted of 18 male (36%) and 32 female (64%) persons and the mean age was 47.6 ± 5.5 years, while the healthy persons (n = 100) included 34 males (34%) and 66 females (66%) with the mean age of 42.1 ± 6.6 years. ELISA test results revealed anti-Toxocara antibodies in 3 out of 100 (3%) healthy persons, while anti-Toxocara antibodies were not detected in the serum samples of 50 patients with RA.

4. Discussion

In our study, anti-Toxocara antibodies were detected in the serum samples of patients with MS and healthy persons, while the serum samples of patients with RA were seronegative. Based on the statistical analysis, there was no significant difference in Toxocara seropositivity between the control group with MS and RA patients.

Few studies have been conducted on the relationship between parasitic infections and rheumatoid arthritis disease. In contrast to our study, Kaplan et al. identified anti-Toxocara antibodies in 35.6% of forty-five patients with RA and Toxocara seroprevalence in RA patients was significantly higher than healthy persons (8.3%). Similar to our study, Jimenez-Balderas et al. checked out the association between parasitic diseases in childhood and autoimmune diseases such as rheumatoid arthritis, anti-Toxocara antibodies were not detected in none of the patients with rheumatoid arthritis. In several studies, arthritis has been reported as one of the most common symptoms of toxocariasis in patients. According to the few studies about the relationship between toxocariasis and rheumatoid arthritis, it seems that further investigations with larger numbers of patients are needed for the evaluation.
several studies. In this survey, seroprevalence of toxocariasis in MS patients in comparison with healthy persons was studied and there was no significant difference in Toxocara seropositivity between the control group and patients with MS. Zibaei and Ghorbani investigated toxocariasis among sixty-eight patients with MS in comparison with 70 healthy persons using ELISA method. Similar to our study, the seroprevalence of Toxocara infection was found to be higher in MS patients as compared to the healthy control, but a significant association (P = 0.004) between Toxocara seropositivity and multiple sclerosis was reported while in our study, there was no significant difference in Toxocara seropositivity between the control group and MS patients, also in the study carried out by Kuk et al. there was no significant difference in Toxocara seropositivity between control population with MS. In these studies, contrary to the hygiene hypothesis, the prevalence of anti-Toxocara antibodies in MS patients was higher than healthy persons.

In this study, seropositivity was higher among females compared to males like the study of Zibaei and Ghorbani. This can be due to the most of the participants in the present study were females (69.1%), but the statistical analysis showed that there was no significant difference between toxocariasis and gender. In the current study, the mean ages of patients and controls was not equal which could be due to the multiple sclerosis disease usually affects young people and rheumatoid arthritis most commonly begins in middle age. However, the there was no significant correlation between IgG antibodies against Toxocara and age. Since the studies showed that gender and age did not influence Toxocara seropositivity.

5. Conclusion

This study indicates that there was no significant correlation between IgG antibodies against Toxocara and variables such as gender and age. Based on the statistical analysis, there was no significant difference in Toxocara seropositivity between our control population with MS and RA patients. The role of Toxocara as an inhibitor or possibly a cause or risk factor of autoimmune disease such as MS and RA is unclear. Especially the role of parasitic diseases on RA patients remains controversial, and more investigations are recommended with larger numbers of RA patients.

Conflicts of interest
The authors declare that there is no conflict of interests.

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Appendix A. Supplementary data
Supplementary data to this article can be found online at https://doi.org/10.1016/j.cegh.2019.06.005.

References