SEROPREVALENCE OF TOXOPLASMA GONDII INFECTION IN PREGNANT WOMEN IN MIANDOAB CITY, IRAN

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ABSTRACT

Immunity to Toxoplasma gondii infection is known to be a critical point for women during pregnancy. Non immune pregnant women may at risk to be infected with the parasite. The parasite can be transmitted via placenta and causes adverse effects in fetus. The main objective of the present work was to study seroprevalence of Toxoplasma infection in pregnant women referred to Health Center in Miandoab. Totally 200 blood samples were collected from 18-40 years pregnant women referred to Health Center in Miandoab during one year. The sera were tested for IgG and IgM titration with ELISA kits. In addition, demographic characteristics of the women were obtained through appropriate questionnaires. Positive IgG and IgM titers were identified in the sera of (39.5%) and (2.5%), of the pregnant women, respectively. The higher frequency of positive titers was associated with older age. In addition, 94.42% of the women with positive titer had a history of contact with cats. Regarding the prevalence rate of 60% in non-immune pregnant women in Miandoab, the preventive measurements in nutrition and contact with cats should be considered by the women. We recommend the sera of the pregnant women should be monitored for Toxoplasma infection at least once a year, particularly during the first trimesters of pregnancy.

Keywords: Seroprevalence, Toxoplasma Gondii, Pregnant Women, Miandoab

INTRODUCTION

The intracellular protozoan parasite, toxoplasma gondii, causes infection in men and animals. The primary ‘hosts which harbour the intestinal, sexual stage are cats (Boyle, 2009; Montoya, 2004). Transmission to humans happens mainly by eating raw or undercooked contaminated meat (Weiss, 2009; Dubey, 2008), raw cow’s milk and birds eggs, swallowing oocysts discharged in faces of infected cats, inoculation of trophozoites through the skin, or by inhalation (Remington et al., 2004). Trans-mission from a mother infected during pregnancy, to the fetus causes congenital toxoplasmosis (Speet et al., 2005; Reis, 2006). Human toxoplasmosis is worldwide. In adolescence and adulthood, most infections are subclinical or run a very mild clinical course (Remington et al., 2006). Toxoplasmosis is a systemic infection, always accompanied by the production of serum anti-bodies at high titre. After the acute stage antibodies persist at lower titre, usually throughout life. The number of seropositive persons in a population, therefore, increases with age. Although antibodies for toxoplasma gondii have been found in the sera of humans and animals throughout the world, the proportion of subjects with positive reactions varies consider-ably by geographic area, age and test method used (Oyibo, 2009; Al-Mohammad et al., 2010). The risk, by age, of acquiring infection is not uniform throughout the world. It has been reported that prevalence of seropositivity among Eskimos is zero, among Brazilians, 72% (Fuente et al., 1997). Frequency among the population of the U.S.A ranges from 10 to 20% in young adults and from 35 to 70% in older persons (Remington et al., 2006). Little is known about prevalence of toxoplasma gondii infection in Iran. Very few studies have been reported concerning prevalence of toxoplasma gondii antibodies in some population groups (Jaqueti et al., 1991; Studenicová, 2008). The present study was undertaken to determine the prevalence of toxoplasmosis in Pregnant Women in Miandoab City, Iran for
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toxoplasma IgG antibodies. Since very high IgG antibody levels may correlate with current infection, IgM testing may be used for differential diagnosis.

Detection of IgM antibodies establishes the diagnosis of recently acquired or reactivated infection, but these antibodies soon disappear or decrease to very low levels followed by the appearance of IgG which stays longer. It was also planned to determine toxoplasma gondii IgM antibodies in Pregnant Women who were positive for toxoplasma IgG antibodies.

MATERIALS AND METHODS

This cross sectional study was performed from September to October 2013 in Miandoab City, north-west Iran. The city has a moderate and semi-humid climate. In the current survey, sample size was calculated considering a prevalence of 35%, a degree of precision of 4 (d=0.04) and 95% confidence interval. Consequently, the sample size was calculated as 200 pregnant women.

Collecting Samples

The objects were women referred to Health Center in Miandoab for routine examinations of pregnancy. A questionnaire containing socio-demographic and behavioral habits was designed and completed for individuals.

Overall, 200 blood samples were collected and sera separated by blood centrifugation at 3000 rpm for 5 min. Serum samples were transferred to the Laboratory and stored at -20 °C until use.

Analyzing Samples

The anti- T. gondii IgG and IgM antibodies were tested with commercial ELISA kit (Pishtaz Teb Zaman, Tehran, Iran) according to manufacturer instructions and results read by an automated ELISA reader machine. All samples were conducted as a single test. Standards with three different concentrations were employed to ensure kits were working properly and technical procedures were performed correctly.

Statistical Analysis

ELISA results and data from questionnaires were analyzed employing Chi-square statistical test with 95% confidence interval using SPSS software version 16. The correlation between T. gondii infection with some variables such as age, living place (urban/rural), education, occupation, cat or other animals ownership, soil contact, consumption of raw/undercooked meat or egg, consumption of raw/unpasteurized milk, vegetables washing method, frequency of consuming vegetables was estimated.

RESULTS AND DISCUSSION

Results

The overall seroprevalence of T. gondii infections among pregnant women referred to Health Center in Miandoab was 41% (82/200). The IgG and IgM antibodies against Toxoplasma gondii were positive in 79/200 cases (39.5%) and 5/200 cases (2.5%), respectively. Two pregnant women (1%) indicated both IgG and IgM antibodies against T. gondii. The results of seroprevalence along with personal and socio-demographic data are indicated in Table 1.

The correlation between age (P= 0.042) and soil contact (P= 0.002) with the T. gondii infection was statistically significant. No significant relationship was seen between toxoplasmosis and other tested variables.
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Table 1: Prevalence of specific anti- *Toxoplasma* IgG and IgM antibodies and socio demographic data in pregnant women in Miandoab, Iran

<table>
<thead>
<tr>
<th>Socio-demographic characteristics</th>
<th>No. of tested women</th>
<th>Prevalence of T. gondi IgG No. (%)</th>
<th>Prevalence of T. gondi IgM No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group (yr)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤20</td>
<td>22</td>
<td>6</td>
<td>27.3</td>
</tr>
<tr>
<td>21-30</td>
<td>141</td>
<td>49</td>
<td>34.7</td>
</tr>
<tr>
<td>&gt;30</td>
<td>37</td>
<td>19</td>
<td>51.35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>200</td>
<td>79</td>
<td>39.5</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>115</td>
<td>44</td>
<td>38.2</td>
</tr>
<tr>
<td>Rural</td>
<td>85</td>
<td>37</td>
<td>43.5</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>10</td>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>Elementary school</td>
<td>38</td>
<td>20</td>
<td>52.6</td>
</tr>
<tr>
<td>Guidance school</td>
<td>48</td>
<td>21</td>
<td>43.75</td>
</tr>
<tr>
<td>High school</td>
<td>83</td>
<td>31</td>
<td>37.3</td>
</tr>
<tr>
<td>University</td>
<td>21</td>
<td>7</td>
<td>33.3</td>
</tr>
<tr>
<td>Employed</td>
<td>16</td>
<td>5</td>
<td>31.2</td>
</tr>
<tr>
<td>Unemployed</td>
<td>184</td>
<td>75</td>
<td>40.76</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First trimester</td>
<td>92</td>
<td>37</td>
<td>40.21</td>
</tr>
<tr>
<td>Second trimester</td>
<td>25</td>
<td>10</td>
<td>40.0</td>
</tr>
<tr>
<td>Third trimester</td>
<td>83</td>
<td>32</td>
<td>38.5</td>
</tr>
</tbody>
</table>

Discussion
This study revealed a seroprevalence of 39.5% (79/200) and 2.5% (5/200) for IgG and IgM antibodies against *T. gondii* in pregnant women in Miandoab City, respectively. Congenital toxoplasmosis can lead to a wide variety of manifestations from spontaneous abortion and still-birth to hydrocephalus or microcephalus, cerebral calcifications and retinochorioditis in the fetus and infant (Remington et al., 2006; Oyibo, 2009). Studies had been performed to evaluate the *T. gondii* infection in pregnant women or child bearing age in some countries and different seroprevalences were estimated. The reported seroprevalences of *T. gondii* infection were 51.4% in Saudi Arabia (Al-Mohammad et al., 2010), 59% in Argentina (Fuente et al., 1997), 43% in Austria (Aspo et al., 1992), 30% in Spain (Jaqueti et al., 2011), 22.1% in Slovakia (Studenciková, 2008), 24.6% in Turkey (Akyar, 2011) and 92.5% in Ghana (Ayi et al., 2009). The prevalence rate of 29.1% and 0.8% for anti- IgG and IgM antibodies in pregnant women was estimated in Zair, Nigeria (Ishaku et al., 2009).
Among pregnant women tested in rural Durango State, Mexico, IgG antibodies against *T. gondii* infection varied from 0% to 20% in different communities. Overall, 8.2% had IgG and 2.3% had IgM antibodies, too (Alvarado-Esquível et al., 2009).

In Iran, the prevalence rates of 22.7% and 31% were estimated in pregnant women from Kermanshah (Athari, 1993) and Khorraram-Abad (Cheraghipour et al., 2010), whereas the rate of *T. gondii* infection was 20.1% and 19.2% in pregnant women of Isfahan (Jalayer et al., 1997) and Sabzavar (Moalaee et al., 1992), respectively. Abdi et al. (2008) found the prevalence rate of 44.8% of infection in Ilam Province (Abdi et al., 2008). A study in Kerman, South eastern Iran, reported a prevalence of 46.9% in pregnant women (Keshavarz et al., 2000). In Zanjan City, located in northwest of Iran, 1.4% and 37.2% of tested pregnant women had IgG and IgM antibodies against *T. gondii*, respectively (Hajsoleimani et al., 2012).

North of Iran has suitable climate for oocyst sporulation of *T. gondii*, so high prevalence of infection is expected there. The present study showed a high rate of IgG anti-*T. gondii* anti-body (39.5%) positive along with a relatively low prevalence rate for IgM (2.5%) in pregnant women in Miandoab City.

However, in the present study the relation of the *Toxoplasma* infection with age was statistically significant that is in concordance with results of some previous studies in other parts of Iran such as Bandar Abbas (Setoodeh et al., 2003), Hamadan (Fallah et al., 2008), Khorraram-Abad (Cheraghipour et al., 2010) and Alashtar (Cheraghipour et al., 2009). Also, our results indicated a significant difference between *T. gondii* infection and soil contact that is not surprising since north-west of Iran has appropriate climate for oocyst sporulation and contacting with oocyst infected soil is one of the common routes of human infection. In the current study there was no statistically significant relationship between toxoplasmosis and some tested criteria such as living place (urban/rural), education, occupation, cat or other animals ownership, or egg, consumption of raw/unpasteurized milk, vegetables washing method, frequency of con-suming vegetables. Whereas significant correlation was reported between the infection with education (Sharifi–Mood et al., 2004; Parvizpour et al., 2008), consumption of raw/undercooked meat (Kamyabi et al., 1999; Garedaghi et al., 2011) and frequency of consuming vegetables (Fallah et al., 2004) in some previous studies in Iran.

**Conclusion**

The results of this study indicate that about 60% of pregnant women in this city had no con-tact with the parasite and are at risk for congenital toxoplasmosis, so, preventive measures and establishing diagnostic toxoplasmosis tests during pregnancy are warranted.

**ACKNOWLEDGMENT**

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