INTRODUCTION

Toxoplasmosis is caused by an obligate intracellular protozoan parasite, *Toxoplasma gondii*. The infection is worldwide, particularly in warm and moist climates. One-third of the human world population is infected with this parasite. Generally unrecognized food born disease, it is one of the most prevalent parasitic infections to humans and domestic animals. Having very low host specificity, can probably infect almost any mammal.

It is one of the most frequent zoonoses in the world and the disease is oligosymptomatic in most cases. Vertical transmission is an important cause of fetal malformation and sequels in newborns. Approximately 10% of postnatal cases present multiple manifestations, ranging from low fever and mild lymphadenopathy to severe encephalitis. In moderate cases, lesions such as retinochoroiditis may emerge during acute infection or even years later. Besides vertical infection during pregnancy, humans can get infected postnatally either by oral uptake of sporulated *Toxoplasma* oocysts or by ingestion of tissue cysts upon consumption of raw or undercooked meat. A high seroprevalence of *T. gondii* in animals slaughtered for meat production has been observed in Switzerland. In immune competent individuals, *T. gondii* preferentially infects tissues of central nervous systems, which might be an adding factor of certain psychiatric disorders and the parasite can cause life-threatening infections and spontaneous abortions.

MATERIAL AND METHODS

The survey was conducted from January 2005 to March 2005 at District Head Quarter Hospital, Muzaffargarh. A total of 100 blood samples were collected randomly from male and female hosts. The host name, age and sex were recorded. The blood samples were collected and left for about one hour so that clotting could take place. Later on they were centrifuged and the supernatant (serum) was transferred carefully to clean and labelled test tubes. The sera were frozen until processed for further analysis. The samples were proceeded for analysis of specific immunoglobulin G (IgG). The commercial “Latex Agglutination kit” (LA) was used for this purpose.

The kit was used according to the manufacturer instructions. The reagents were brought to the room temperature and dilutions of 1/16 were made in physiological saline (0.9% NaCl). Drop of diluted serum (40 µl) was placed onto a slide black area and the latex reagent was mixed well and one drop was added to each serum drop. Both drops were mixed together with the aid of
stirrer and the slide was tilted. Presence or absence of agglutination was observed within the period no longer than three minutes. The positive sera indicated the clear agglutination, while in negative sera no agglutination was observed.

RESULTS

The overall prevalence of human toxoplasmosis was 37% during the present study. Relationship between sex and human toxoplasmosis revealed that the prevalence (40%) of T. gondii was more in males as compared to (34%) in females. (Table 1)

Relationship between age and human toxoplasmosis showed no significant differences in age groups. However the highest prevalence (50%) was observed in the age group of 32-41 years. (Table 2)

DISCUSSION

Different values for the prevalence of T. gondii have been reported in different parts of the world. Higher prevalence has been reported by Konishi et al.10 who surveyed antibody to Toxoplasma among 1761 people in Surabaya, Indonesia and found the overall prevalence of 58%. Maiga et al.11 carried out one year study among patients with acquired immunodeficiency syndrome and blood donors in Bamako. The overall prevalence was 60%. Chacin-Bonilla et al.12 conducted a survey of 335 individuals of 1-65 years of age in 6 communities from the San Carlos Island, Western Venezuela. The indirect haemagglutination test showed the overall infection rate of 49.8%. Negash et al.13 tested 65 serum samples from urban and peri-urban residents aged between 15 days and 65 years by modified direct agglutination test in Nazareth Town, Ethiopia. Serological evidence was found in 60% hosts. Asthana et al.14 detected toxoplasmosis in 57% of 534 pregnant women in Grenada, West Indiees by enzyme linked immunosorbent assay. Santos et al.15 observed 97.4% of 113 humans infected with T. gondii by indirect fluorescent antibody test in Mato Grosso state, Brazil. Bouhamdan et al.16 reported 62.2% prevalence among 3516 blood samples (1371 sera from hospital laboratories and 2145 sera from private laboratories) in Beirut. The lower prevalence is given by Kawashima et al.17 who determined 11.1% seropositivity among 904 urban residents of Metro Manila Philippines. Mohan et al.18 detected the IgG antitoxoplasma antibodies among 4.6% subjects from rural, urban and urban slum populations of Union Territory, Chandigarh, India. Al-Qurashi19 carried out serological analysis of 1400 subjects in Al-Nereiyah and Al-Qurain region of Saudi Arabia using the microparticle enzyme immuno-assay and detected inactive toxoplasmosis (IgG) to be 26.36% and 25.0% respectively. Studenièová et al.20 found IgG antibody prevalence of 24.2% (123/508) among healthy subjects using ELISA from Slovakia. Abu-Madi et al.21 analysed the serological response of 1625 subjects referred for routine hospital based serological tests through and enzyme-linked immunosorbent assay and observed the overall prevalence of IgG antitoxoplasma antibodies responses to be 29.8% in Doha Qatar. Xiao et al.8 reported overall anti-T. gondii of 12.3% from 2634 healthy individuals and 547 patients with certain psychiatric disorders in Changchun and Daqing in the Northeast and in Shanghai in the South of China by indirect ELISA and direct agglutination assay.

Variations in results reported by researchers from different parts of the world could be due to multiple factors including consumption of semi-cooked meats;22 consumption of home-made ice.23 The presence of felines can indicate the likelihood of a contaminated environment, posing a risk to the human population and other animals;15 dog ownership;24 eating of unwashed raw vegetables

<table>
<thead>
<tr>
<th>Hosts</th>
<th>Number examined</th>
<th>Number infected</th>
<th>Prevalence (%)</th>
</tr>
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<tbody>
<tr>
<td>Male</td>
<td>50</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Female</td>
<td>50</td>
<td>17</td>
<td>34</td>
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</table>

<table>
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<tr>
<th>Age groups (years)</th>
<th>2-11</th>
<th>12-21</th>
<th>22-31</th>
<th>32-41</th>
<th>42-51</th>
<th>52-61</th>
<th>62-71</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers examined</td>
<td>2</td>
<td>17</td>
<td>18</td>
<td>24</td>
<td>19</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Numbers infected</td>
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<td>7</td>
<td>4</td>
<td>12</td>
<td>6</td>
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<tr>
<td>Prevalence (%)</td>
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<td>41.1</td>
<td>22.22</td>
<td>50</td>
<td>31.5</td>
<td>43.75</td>
<td>25</td>
</tr>
</tbody>
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Table 1: Relationship between sex and human toxoplasmosis.

Table 2: Relationship between age and human toxoplasmosis.
or fruits; organ transplantation and across the placentas from the mother to the fetus; drinking unpasteurized goat’s milk. Employment status is also important. It relates to the level of exposure, as the farmers and employees in village rural areas are observed to have high prevalence than students and children in the urban areas; drinking rainwater; poor kitchen hygiene. Blood donors also constitute a significant risk of transfusion transmitted toxoplasmosis, particularly donors without education have a significantly higher frequency of infection than those with 13–19 years of education. Significantly high seroprevalence of Toxoplasma antibodies are also observed amongst individuals who keep livestock and abattoir workers. Individuals who handle/ eat rodents and those who constantly have contact with soil also have higher seroprevalence of Toxoplasma antibodies.

Results regarding the relationship between sex and toxoplasmosis indicate that the present study is in agreement with Konishi et al; Kawashima et al, Alvarado-Esquivel et al, Swai and Schoonman, Uneke et al.

Higher prevalence in male hosts could be explained on the basis that the prevalence and intensity of infections caused by protozoa is higher in males than females due to immunological differences. The reason for these differences in susceptibility is multifactorial. Sex-associated hormones can also modulate immune responses and consequently directly influence the outcome of parasitic infection. Sex steroid hormones alter genes and behaviors that influence susceptibility and resistance to infection. Thus, males may be more susceptible to infection than females not only because androgens reduce immunocompetence, but because sex steroid hormones affect disease resistance genes and behaviors that make males more susceptible to infection. The innate physiological differences between males and females can also be the factors. A close functional relations between the immune, nervous and endocrine systems exist which communicate between each other using the common mediators and their receptors. The immune cells not only receive signals from the endocrine system but also produce numerous hormones, usually after stimulation with antigens including parasites antigens. On the other hand, parasites are able to exploit hormonal microenvironment within the host to establish an infection and avoid the eradication by evolving receptors for host hormones. Some parasites produce also steroid hormones and alter host hormones levels. The direct effects of the host hormones on parasite physiology may significantly contribute to sexual dimorphism in parasitism.

Usually the prevalence rate of human toxoplasmosis increase with the age of the host as reported by Kawashima et al; in Philippines, Al-Qurashi in rural areas in the eastern region of Saudi Arabia, Nissapatorn and Abdullah in Malaysia, Barbosa et al, in North-eastern Brazil, Fromont et al. in France, El-Kady in Egypt. But the age prevalence curve of population in Muzaffargarh is very much different from those of above mentioned studies which may indicate that this population has a much greater transmission rate. However, prevalence does not reach near 100% in any of the age group.

CONCLUSION

The disease has high prevalence in this area. The disease should be prevented through education. Some measures that should be taken by all individuals are the following: wearing gloves or washing hands after working with soil, not consuming undercooked or raw meat, thoroughly washing kitchen utensils after use, washing fruits and vegetables before consumption, covering children’s sandboxes and keeping outdoor play areas free from cat access, wearing gloves/washing hands after changing litter boxes. Pet cats should be tested for toxoplasmosis.

REFERENCES


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