ORIGINAL ARTICLE

PREVALENCE OF HUMAN TOXOPLASMOSIS IN DISTRICT MUZAFFARGARH, PUNJAB, PAKISTAN

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ABSTRACT

Background: Toxoplasmosis is the disease which affects people worldwide. The disease can be congenital or acquired. It remains generally asymptomatic and proves lethal in the persons with low immunity. **Methods:** Serological examinations were carried out from January 2005 to March 2005 at District Head Quarter Hospital, Muzaffargarh. Sample size was 100 including 50 male patients and 50 female patients. Commercially available Latex Agglutination kit was used to detect toxoplasmosis. **Results:** Out of 100, only 37 hosts were infected with *Toxoplasma gondii* with the overall prevalence of 37%. The parasite was more (40%) prevalent in males as compared to (34%) in females. The prevalence of *T. gondii* was highest (50%) in age group of 32-41 years and the parasite was not found in age group of 2-11 years. **Conclusion:** Toxoplasmosis has a high prevalence in Muzaffargarh district of Punjab, Pakistan. There is need to make public awareness in this region

KEY WORDS: Toxoplasmosis, *Toxoplasma gondii,* Prevalence.

INTRODUCTION

Toxoplasmosis is caused by an obligate intracellular protozoan parasite, *Toxoplasma gondii*.[1] The infection is worldwide, particularly in warm and moist climates.[2] One-third of the human world population is infected with this parasite.[3] Generally unrecognized food born disease, it is one of the most prevalent parasitic infections to humans and domestic animals.[4] Having very low host specificity, can probably infect almost any mammal.[5]

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.[6] 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.[7] 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.[8,9] There are several studies on its seroprevalence around the world, but studies focusing on Pakistan are limited in number.

Keeping in view the importance of the parasite the present project is aimed to study the overall prevalence of *T. gondii* and its relation to age and sex of the host in and around Muzaffargarh, Pakistan.

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 serums were frozen until processed for further analysis. The samples were proceded for analysis of specific immunoglobulin G (IgG). The commercial "Latex Agglutination kit" (L.A) 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

Table 1: Relationship between sex and human toxoplasmosis.

Hosts	Number examined	Number infected	Prevalence (%)
Male	50	20	40
Female	50	17	34

Table 2: Relationship between age and human toxoplasmosis.

Age groups (years)	2-11	12-21	22-31	32-41	42-51	52-61	62-71
Numbers examined	2	17	18	24	19	16	4
Numbers infected	0	7	4	12	6	7	1
Prevalence (%)	0	41.1	22.22	50	31.5	43.75	25

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%. Chacín-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 Indies 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 4.66% subjects from rural, urban and urban slum populations of Union Territory, Chandigarh, India. Al-Qurashi[19] carried out serological analysis of 1400 subjects in Al-Nereiyah and Al-Qurain region of Saudi Arabia using the microparticle enzyme immune-assay and detected inactive toxoplasmosis (IgG) to be 26.36% and 25.0% respectivity. 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

or fruits;[4] organ transplantation and across the placenta from the mother to the fetus;[1] drinking unpasteurized goat's milk.[25] 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;[2,19] drinking rainwater;[26] poor kitchen hygiene.[27] Blood donors also constitute a significant risk of transfusion transmitted toxoplasmosis,[28] particularly blood donors without education have a significantly higher frequency of infection than those with 13–19 years of education.[29] Significantly high seroprevalence of *Toxoplasma* antibodies are also observed amongst individuals who keep livestock and abattoir workers.[30] Individuals who handle/eat rodents and those who constantly have contact with soil also have higher seroprevalence of *Toxoplasma* antibodies.[31]

Results regarding the relationship between sex and toxoplasmosis indicate that the present study is in agreement with Konishi *et al*; [10] Kawashima *et al*,[17] Alvarado-Esquivel *et al,*[29] Swai and Schoonman,[30] Uneke *et al.* [31]

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.*[32] 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.[33] 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.[34] The innate physiological differences between males and females can also be the factors.[35] 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.[36] The direct effects of the host hormones on parasite physiology may significantly contribute to sexual dimorphism in parasitism.[37]

Usually the prevalence rate of human toxoplasmosis increase with the age of the host as reported by Kawashima *et al.* [17] in Philippines, Al-Qurashi[19] in rural areas in the eastern region of Saudi Arabia, Nissapatorn and Abdullah[38] in Malaysia, Barbosa *et al.* [39] in North-eastern Brazil, Fromont *et al.* [40] in France, El-Kady[41] 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.

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