

# SEROPREVALENCE OF HUMAN TOXOPLASMOSIS IN DERA GHAZI KHAN, PUNJAB

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## ABSTRACT

**Background:** Toxoplasmosis is a zoonotic disease of warm blooded animals and humans caused by the parasitic protozoan *Toxoplasma gondii*. This parasite is ubiquitously distributed throughout the world. It causes severe congenital abnormalities including hydrocephalus and mental retardation in infants. Keeping in view the importance of this parasite, the present project was designed to study the prevalence of human toxoplasmosis and its relationship to sex, age and caste of humans.

**Material & Methods:** This study was conducted in rural areas of district D.G.Khan. The samples were tested by latex agglutination test. The data were collected on the designed proforma and the significance of differences was evaluated by chi-square test using Minitab version 13.

**Results:** Overall prevalence of *T. gondii* infection was 29.5%. It was more prevalent in females as compared to males. The relationship between age and human toxoplasmosis showed that the prevalence was highest in age group 51-65 years and lowest in 36-50 years. Caste wise prevalence showed maximum in Mehrwani and minimum in Khakkh caste.

**Conclusion:** The infection rate of toxoplasmosis is 29.5% in D.G.Khan. It increases with age and women have a higher risk of infection than men.

**KEY WORDS:** Toxoplasmosis, *Toxoplasma gondii*, Human, Seroprevalence.

## INTRODUCTION

Toxoplasmosis is a cosmopolitan zoonotic disease caused by the parasitic protozoan *Toxoplasma gondii*.<sup>1</sup> Serological studies show a considerable variation in the prevalence of *Toxoplasma* infection from 0-95% in different parts of the world and indeed between different population groups within the same country.<sup>2</sup> Most infections in immunocompetent humans are asymptomatic and in upto 10% of infected individuals cervical lymphadenopathy or ocular disease occurs.<sup>3</sup> *Toxoplasma gondii* can also cause severe encephalitis via acute infection or reactivation of latent infection among immune suppressed persons, including those with acquired immunodeficiency syndrome, those with immunosuppressive cancer, and transplant recipients on immunosuppressive drugs. Toxoplasmosis is the most frequent severe neurological infection among persons with acquired immunodeficiency syndrome. Newly acquired *T. gondii* infection in a pregnant woman can be transmitted to the fetus and may cause mental retardation, blindness, epilepsy, and death. Most infants who are infected while in the womb have no symptoms at birth but later in life may develop serious symptoms. A small percentage of infected newborns have serious eye or brain damage at birth.<sup>4</sup>

*Toxoplasma gondii* is recognized as an important opportunistic pathogen of fetuses, newborns and patients with a variety of primary genetic and acquired immunodeficiencies. The majority of immunocompromised patients that develop clinical disease have defects in T cell function highlighting the importance of lymphocytes in controlling this persistent infection. However, in chronically infected hosts that lose T cell function, reactivation may lead to disease. Toxoplasmosis is a common cause of death in AIDS patients. While the brain is the most frequently affected organ, toxoplasmosis can involve any organ including the testis, dermis and spinal cord.<sup>5</sup>

Although various researchers in different parts of the world have conducted surveys in order to examine the prevalence of human toxoplasmosis,<sup>4,6-8</sup> but there is no published report on the prevalence of human toxoplasmosis from Dera Ghazi Khan. Keeping in view the importance of this parasite, the present project was designed to study the prevalence of human toxoplasmosis and its relationship to sex, age and caste of humans.

## MATERIAL AND METHODS

During this survey 200 blood samples were examined for human toxoplasmosis. The age, sex and caste of the humans were recorded. The

venous blood (3-5ml) was taken from each person under aseptic conditions and serum was extracted after clot formation and stored in clean capped serum cups at -20°C until processed for analysis. The commercial “Latex Agglutination Kit” (Antec Diagnostic Product, UK) was used for the analysis of specific immunoglobulin (IgG) antibodies against *T. gondii*.

Results were analyzed with Minitab 13.0 software package. Chi-square test was used for *T. gondii* prevalence in respect to sex, age groups and caste of the population. The difference was considered to be statistically significant when the p value was <0.05.

**RESULTS**

A total of 200 human blood samples of age (5-80 years) residing in the vicinity of D.G.Khan were examined for *Toxoplasma gondii*. The overall prevalence of human toxoplasmosis was 29.5%.

Among these 98 (49%) were males and 102 (51%) females. The results indicate the toxoplasmosis prevalence slightly lower 28.57% in males than 30.39% in females. But the difference was statistically non-significant.

Data for age-wise prevalence of toxoplasmosis is shown in (Table 1). There is highest (50%) prevalence among age group 51-65 years and lowest (13.79%) in age group 36-50 years (p<0.05).

The relationship between caste and human toxoplasmosis was highest (31.034%) in Mehrwani and lowest (25%) in Khakkh. (Table 2)

**DISCUSSION**

Toxoplasmosis is an endemic parasitic zoonosis throughout the world and mainly a risk to unborn infants and to persons with weakened immune systems. Prevalence of *T. gondii* infection in humans and animals has been used to know

**Table 2: Relationship between caste and human toxoplasmosis.**

Caste	Number of subjects examined	Number of subjects infected	Prevalence (%)
Mehrwani	87	27	31.034
Khosa	57	17	29.824
Lashari	40	11	27.5
Khakkh	16	04	25.0

the endemicity of the parasite. The prevalence of toxoplasmosis in many countries has been investigated. Similar results (30%) were reported in the eastern region of Saudi Arabia.<sup>9</sup> While higher values 47.4, 59.6 and 90% were recorded in Brazil, Egypt and Ethiopia, respectively.<sup>10-12</sup> However lower incidence rate (4.19, 11.3, 22, 26.3) were recorded in Vietnam, Mexico, Pakistan and India respectively.<sup>13-16</sup>

Studies on the prevalence of toxoplasmosis have shown that prevalence of parasite depends on many factors like nutritional habits, socio-economic status, immunity,<sup>17</sup> hygienic conditions, consumption of raw or under cooked meat, contaminated soil and unfiltered water.<sup>18</sup> In addition, the differences in the overall prevalence observed among different studies might have been due to differences in the diagnostic techniques and lack of awareness.<sup>19</sup> Climatic variation from region to region<sup>16</sup> may be another factor. Climate change causes increasing temperatures, drier summers, and wetter winters. Because mean winter temperatures are increasing (except for some short periods of extreme winter weather), sporulated oocyst survival is likely to increase. This increase can have consequences for *T. gondii* prevalence in intermediate and final hosts.<sup>20</sup> The prevalence of toxoplasmosis in this study was seen in the population living in rural area and the reason for high prevalence may be lack of education and environmental conditions. In addition, lengthy summer and dry weather of the area may be favorable for the sporulation of oocytes.

The sex of the hosts’ affects on the prevalence of *T. gondii*. The female hosts were more susceptible than males. This is due to many reasons that women traditionally take more care of pet animals and handle raw meat more frequently than men because they spend more time cooking at home. The higher prevalence in females than males has also been reported in other studies.<sup>8</sup> Sex-associated hormones (testosterones, androgen and estrogens) directly influence the immune

**Table 1: Relationship between age and human toxoplasmosis.**

Age group (years)	Number of subjects examined	Number of subjects infected	Prevalence (%)
5-20	92	20	21.73
21-35	56	26	46.43
36-50	29	04	13.79
51-65	16	08	50.00
66-80	07	01	14.29

system and thus susceptibility to diseases. While sex hormones alone do not cause disease, abnormal hormone levels and environmental conditions may provide the stage for other factors (genetic, infectious) to trigger the disease.<sup>21</sup> Literature generally indicates that females have more immunity than males and are less susceptible to diseases<sup>22</sup> but during the present study toxoplasmosis is more prevalent in females as compared to males. This may be due to different factors e.g., break down of immunity in females due to hormonal imbalance, nutrition and age.<sup>23</sup>

The *T. gondii* infection increased as the age of host increased. Age is an important factor in the prevalence of human toxoplasmosis. According to the results of the present study, the prevalence of *T. gondii* was higher in older groups than younger. This could be explained on the basis that the humans included in this age group were less resistant to *T. gondii*. The present results are supported by the earlier studies conducted in Palestine and France respectively.<sup>24,25</sup> Getting older does increase the risk for many diseases and disorders. The usual physiological change of aging e.g. a decline in immune system functioning thus enhances the risk of infection.

The prevalence of human toxoplasmosis was highest among Mehrwani and lowest among Khakkh caste. Seroprevalence of *T. gondii* infection among Atayal and Paiwan mountain aborigines and Southeast Asian laborers in Taiwan where the overall seroprevalence of *T. gondii* infection was 19.4% for Atayal, 26.7% for Paiwan, 42.9% for Indonesian, 14.7% for Thai, and 11.3% for Filipinos.<sup>4</sup> The seroprevalence among Iauarete, a multiethnic Indian community, prevalence was greater in Indians belonging to the Hupda ethnic group.<sup>26</sup>

It is obvious from above studies that prevalence of *T. gondii* is variable. Analyzing human genetic variation provides a powerful tool in understanding risk factors for disease. According to different studies different specific genes are involved in prevalence of toxoplasmosis. There are association between HLA haplotypes and severity of toxoplasmic encephalitis in AIDS, immunocompetent patients and the manifestation of disease in congenitally infected subjects.<sup>27</sup> Genetic factors can be the major reason behind the differential prevalence of toxoplasmosis among different castes during present study.

## CONCLUSION

The infection rate of toxoplasmosis is 29.5% in DG Khan. It increases with age and the highest rate was observed in 51-65 years age group. Women have a higher risk of infection than men.

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