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Short Communication

Seroprevalence of *Toxoplasma gondii* Infection in Camels (*Camelus dromedaries*) in and around Bahawalpur Region of Pakistan

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ABSTRACT

Toxoplasma gondii is an intracellular parasite, which infects human and animals by ingestion of tissue cyst, raw or undercooked meat or oocyst from soil, vegetables, fruits, water, soil and food contaminated by cat faeces or by transmission through the placenta, milk and blood transfusion. Seropositivity levels vary widely among different regions of the globe and according to sociocultural habits, geographic factors; climate and transmission routes and typically rise with age. In view of the worldwide importance of *T. gondii*, a study was conducted to determine the prevalence of *T. gondii* antibody in camels by using *Toxoplasma* Latex Test Kit. The overall prevalence of *T. gondii* infection in camels was recorded as 10%. Two camels were found seropositive at 1:16 dilution showing residual or nonspecific immunity, five camels were found seropositive at 1:128 showing acquired or evolving immunity, whereas three camels were positive at antibody titre of 1:256 giving an evidence of present infection. It was also noted that seropositivity of *T. gondii* in camels was higher in age group from 6–10 years; infection was higher in female camels having abortion history.

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Toxoplasma gondii is an intracellular protozoan parasite (Smith, 1995) which infects humans as well as wide variety of mammals and birds (Hill et al., 2005). *Toxoplasmosis* is found throughout the world and tends to be more prevalent in tropical climates (Dubey, 1999). The organism was first discovered by Nicolle and Manceaux (1908) as a tissue parasite of gondii (an African rodent), and Darling found it in Man (Subash, 1990). The infection has been confirmed in some 200 species of mammals including man and in domestic / wild felines, which are the only definitive hosts (Pedro et al., 2003).

The source of transmission is the ingestion of vegetables, fruits, water, soil, food contaminated by cat faeces, raw or undercooked meat. Flies and cockroaches may act as a mechanical carrier to transfer oocysts to different varieties of foods. Other sources include transplacental transmission, from mother to the offspring through milk, transplantation of organs, transfusion of blood and venereal transmission (Pedro et al., 2003).

T. gondii can cause severe acquired infection in animals and human beings, which may be localized or generalized. Lymphadenitis (deep cervical nodes) is the most frequently observed clinical sign. Other signs include fever, retinochoroiditis, uveitis, malaise, muscle pain, muscle fatigue, sore throat, headache, hepatitis, myocarditis and pneumonia. Encephalitis is an important sign of *Toxoplasma* in later stages. During the 1980,s *Toxoplasmic* encephalitis in humans emerged as a common complication associated with AIDS (Subash, 1990).

As far as congenital infection is concerned, animals and pregnant women develop the most serious side effects leading to spontaneous abortion, still birth, birth defects, mummification, neonatal losses or fetal abnormalities including microcephalya, hydrocephalya, brain calcifications, psychomotor & mental retardation. The mechanism of vertical transmission is not yet understood (Remington et al., 1995).

Depending upon the geographic location, disease has zoonotic importance in human population. In human 15 – 80 % population is infected with *toxoplasmosis.* Approximately 500 million populations are estimated to have antibodies of *T. gondii* infection (Subash, 1990). Study has shown that between 16% to 40% of the human population in North America and Great Britain, 50% to 80% of the populations in Europe and Latin America have antibodies of *T. gondii*, indicating that they have got infection at some time (Pedro et al., 2003).

Serodiagnosis has been a reliable tool to diagnose *Toxoplasma* infection in both human and animals, using various serological tests, such as indirect haemagglutination, indirect immuneflorescent technique, and Enzyme linked immunosorbant assay and latex agglutination test (Ahmed et al., 1983). Due to increasing risk of public health by ingestion of contaminated meat,

toxoplasmosis has becomes extremely important zoonotic disease.

Camel meat is commonly being consumed, and is the most vulnerable to the exposure of toxoplasmosis which may become the potential source of infection for the consumers; so for as no literature could be traced relating to the investigation of toxoplasmosis in Pakistan in camels. Therefore, keeping in view the importance of disease, study on seroprevalence of *T. gondii* in camels was carried out, which would be helpful to adopt the control measures against the diseases in humans.

A total of 100 blood samples of camels were collected at random from various camel colonies of Bahawalpur. The record/history of each animal was recorded in performa. Under aseptic measures, 5–10 mL of blood was drawn from each camel by vein puncture with the help of disposable syringes and was transferred to screw capped sterile test tube, slowly to avoid haemolysis. All the blood samples were labelled with number and date of collection. The samples were left for about an hour for blood clotting to occur. The clotted blood was then separated with the help of a fine loop and blood samples were centrifuged at 3500 rpm for at least 5 minutes. The supernatant sterile serum was aspirated with a pasture pipette and transferred into a screw capped vial which was stored at −20°C degree until

All the serum samples were analyzed for *Toxoplasma* specific IgG antibodies using Latex Agglutination Test (LAT). For this purpose, the commercial *Toxoplasma* Latex Test Kit was used and interpreted as per manufacturer's instruction (Novamed, Ltd.).

A total 100 blood samples of camels were collected and analysed for anti–*Toxoplasma* antibodies at screening dilution of 1:16, 1:128, 1:256 by using commercially available *Toxoplasma* Latex Kit on the principle of Latex Agglutination Test (LAT).
The age of camels ranged from 1–15 years and above. Blood samples were taken and divided in to 3 categories i.e. A–1, A–2, and A–3. The age categories (A–2) that ranged from 6–10 year had the highest seropositive percentage that was 16.6 % followed by A–3 (11–15 yr and above) that was 9.0 %, whereas the number of samples tested in A–1 (1–5 yr) had no positive case (Table 1). As far as the sexes of camels were concerned, 46 were male and 54 were female. Female camels have higher seropositive percentage (11.1 %) than male (8.69 %) (Table 2). The overall seropositive percentage was 10%. According to antibodies titre, 2 camels showed antibody titre at screening dilution of 1:16, 5 camels showed antibody titre at 1:128 and 3 showed antibody titre at screening dilution of 1:256 (Table 1).

Table 1: Overall prevalence of *T. gondii* antibodies in camels in relation to their age

Age (Years)	No of sera Tested	Antibodies Titer			Seropositive	% Seropositive
		1:16	1:128	1:256		
A–1 (1–5)	20	0	0	0	0	0
A–2 (6–10)	36	01	03	02	06	16.6 %
A–3 (11–15) andabove	44	01	02	01	04	9.0 %
Total	100	02	05	03	10	10 %

Table 2: Overall prevalence of *T. gondii* antibodies in camels in relation to their sex

Sex	No of sera Tested	Antibodies Titer			Seropositive	% Seropositive
		1:16	1:128	1:256		
Male	46	01	02	01	04	8.69 %
Female	54	01	03	02	06	11.1 %
Total	100	02	05	03	10	10 %

DISCUSSION

Toxoplasmosis is one of the most common infections in human and animals cause by protozoan parasite *T. gondii*, which is responsible for significantly higher morbidity, and mortality in both human and other warm–blooded animals. *Toxoplasmosis* has worldwide distribution, zoonotic in nature and depending upon the geographic location 15–85% of the population can be symptomatically infected (Subash, 1990). *Toxoplasmosis* is also responsible for abortion and congenital defects in human and domestic livestock including sheep, goats, camels, cow and buffalo (Pedro et al., 2003).

T. gondii can cause severe acquired and congenital infection in animals and human beings associated with fever, lymphadenitis, uveitis, muscle fatigue, hepatitis, encephalitis and abortion. Serological surveys indicate that about 80% of all primary infections are asymptomatic, due to the immune system effectiveness, but variable levels of the disease can affect immunocompromised individuals (Cantos et al., 2000). The acquired immune deficiency syndrome (AIDS) has created an expanding population of susceptible individuals. Usually people suffering from both AIDS and *Toxoplasmosis* have been exposed to the *Toxoplasma* parasite earlier in life and the HIV infection simply allowed the *Toxoplasma* parasite to grow unchecked. The concomitant occurrences should be considered by public health policies especially in those countries with high *Toxoplasma* prevalence, where AIDS is concurrent with economic and public health problems (Passos et al., 2000). *T. gondii* infection is embrotoxic in humans. It is mainly transmitted through raw or undercooked meat and ingestion of oocytes in cat faeces (Cantos et al., 2000).

Toxoplasmosis in camels is important because of its zoonotic importance and camels are main source of meat consumption in Pakistan. Due to the zoonotic importance of *Toxoplasmosis*, the present study was conducted to sort out the seroprevalence of *T. gondii* infection in camels in & around Bahawalpur areas by using commercially available *Toxoplasma* Latex Agglutination Kit (LAT).

Among 100 camels examined in the present study, 2 gave an antibody titre of 1:16 which indicated residual or

nonspecific immunity, 5 gave antibody titre of 1:128 which was due to acquired or evolving immunity, whereas three camels were positive at antibody titre of 1:256 strongly suggested present infections as reported by Fanck et al. (2004).

The overall prevalence of anti–toxoplasma antibodies in camels was recorded as 10%. T. *gondii* antibodies are widely spread in animal's population, which supported that *Toxoplasmosis* is widely spread zoonotic infection (Mirdha et al., 1999). Various researchers recorded the prevalence of anti–*Toxoplasma* antibodies in camels using different serological tests including Latex Agglutination Test (LAT) by Chaudhary et al. (1996) in Abu–Dhabi (18%), Abu–Zeid (2002) in Abu–Dhabi (31.4%), Khalil et al. (2007) in Sudan (22.2%), Hilali et al. (1998) in Egypt (17.4%), Afzal et al. (1994) at Abu–Dhabi (30.9%), Elamin et al. (1991) in Sudan (67%). Indirect Fluorescent Antibodies Test (IFT) by A. Sadrebazzaz et al. (2006), Karimi (2006) in Iran (6% and 4.16%) respectively. Indirect haemagglutination Test (IHAT) by Hussein et al. (1998) in Saudi Arabia (16%), Ibrahim et al. (1997) in Egypt (44.1%), Youssef et al. (2005) in Abu– Dhabi (22.4%). The variation in seroprevalence results of *Toxoplasmosis* in camels in different part of the world was due to difference in environmental and managemental conditions in various geographical areas.

The seroprevalence of *T. gondii* in camels varied with age. The highest (16.6%) seropositive percentage was found in A–2 (6–10 yr) group followed by low (9.0%) seropositive percentage in A–3 (10–15 yr & above) group and no seropositive case was recorded in A–1 (1–5 yr) group. These findings are in concomitant with the results of Marcao et al. (2004), Elamin et al. (1991), and Karimi (2006).

As far as sex of camels was concerned, female camels have the higher seropositive percentage (11.1%), most of them having a history of abortion followed by male camels i.e. 8.69%. The present study revealed that the prevalence of anti–*Toxoplasma* antibodies is more in female camels than male was in concomitant with the results of Hussein et al. (1998).

The current data has confirmed the prevalence of *Toxoplasmosis* in camels in Bahawalpur. The prevalence of *Toxoplasma* infection in human and animals is often associated with infection in pets. Little attention however has been given to domestic pet despite their intimate contact with animals and their feed. *Toxoplasma* is a true zoonotic occurrence in man, domestic and wild animals. Although only a preliminary study showed that the chances of contacting *Toxoplasma*, through the ingestion of oocyst is very high.

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