OCCURRENCE OF *Toxoplasma gondii* IN GOATS IN AND AROUND THRISSUR

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Abstract

Toxoplasmosis is a neglected parasitic zoonotic disease prevalent throughout the globe. The present study was conducted with a total of 184 serum samples collected from goats in and around Thrissur district of Kerala. All serum samples were subjected to indirect Enzyme Linked Immunosorbant Assay for the detection of Toxoplasma gondii specific antibodies. Details on age of the goats, history of bad obstetrics and grazing history were collected to assess its significance on the presence of antibodies. Of the 184 serum samples, 69 (37.5 %) samples had minimum titre of less than 30 S/P per cent, 39 (21.19 %) were weakly positive with 30 to 100 S/P per cent and 76 (41.30 %) were positive with more than 100 S/P per cent. A positive correlation was observed between the presence of T. gondii antibody with grazing, increase in age and bad obstetric history. The presence of T. gondii antibodies in goats is indicative of the widespread prevalence of the disease among the goat population in Thrissur and the potential risk of zoonosis.

Keywords- *Toxoplasmosis, Zoonosis, Enzyme Linked Immunosorbant Assay*

Toxoplasmosis is a widespread zoonotic parasitic disease caused by *Toxoplasma gondii*, an obligate intracellular protozoan parasite, which infects all warm blooded animals including humans. Felids are the only definitive host and spread the parasitic oocyst through faeces. In intermediate hosts upon primary infection, these undergo a taachyzoite stage of infection, followed by formation of bradyzoite containing tissue cysts in brain or muscles (Dubey and Beattie, 1988). Humans acquire infection via (1) oral uptake of sporulated oocyst from environment, (2) consumption of raw or undercooked meat containing tissue cysts or (3) via transplacental transmission of the parasite from the non-immune mother to the foetus. Sheep and goats also acquire infection by similar modes. Majority of infection in animals are asymptomatic and inapparent or latent but in sheep and goat clinical toxoplasmosis are mostly reported with stillbirths, mummification or resorption of foetus (Nurse and Lenghaus, 1986).Prevalence of the disease in animals and humans vary from country to country. Infection in goats not only results in significant reproductive losses, but also presents a potential source to human infection. The seroprevalence of *T. gondii* in goats has been surveyed in many countries. In India, the knowledge on prevalence of the disease in latent or clinical form is scanty and fragmentary and only few reports are available. Hence, the present study was undertaken to assess serologically the extent of toxoplasma infection in goats in Thrissur district of Kerala.

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Materials and Methods

In the study, ELISA was used to detect the anti- *T. gondii* antibodies in goat serum. The samples were collected from goats reared in and around Thrissur district of Kerala during the year 2015 to 2017. A total of 184 serum samples were collected randomly from goats for ELISA. The relevant informations were also collected*viz.*age of the animal, history of bad obstetrics and nature of feeding including grazing history. Goats in different regions in Thrissur were sampled randomly. The sera was separated from blood sample by centrifugation and stored at -20ºC until used.

All serum samples were tested for anti-*T. gondii* IgG antibody with indirect ELISA test using a commercial ELISA kit (IDEXX Toxotest, IDEXX Switzerland). Serum with S/P per cent (corrected OD 450 nm of the sample/ the mean corrected OD 450 nm of two positive controls X 100) equal or more than 100 was considered positive. Serum with S/P per cent less than or equal to 30 was considered negative and between 30 and 100 was considered weakly positive. Results were analysed statistically using Fishers Exact Test to determine the association of occurrence of *T. gondii* in grazing goats and goats with history of bad obstetrics.

Results and Discussion

In the present study, a total of 184 samples were tested using ELISA and 69 (37.5%) samples tested negative for presence of *T. gondii*IgG antibody. Out of the total, 39 (21.19%) serum samples tested weakly positive and 76 (41.30%) samples tested positive for the antibody. This finding is in accordance with Zhao *et al.* (2011) who noted a seropositivity of 36.8 per cent in goats of China by ELISA.

Host age is a physiological element which influence the frequency of toxoplasmosis has been previously acknowledged (Oncel and Vural, 2006). The association of age with presence of infection was significant (P<0.01) and the occurrence of *T. gondii* antibodies was higherin animals more than four years of ageas compared to younger animals (Table 2). This occurrence study also agrees with Jula *et al.* (2013) who reported a prevalence rate of 18.75 per cent in animals older than one year and 10 per cent in animals less than a year old. This increasing trend can be attributed to the fact that aged animals are more likely to be exposed to parasitic oocysts in the environment. Repeated exposure from soil, feed and fodder results in development of high titre of antibodies.

A significantly (P<0.05) higher seroprevalence was noticed in the grazing goats (Table 3). Among the regular grazing animals 53.54 per cent tested positive for *T. gondii* antibodies. This finding is in accordance with Skjerve *et al.* (1998), who reported a higher seroprevalence in Norwegian slaughter lamps let on regular grazing. Grazing regularly enables the animals to come in close contact with contaminated environment resulting in accidental ingestion of oocysts. Repeated exposure to oocysts results in maintaining higher seroprevalence in these animals.

A significantly (P<0.05) higher occurrence of *T. gondii* antibodies were detected in animals with history of bad obstetrics (Table 4). Among the animals with bad obstetric history, 67.9 per cent animals were seropositive for toxoplasmosis. This finding correlates with that of Ahmed *et al.*(2008), who reported that the rate of abortion in goats due to toxoplasmosis was 36.5 per cent and all the aborted animals were seropositive for *T. gondii* antibodies. Toxoplasma localises and multiplies in the placenta and invades the foetus. The host

Table 1.Occurrence of *T. gondii* antibody in goats

Samples analysed	ELISA					
	Negative		Weakly positive		Positive	
184	Number	Per cent	Number	Per cent	Number	Per cent
	69	37.50	39	21.20	76	41.30

Table 2. Occurrence of *T. gondii* in goats in relation with age

Age group	Samples analysed	Seroprevalence						P Value
		Negative		Weakly Positive		Positive		
		No.	%	No.	%	No.	%	
< 1 year	51	41	80.39	9	17.65	1	1.96	0.006**
1-4 years	88	25	28.41	20	22.73	43	48.86	
> 4 years	45	2	4.44	9	20.00	34	75.56	
Total	184	68	36.96	38	20.65	78	42.39	

** (P<0.01)

Table 3. Occurrence of *T. gondii* in goats in relation with grazing

Grazing	Samples analysed	Seroprevalence						P value
		Negative		Weakly Positive		Positive		
		No.	%	No.	%	No.	%	
Regular grazers	127	32	25.20	27	21.26	68	53.54	0.045*
Non Grazers	57	36	63.16	12	21.05	9	15.79	
Total	184	68	36.96	39	21.20	77	41.85	

*(P<0.05)

Table 4. Occurrence of *T. gondii* in goats in relation with history of bad obstetrics

History of bad obstetrics	Samples analysed	Seroprevalence						P value
		Negative		Weakly Positive		Positive		
		No.	%	No.	%	No.	%	
History of bad obstetrics	28	2	7.14	7	25.00	19	67.86	0.031*
No history of bad obstetrics	156	66	42.31	32	20.51	58	37.18	
Total	184	68	36.96	39	21.20	77	41.85	

*(P<0.05)

immunity is locally suppressed and immaturity in foetal immunity results in abortion in ewes. Based on the stage of gestation and onset of infection, varied sequel may be noticed ranging from embryonic resorbtion to still births.

High occurrence of *T. gondii* antibodies (41.30 per cent) was detected in goats in the present study. This indicates that infection of toxoplasmosis in goats is widespread in the area. A one health approach is necessary to control the disease in food animals and prevention of food borne toxoplasmosis. Adequate awareness must be conducted among farmers in order to control infection in goats.

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