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Short Communication

Seroprevalence of *Toxoplasma gondii* in Sheep, Cattle and Horses in Urmia North-West of Iran

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ABSTRACT

Background: *Toxoplasma gondii* is a zoonotic protozoan parasite found worldwide and responsible for major economic losses in most classes of livestock. This study was aimed to determine the prevalence of *T. gondii* infection in sheep, cattle and horses in Urmia, north-west of Iran, using MAT.

Methods: Blood samples of 276 livestock and 26 horses were collected from July 2009 till April 2010. The data were analyzed by the Chi-square, Fisher's Exact and Cochran's and Mantel-Haenszel Tests. The level of significance was set at $P < 0.05$.

Results: Thirty-three (21.1%) sheep, 2 (1.6%) cattle and 3 (11.5%) horses were seropositive to *T. gondii*. Analysis showed that sheep were 15 times more likely to be seropositive comparing to cattle also 2 times more likely to be seropositive than horses.

Conclusion: This study showed seroprevalence of equine *T. gondii* infection with a considerable rate in sheep in Urmia, northwest of Iran. More comprehensive studies on livestock toxoplasmosis are required for further analysis of the parasite reservoir for human infection.

Keywords: MAT, Prevalence, livestock, *Toxoplasma gondii*, Iran

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Introduction

Toxoplasmosis is a cosmopolitan zoonotic disease caused by the obligatory protozoan *Toxoplasma gondii* being responsible for major economic losses in most classes of livestock through abortions, still birth and neonatal losses (1,2). The distribution of this parasite depends on regions and weather condition where the oocysts survive in environment (3-5). The ingestion of undercooked infected meat is considered as an important source of the infection for humans (6,7).

Despite its worldwide presence, the prevalence of toxoplasmosis is not well known especially In Urmia. Urmia is located in northwest of Iran (37°33'N 45°06'E / 37.55°N 45.1°E) with semi-humid climate and moderately cold winters. The present study is the first report that aimed at determining the prevalence of *T. gondii* infection in sheep, cattle and horses in this region.

Materials and Methods

Blood samples were collected from 156 sheep, 120 cattle and 26 horses that were brought to Urmia University veterinary hospital only for surgery occurred from accident from July 2009 till April 2010. Sera of samples were separated and stored at -20°C until assayed. Specific IgG antibodies to *T. gondii* were examined with Modified agglutination test (MAT) as described by

Desmonts (8). *Toxoplasma* RH strain tachyzoites supplied by Department of Parasitology at Kerman University of Medical Sciences, Iran, were propagated in mice and cell culture, isolated and fixed in formaldehyde solution (9). Sera were tested on 96-well plates with a U shaped bottoms (25 µl of prepared mix antigen plus 25 µl of serum), based on two-fold serial dilutions, from 1:10 until 1:160 beside of negative and positive controls and antibody titer of $\geq 1:20$ was considered positive (10,11). Positive controls supplied by Veterinary Faculty of Urmia University, Iran. The data were analyzed by the Chi-square, Fisher's Exact and Cochran's and Mantel-Haenszel Tests. The level of significance was set at $P < 0.05$.

Results

Thirty-three (21.1%) sheep, 2 (1.6%) cattle and 3(11.5%) horses were seropositive to *T. gondii* by MAT. The data of *T. gondii* antibodies and MAT titers in all groups of animals are shown in Table 1. Univariate analysis showed that sheep are 15 times more likely to be seropositive than cattle (OR=15.829; 95% CI=3.715-67.445), also analysis showed that sheep are 2 times more likely to be seropositive than horses (OR=2.057; 95% CI=0.582-7.273). This study showed that horses are 7 times more likely to be seropositive than cattle (OR=7.696; 95% CI=1.217- 48.656).

Table 1: Prevalence of *T. gondii* antibody and the MAT titers in sheep, cattle and horses in Urmia, northwest of Iran

Livestock	Age	No. examined	No. (%) positive	No. of samples showing the antibody titers at				
				1:20	1:40	1:80	1:160	
Sheep	≤6 months	36	1	33 (21.1)	1			
	>6 months	120	32		16	8	4	4
Cattle	≤6 months	12	-	2 (1.6)	1	1		
	>6 months	108	2					
Horses	≤6 months	-	-	3 (11.5)				
	>6 months	26	3				3	

Discussion

The present study showed a relatively high seroprevalence of *T. gondii* in sheep in this region of Iran. Few studies have reported *T. gondii* seroprevalence in livestock in this region. The seropositivity of sheep was 21.1% that is a bit different than that of other studies from Iran. For example, a study in Kerman showed that 24.7% of sheep were seropositive to *T. gondii* using MAT (12). Other studies on seroprevalence in sheep in center (13) and southwest (14) of Iran showed the seropositivity of 29.1% and 13.1%, respectively in these two regions.

The seroprevalence of *T. gondii* antibodies in cattle was 1.4%. Higher rates of seropositivity of the infection were reported from other regions of the world, i.e. 10.5% in Vietnam (15), 9% in Indonesia (16) and 0% in another part of Iran (17). In our study, the seropositive sheep were 15 times more than the seropositive cattle. It seems that different susceptibility to *T. gondii* infection in different animal species is important in consequent infections. A study in Mazandaran Province (north of Iran) found no *T. gondii* seropositivity in cattle (18), but Hamidinejat showed that 15.7% of cattle were seropositive in south-west of Iran by MAT (19).

Our study showed that seropositivity in horses was 11.5%. This is first report on the seroprevalence of equine *T. gondii* infection from Urmia. A similar study in Qazvin, Iran, showed a quite higher rate of seropositivity (71.2%) in horses (20). Existence of *Toxoplasma* infection in horses may depend on stable conditions. The seroprevalence differences can be attributed to epidemiological factors effective on *T. gondii* parasite. It can be noted that sampling techniques, husbandry method used in different regions, frequency of cats on the farms and climatic variations from one region to another, which are essential elements in epidemiological studies and different results.

In conclusion, the present study showed seroprevalence of *T. gondii* infection in livestock with a considerable rate in sheep in Urmia, northwest of Iran. The infection in sheep and cattle in this region of Iran can be a good reason for further characterization and control of *T. gondii* infection in animals towards the reduction of human infection.

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