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Prevalence of *Toxoplasma gondii* Antibodies in Southwest Cats of Albania

SHEMSHO LAMAJ[1*], GERTA DHAMO[2], ILIR DOVA[2]

[1]Regional Agricultural Directory of Gjirokastra, Albania

[2]Faculty of Veterinary Medicine, Agricultural University of Tirana, Albania

Abstract

Toxoplasma gondii is a zoonotic protozoan parasite found worldwide and cause a disease known as toxoplasmosis. Cats, as definitive hosts, play an important role in the transmission of *Toxoplasma gondii*. A total of 138 domestic household blood samples were collected from Gjirokastra and Tepelena areas from October 2012 to January 2014. Positive sera for *T. gondii* were identified in 58 (42 %) samples exclusively via the by modified agglutination test (MAT). *T. gondii* antibodies were detected in cats. The antibody titers in the positive animals ranged from 1:25 to 1:500. Our results suggest that *T. gondii* infection is common in household cats in Southwest of Albania.

Keywords: Seroprevalence, cats, *Toxoplasma gondii*, toxoplasmosis, parasite.

1. Introduction

Toxoplasmosis is a zoonosis that affects both animals and humans world-wide. This disease is of economic importance in regard to animal reproduction, and has become a public health concern since it leads to abortions and neonatal complications in humans. The definitive host for *T. gondii* is cat and the intermediate hosts are mammals and birds. People can get infected by ingestion of tissue cysts with raw or undercooked meat, and by ingestion of oocysts with water, vegetables or soil [13]. It has been suggested that *T. gondii* infection with oocysts is more serious than infection with tissue cysts [14]**.** Cats play an important role in the spread of toxoplasmosis because they are the only animals that excrete resistant oocysts into the environment [25]. In Albania, large numbers of stray cats are found roaming the streets, fresh markets, public places. These stray cats act as sources of many zoonotic diseases, such as rabies, cat-scratch disease, ehrlichiosis and toxoplasmosis. Usually the presence of antibodies rather than oocyst shedding is detected. The standard diagnosis of toxoplasmosis in cats is based on coprological diagnosis. Serological surveys for the detection of anti-*T. gondii* antibodies in cats was used to assess the degree of environmental contamination as the antibodies persist and indicate prior exposure to *T. gondii* [20]. In the present study, the prevalence of *T. gondii* in cats from different Gjirokastra and Tepelena rural areas was investigated using the modified agglutination test (MAT). The objective of this study was to investigate the epidemiology of toxoplasmosis in household cats in southwest rural environment of Albania.

2. Material and Methods

A total of 138 cats (53 household and 85 outside or in–out cats) of various ages and of both sexes that referred to private animal clinics in different rural and urban areas of Tepelena and Gjirokastra. from October 2012 to January 2014 for various ailments. The animals were gently restrained, and 3 to 5 ml of blood was drawn from the jugular vein, sera were separated with a fine loop immediately and were centrifuged at 3500 rmp for 10 minutes and store -20ºC until used. Sera were diluted 1:25, 1:50, and 1: 500 with phosphate buffer saline and tested by the modified agglutination test (MAT), as described by Dubey and Desmonts (1987). On the basis of extensive evaluation in cats fed tissue cysts, a titer of 1:25 was considered indicative of *T. gondii* infection in cats [5, 7, 8, 9]. Each cat was thoroughly examined and searched for ectoparasites. The age, sex, health status and environ- mental condition were recorded.

*Corresponding author: Shemsho Lamaj; E-mail: shemsholamaj@yahoo.com
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Health condition criteria were as follows: good condition: healthy, invisible crest of ileum, no dehydration, no clinical signs of disease including normal mucous membranes; poor condition: unhealthy, visible crest of ileum, weak, dehydrated, purulent ocular or nasal discharge, or clinical signs of ill- ness observed.

3. Results and Discussion

The overall seroprevalence of *Toxoplasma gondii* in cats was 42 percent. Antibodies to *T. gondii* were found in 58 out of 138 (42%) cats: 6 at titers of 1:25, 13 at 1:50, and 39 at 1:500. Thus, 67 % of seropositive cats had high (1:500) antibody titers (Table 1). Sero-positive cats were found in all areas examined (Table 1).

Table 1. Prevalence of *T. gondii* antibody and the MAT titers in cats in study areas

Sex	No. Examined	No. (%) Positive	No. of cats with antibody in titers		
			1:25*	1:50*	1:500*
Male	57	23 (40.4)	2 (3.5)	6 (10.5)	18 (31.6)
Female	81	35 (43.2)	4 (5.0)	7 (8.6)	21 (25.9)
Total (%)	**138**	**58 (42.0)**	**6 (4.4)**	**13 (9.4)**	**39 (28.3)**

Serum dilution

The present study examined samples collected from different rural and urban areas of Tepelena and Gjirokastra. The prevalence of *T. gondii* antibodies in 42% of cats suggests wide-spread contamination of the rural environment with oocysts. Based on its zoonotic nature, toxoplasmosis is one major public health issue world-wide and thus monitored closely in human medicine, but it is also considered as an important cause of reproductive disease in small ruminants. The quantity of oocysts produced after primary infection varies from 3 to 810 million oocysts [2]. In addition to the considerable amount of oocysts shed, the oocysts are very resistant and can remain viable for up to 18 months in soil depending on humidity, temperature and exposure to direct sunlight [16, 28], and for 6 up to 54 months in water [11] and seawater [19]. Contamination of the environment with *T. gondii* oocysts by cats plays an important role in the epidemiology of toxoplasmosis of animals and humans, which is illustrated by the low prevalence of *T. gondii* infections in areas without cats [10, 21, 27]. Options for ante-mortem diagnosis in cats include fecal examination for oocysts and serologic testing; definitive diagnosis of toxoplasmosis can be difficult to accomplish. Most infected cats will shed oocysts only at a single point in their lifetime, generally for a period of one to two weeks, and it has been estimated that only 1% of cats at any given time are actively shedding [13]; this estimate was supported through the observation of *T. gondii*-like oocysts in a population of Californian cats [1], although tests to confirm the oocyst identity were not reported. The probability of finding oocysts in the feces of a cat is low; a survey of cats in Germany and other European countries recently reported detection of *T. gondii* oocysts in 26 of 24,106 (0.11%) fecal samples. Complicating fecal detection is the fact that oocysts of other coccidia morphologically resemble those of *T. gondii* (*Hammondia hammondi* and *Besnoitia spp*); molecular and bioassay techniques are used to distinguish between organisms, and mouse bioassay is the only definitive confirmation method. Serology can also be used as a diagnostic tool; however, positive results must be properly interpreted. Although a single positive IgG titer indicates exposure, clinical toxoplasmosis is indicated by a positive IgM titer or a fourfold increase in IgG levels in paired serum samples taken 2–4 weeks apart. Because most cats seroconvert after they have finished shedding oocysts, the use of serology in pet cats as an indication of exposure risk to humans is limited. Specific antibodies to *T. gondii* have been detected in up to 74% of adult cats in some populations [26]. Both tissue cysts and antibodies persist, while in general, a cat sheds oocysts for up to three weeks after a primary infection only [2]. The prevalence of oocyst excretion in faeces is therefore much lower than the seroprevalence: large scale screening demonstrated Toxoplasma-like oocysts (this includes *Hammondia hammondi* oocysts) in 0.31% of faecal samples from German and other European cats, 0.11% was confirmed as *T. gondii* [23]. The MAT method was chosen for this study,

because of its high specificity and sensitivity, as well as its simple application and usage with no cross-reactivity with other infective organism of cat [6], also this test is used to get comparative serological data on naturally infected cats [12, 22]. In this study the prevalence of *T. gondii* infection in referred cats to private veterinary clinics in Tepelena and Gjirokastra areas in southwest of Albania is 42 %. Also world-wide toxoplasma prevalence ranges in cats from 5.4% to 90 %. However, the prevalence of IgG antibody of *T. gondii* reported in this study is comparable to other studies from Albania and other regions of the world. In the previous study, of 146 domestic cats surveyed in Tirana during 2008 through 2010, antibodies to *T. gondii* were found in 91 cats (62.3%), and antibodies were measured by the indirect fluorescent antibody test (IFAT) [24]. In our study, the overall seroprevalence of *Toxoplasma gondii* in cats (42 percent) was lower than that of stray cats 91 (62.3 %) and adult cats 26 (83.9 %) reported by Silaghi et al. (2014) in Tirana. This variation is probably related to differences in the timing of the studies, the environmental conditions responsible for the dissemination of *T. gondii* infection [4], season of sampling and differences of sensitivities and specificities of used tests and the distribution of samples. The high prevalence of *T. gondii* antibodies in the cats from Tirana, Albania, is certainly related to their origin from suburban habitats with constant access to the outdoors, which has been identified as a risk factor of the infection [18]. The data of this study indicate a high endemicity of *T. gondii* in the southwest of Albania because all seropositive cats had probably already shed oocysts and contaminated the environment.

4. Conclusions

This study emphasizes the potential role of stray cats and outside or in-out cats as a source of toxoplasmosis transmission to humans in Albania. This information is important for public health, because cats are one of the most popular pets in Albania and frequently come into close contact with humans [17]. These cats may contaminate the environment, thus exposing humans, and particularly children, to possible *T. gondii* infection. Cat owners can reduce their pets' exposure risk by: (i) keeping all cats indoors so they do not become infected by ingesting rodents and birds; (ii) not feeding cat's raw meat; and (iii) controlling potential intermediate hosts such as rodents [15].

5. References

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