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Original Article

Toxoplasma gondii Infection in Stray Cats

H Hooshyar, P Rostamkhani, S Talari, M Arbabi

Dept. of Parasitology, School of Medicine, Kashan University of Medical Sciences, Iran

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Abstract

Background: Cat as definitive host of *Toxoplasma gondii* is important in the epidemiology of toxoplasmosis. The object of this study was to determine the seroprevalence of *T. gondii* as well as parasite isolation from faeces and brain tissues of stray cats in Kashan, central Iran.

Methods: The prevalence of *T. gondii* was determined in serum, feces and brain tissue of 50 stray cats. IgG specific antibody to *T. gondii* was assessed by indirect fluorecent antibody test (IFAT).

Results: Overall infection rate was 86% in 1:20 to1:640 titers. The highest percentage (22%) was for 1:160 and the least (6%) were for 1: 640. *T. gondii* tissue cyst isolated from 2(4%) cats by bioassay in mice. No oocysts detected from cat stool by direct and concentration methods.

Conclusion: This study showed that the prevalence of *T. gondii* in stray cats is high in Kashan region.

Key words: Toxoplasma gondii, *Cats*, *Iran*

Introduction

Toxoplasma gondii is a zoonotic coccidian protozoon with worldwide dis-tribution that infects human and warm-blooded animals (1). Carnivores become infected with *Toxoplasma* by ingesting meat containing bradyzoite in tissue cyst. Herbivore animals become infected mostly by ingesting soil contaminated with cat faeces containing oocysts, while human being omnivorous, is infected with either stages (2). The most common clinical form of human toxoplasmosis is lymphadenitis but the major clinical problem of toxoplas-mosis is congenital infection of fetus resulted from primary infection during preg-nancy, as well as ocular toxoplasmosis and reactivated form in immunocompromised patients (3).

Some studies carried out in Iran showed a high prevalence of *Toxoplasma* infection in human and animals (4-7). For example, a recent study in northwestern of Iran (Ardabil Province) showed that in 30% of sheep, 15% of goats and 9% of cattle, antibody to *T. gondii* was found (8). A seroprevalence study of *Toxoplasma* in Tehran showed that 90% of stray and 36% of household cats were positive for *Toxoplasma* antibody (9). Human infection rates are related to the frequency of cats and living conditions (2). Cats are inhabitants near the human in rural and urban area of the world. There is high prevalence of cats in Iran; they can be an important potential source of transition of zoonotic parasites such as *Toxoplasma*.

The object of this study was to determine the seroprevalence of *T. gondii* as well as parasite isolation from faeces and brain tissues of stray cats in this area.

***Corresponding author:** Tel: +98 361 5550021-5, *E*-mail: hooshyar4@yahoo. com

Materials and Methods

Fifty stray cats were captured by means of traps in rural and urban areas of Kashan, central Iran, from June 2004 to April 2005. Sex, weight and locality were recorded. Fresh faeces were collected and formalin-ether concentration method (10) was applied for detection of oocysts. After necropsy, the brain was separated aseptically and examined directly for *Toxoplasma* tissue cyst. Eight smears were examined directly per cat. About 2g of brain homogenized with normal saline and a 20% suspension were prepared. One ml of the suspension of each brain inoculated into 4 suriyan mice intrapritoanally (11). After two months, the mice were killed and unstained film and Giemsa stained smears of the brains were prepared and examined microscopically for *Toxoplasma* tissue cyst.

Blood samples from heart were collected immediately after autopsy; sera were separated by centrifugation at 400g for 10 min and stored at -20 ºC until exploit. Serum samples of cats were tested for anti *Toxoplasma* IgG antibodies with IFA procedure (9). The antigen was home made and prepared in Dept. of Parasitology, School of Public Health, Tehran University of Medical Sciences, Iran. All positive samples were run at higher dilution until the last positive titer. Negative control was PBS. The positive serum control and fluorescein isothiocyanate (FITC) conjugated goat anti-cat IgG antiserum prepared from Dr Rastegar's Central Laboratory of the Veterinary Faculty, Tehran University. All slides were examined by fluorescence microscopy using FITC filters, at 250x and 400x magnification.

Statistical evaluation was carried out using geometric mean of reciprocal titers (GMRT) and Fisher exact test.

Results

From 50 cats, 38(76%) were male. The weight of cats ranged from 800 to 7500 gr. The mean of weight was 3 kg, SD± 1.46 (3.2 kg for females and 3kg for males).

No oocysts were detected from cat stool by direct microscopy and formalin ether concentration methods.

Antibodies were found in 43 of 50 cats (86%) (Table 1). The GMRT of titers was 1:45. The prevalence of seropositive male cats (86.8%) was higher than female (83.3%) cats but the difference was not significant.

No *Toxoplasma* tissue cyst was observed in cat brain impression smear by direct microscopy examination and after Giemsa staining of smear. By mice inoculation bioassay, *T. gondii* tissue cysts were isolated from 2 (4%) male cats (Fig. 1). In two positive cats the titer of *Toxoplasma* antibody was 1:160.

Table 1: Antibody titer of serum samples from 50 cats by IFA test for *Toxoplasma gondii*

Titer	Male No (%)	Female No (%)	Total No (%)
Negative	5 (13.2%)	2(16.7%)	7(14%)
1:20	7(18.4%)	3 (25%)	10(20%)
1:40	4 (10.5%)	1(8.3%)	5(10%)
1:80	6(15.8%)	3(25%)	9(18%)
1:160	11(28.9%)	0	11(22%)
1:320	3(7.9%)	2(16.7%)	5(10%)
1:640	2(5.3%)	1(8.3%)	3 (6%)
Total	38 (100%)	12(100%)	50(100%)

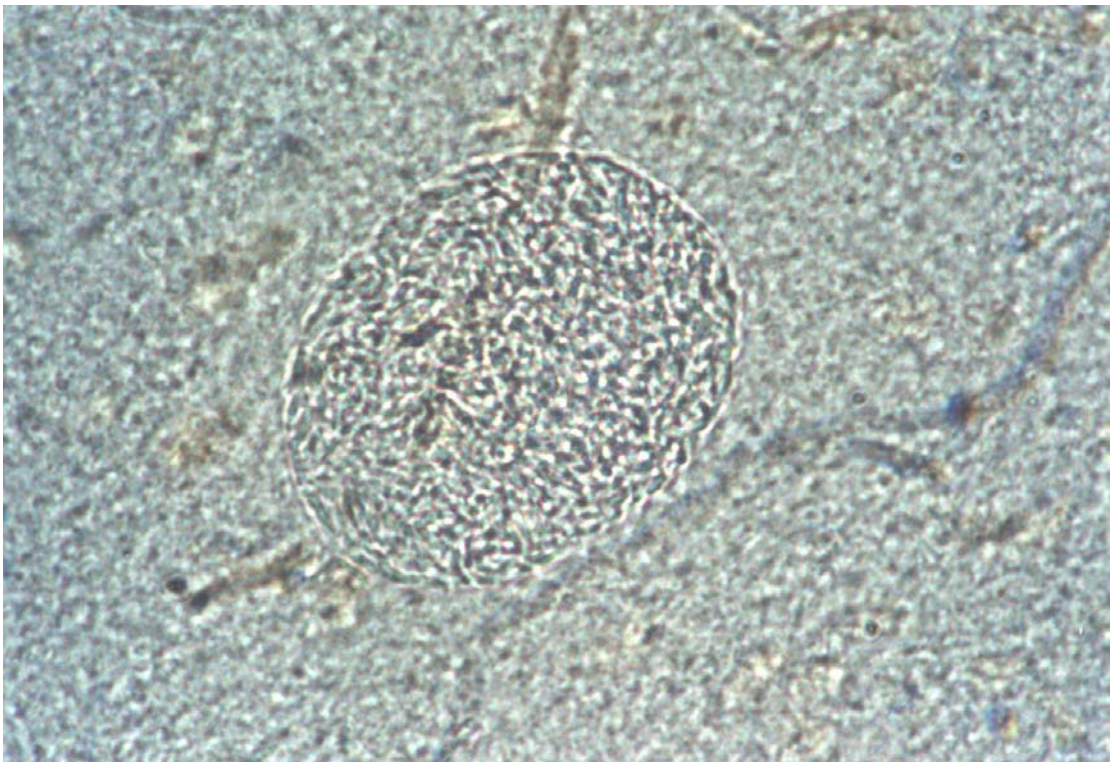

Fig 1: *Toxoplasma gondii* tissue cyst isolated from mice brain (400 X)

Discussion

Household and stray cats often live freely out and in human houses. In addition to their natural food, cats feed on garbage discarded around the houses in night, this is important because they discharge some helminthic eggs and protozoan cysts into the environment, transmittable to human.

Due to close contact of cats with human and this fact that children play outdoors on the soil, cats can be an important potential source of transmition of zoonotic parasite such as *Toxoplasma* because they are the only hosts that can excrete the resistant *T. gondii* oocysts into the environment (12). An epidemiological study showed that herbivores acquire infection by ingestion of pasture and water contaminated with *Toxoplasma* oocysts shed by cats (13).

In Iran, human and animal toxoplasmosis is one of the major zoonotic infection diseases (13) and tissue cyst and anti *Toxoplasma* antibody has been detected from human, cattle, goat, sheep, wild and domestic birds (4-8).

In this study, we found a high rate of IgG anti *Toxoplasma* antibody (86%) in cats using IFAT. A recent similar study in Tehran on stray and household cats showed that 90% and 36% were seropositive, respectively (9). In another study in Tehran on 102 stray cats, 89/2% were seropositive by IFAT which is comparable with the present finding (14). A study in Tabriz showed that 36/2% of cats were positive using dye test which differed with our methods (15). In Brazil, a study in rural area of western Amazon showed that 87.3% of cats were positive for anti *Toxoplasma* antibody by IFA test (16).

Hadazadeh *et al.* tested 100 serum sample from domestic and stray cats in Tehran using IFA test and found no significant difference in the *T. gondii* antibody titers between males and females (9). Similar finding was reported by Sumner (17). Our results showed agreement with their results.
We could not detect any oocysts from faces of cats by direct and concentration methods, which is similar to other studies undertaken in Tehran (14) and Colombia (12). The presence of antibody titer to *Toxoplasma* usually occurs after finishing of oocysts shedding period (18) and only seven (14%) of cats in this study were seronegative.
Due to low sensitivity we could not observe any tissue cysts in direct and staining of brain smears of cats but by mice inoculation we detected tissue cyst from two (4%) cats. This is a sensitive method for detection of *Toxoplasma* from tissue.
In conclusion, we suggest that stray cats have an important role in contamination of environment to oocysts but it is not clear that they have being infective by ingestion of oocysts or by eating the meat of intermediate host especially small rodent and birds. Some studies on such intermediated host are necessary in this region.

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