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ORIGINAL ARTICLE

Prevalence of *Trypanosoma* spp. in domestic and stray cats in Mymensingh, Bangladesh.

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Abstract

Background: *Trypanosoma* spp. infection is a significant disease affecting both humans and animals, including cats. This study aimed to assess the prevalence of *Trypanosoma* spp. in domestic and stray cats in the Mymensingh district, Bangladesh.

Methods: A total of 36 blood samples were collected from cats (16 males and 20 females), prepared as thin blood smears, and examined under a microscope at the Department of Parasitology, Bangladesh Agricultural University, Mymensingh, Bangladesh.

Results: Out of the 36 samples, 3 (8.00%) were infected with *Trypanosoma* spp. Both young cats (<1 year old) and adult cats (>1 year) had an equal infection rate of 8.33% with Trypanosoma spp. The odds of infection were 1.66 times higher in females (10.0%) than in males (6.25%). Trypanosoma spp. was prevalent throughout the year, with rates of 7.6%, 8.33%, and 9.1% during the summer, rainy, and winter seasons, respectively. The odds of infection were 1.1 times higher in the rainy season compared to the summer, and 1.2 times higher in the winter season compared to the summer.

Conclusion: This study suggests that *Trypanosoma* spp. infection in domestic and stray cats is a persistent issue regardless of age, sex, or season.

Keywords: *Trypanosoma*, prevalence, domestic cat.

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Introduction

Trypanosoma spp. are located in the bloodstream and tissues of vertebrates. Trypanosomiasis in animals is distributed across sub-Saharan Africa, parts of Asia, and South America. *T. evansi* has been described in North Africa and the Middle East. A few species are of huge importance as a serious cause of morbidity and mortality in animals and man in tropical areas. With one exception, all of them have an arthropod vector.

Small animals like the dog and cat are susceptible to *T. brucei* and *T. congolense.* The disease is generally acute and other than signs of fever, anemia and myocarditis, corneal opacity is often found. There can be neurological pathology leading to aggressive signs, ataxia or convulsions.

The parasitemic animals generally survive for prolonged periods, there are a lot of opportunities for fly transmission, in particular of *T. brucei*, and *T. congolense*. Whereas, some strains of *T. vivax* in cattle and *T. simiae* in domestic pigs can kill the hosts in 1-2 weeks so that the rate of fly infection are reduced.

Some trypanosomes possess new variant antigen to produce a second wave of parasitemia. The host then generates a second antibody, the glycoprotein coat has altered in many trypanosomes that lead to a third wave of parasitemia. This antigenic variation affiliated with waves and remission of parasitemias, at weeks intervals, for months, usually with a fatal prognosis. (Soulsby, 1982; Urquhart *et al*., 1996)

No investigation was conducted on the prevalence of *Trypanosoma* in the cats in Bangladesh. Prevalence of *Trypanosoma* in the cats in association with their age, sex, season of the year are yet to be addressed in Bangladesh. Therefore, an attempt was made to record a complete prevalence of *Trypanosoma* in domestic and stray cats in Bangladesh.

Materials and methods

Sample collection

A total of 36 domestic and stray cats were collected from various regions of Mymensingh district, Bangladesh. The experiment was based on blood sample examinations.

Ante-mortem inspection

The general health condition, age and sex were recorded. In terms of breed, indigenous local ones were studied in all cases. The cats were confined in a cage for at least 2 days to observe the clinical signs. The cats were observed to detect clinical signs usually shown as a result of parasitic infections such as anorexia, lethargy, dyspnea, anemia, vomiting, diarrhea, fever, abdominal pain and distension and poor hair coat.

Collection and preparation of blood smear

Blood samples were collected from saphenous vein, placed in a clean glass vial with anticoagulant (Calcium-EDTA) and preserved in refrigerator for future use. Thin smears were made to examine the protozoa. The smears were air dried, fixed with methanol for 3 minutes, stained with Giemsa's stain and air dried (Cable, 1957). The slides were then examined under microscope in higher magnifications (40x and 100x).

The prevalence of *Trypanosoma* spp. was computed by using the formula described by Thrushfield (1995). The odds ratio was calculated by using the formula given by Schlesselman (1982).

Results

Trypanosoma are elongated spindle-shaped protozoa with 8.0-39 um long. All members contain a flagellum that arises at the posterior end of the trypanosome from a basal body at the foot of a flagellar pocket. The flagellum runs to the anterior end of the body. It is attached along its length to the pellicle to form an undulating membrane. After that the flagellum may continue forward as a free flagellum. In a stained specimen, a single and centrally located nucleus can be seen. Near the flagellar pocket, a small structure, the kinetoplast, that contains the DNA of the single mitochondrion (Soulsby, 1982; Urquhart *et al*., 1996).

In this research work, a total of 36 adult cats (16 Male and 20 female) were examined. Out of 36 examined cats, only 3 (8.00%) were infected with *Trypanosoma* with 7- 46 protozoa per focus

(Figure 1, Table 1). Young (aged with <1 year old, 8.33%) and adult cats (aged with >1 year, 8.33%) were equally infected with *Trypanosoma*. Females (10.0%) were 1.66 times more susceptible to *Trypanosoma* infection than that of males (6.25%). The prevalence of *Trypanosoma* was recorded all the year round. The rate of infection was 7.6%, 8.33% and 9.1% during summer, rainy and winter seasons, respectively. The infection rate is 1.1 times more likely in the rainy season than that of in the summer season. In winter season, the infection is 1.2 times more likely than in the summer season (Table 2).

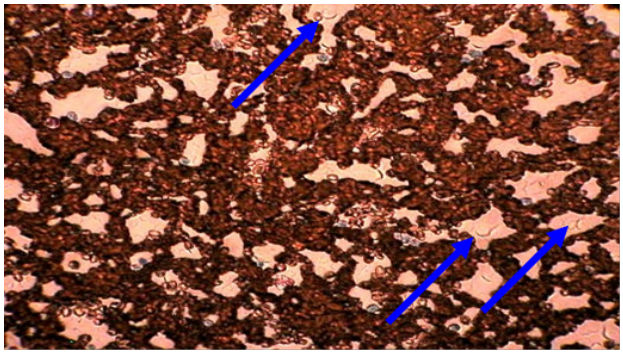

Figure 1. *Trypanosoma* spp (arrows) in the blood film of a cat stained with Giemsa's stain.

Table 1. Prevalence and mean density of *Trypanosoma* spp. in cats in Bangladesh

Protozoa	Prevalence (n=36)		Parasite burden
	Infected	Percentage	Range
Trypanosoma spp.	3	8.0	7– 46 per focus

n = Total number of cats examined

Table 2. Age, sex and seasonal prevalence of *Trypanosoma* spp. in cats in Bangladesh

Variable	Category	Tested (Positive)	Prevalence (%)	Odds ratio
Age (Year)				
	Young (< 1)	12 (1)	8.33	1.0 (young vs. adult)
	Adult (> 1)	24 (2)	8.33	
Sex				
	Male	16 (1)	6.25	1.66 (female vs. male)
	Female	20 (2)	10.0	
Season				
	Summer	13 (1)	7.6	1.1 (rainy vs summer)
	Rainy	12 (1)	8.33	1.1 (winter vs. rainy)
	Winter	11 (1)	9.1	1.2 (winter vs. summer)

Discussion

This is the first report of *Trypanosoma* spp. in cats in Bangladesh. Thirunvukkaarsu *et al*. (2000) described *T. evansi* infection in a cat from india. In carnivores, Khudesta *et al*. (2001) diagnosed the death of four royal Bengal tigers by *T. evansi* infection in Bangladesh. *Thypanosoma* infection was also reported by Ahmed *et al*. (1985) in canine in Bangladesh. In other animals, Rahman (1982) recorded *T. evansi* (0.34%) and *T. theileri* (0.585%) in cattle; *T. evansi* (3.8%) in horses; *T. evansi* (24.0%) in rats; *T. morinorum* (32.4%) in bats and *T. avium* (30.0%) in doves in Bangladesh. Mohammed *et al*. (2022) found that the infection rate of *Trypanosoma* spp. was 34.2% (41 out of 120) in Iraq. Zecca *et al*. (2020) found that 167 euthanized cats from a south Texas shelter, USA were sampled for *T. cruzi* antibodies. A total of 19 cats (11.4%) were seropositive. These variations in the prevalence may be due to differences in climatic conditions and methodologies.

A similar prevalence was observed in young cats, <1 year old and adult cats >1 year (8.33%)). Mohammed *et al*. (2022) found that the *Trypanosoma* infection in younger cats (45%) was significantly more than in older cats (16%) in Iraq. Ochieng *et al*. (2022) in Uganda found that there was no significant statistical difference in cat prevalence rate in relation to dog's age, sex, and site ($P > 0.05$) in *Trypanosoma* infection. Cardinal *et al*. (2018) in Argentina in human found that the seroprevalence of *Trypanosoma* infection among 691 residents examined was 39.8% and increased steadily with age, reaching 53-70% in those older than 20 years. Exact reason in the prevalence of infection in different age groups in cats is difficult to explain. But it could be due to an immunological phenomenon.

Females (10.0%) were more (1.66 times) susceptible to *Trypanosoma* spp. infection than that of males (6.25%). Ochieng *et al*. (2022) in Uganda found that there was no significant statistical difference in prevalence rate of canine African trypanosomiasis in relation to dog's age, sex, and site ($P > 0.05$). Mohammed *et al*. (2022) found that in Iraq with significant differences between females and males *Trypanosoma* spp and *T. evansi* infection. The infection rate was significantly ($p < 0.05$) higher in males (49.1%) compared with that in females (22.4%). This finding is very difficult to compare in cats. Slightly higher prevalence of infection in females than that of males could be due to alteration of physiological condition of cats during pregnancy and lactation. The body resistance in different sexes may have a role in this variation.

The prevalence of *Trypanosoma* spp. was recorded all the year round. The rate of infection was 7.6%, 8.33% and 9.1% during summer, rainy and winter seasons respectively. The infection rate is 1.1 times more likely in the rainy months than that of in the summer season. In winter season, the infection is 1.2 times more likely than in the summer season. Suganuma *et al*. (2022) in Japan found that the prevalence of *T. theileri* infection in dairy cattle was significantly higher in summer and winter seasons than in other seasons. Dumonteil *et al*. (2002) documented strong seasonal variations in *T. dimidiata* populations, with a higher abundance during the hot and dry season in April-June in Mexico. Mamoudou *et al*. (2016) in Cameroon found an overall trypanosomosis prevalence of 9% in the cattle. There were significantly ($P < 0.05$) more *Trypanosoma* infected cattle in the dry season than the rainy season. These results are difficult to compare. However, this variation in prevalence could be due to various climatic conditions in different seasons. The differences in the temperature, humidity and other environmental factors could have contributed to the variation in the infection rate of *Trypanosoma* spp.

Conclusion

The present study clearly indicates that *Trypanosoma* spp. infection is a problem in domestic and stray cats in Bangladesh. This infection might cause clinical disease in cats and cause public health risk to humans. Development of sustainable and cost-effective prevention and control strategies against *Trypanosoma* spp. is required and to achieve that further investigation is needed.

Conflict of Interest

The authors declared no conflict of interest.

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