Available online at www.sciencedirect.com
ScienceDirect
Veterinary Parasitology 147 (2007) 9–15
veterinary parasitology
www.elsevier.com/locate/vetpar

Follow-up of the health conditions of an urban colony of free-roaming cats (*Felis catus* Linnaeus, 1758) in the city of Rio de Janeiro, Brazil

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Received 5 February 2007; received in revised form 24 March 2007; accepted 27 March 2007

Abstract

Similar to other urban areas where food and shelter are abundant, the zoological garden of Rio de Janeiro has dealt for years with a colony of feral or semi-feral domestic cats. A survey was conducted during 2002–2004 as a follow-up to a previous study in 2001 of the cat colony to identify pathogens circulating among the population and to annually follow the status of the cats to analyze morbidity coefficients and associations among infections and infestations identified in the colony. During the 3 years of the present study, 75 cats were sampled at least once, including 44 that were caught and examined only once, 14 that were examined twice, and 17 that were examined three times. For each cat that was caught, records were kept regarding sex, age, general health, and the presence of ectoparasites. Each year, a blood sample was taken for hematologic testing, platelet count, hemoparasite detection, antibodies to *Toxoplasma gondii*, and retrovirus detection. Blood counts were within normal range for the majority of cats tested. Feline immunodeficiency virus, fleas, and lice were detected in all years; however, incidence rates for each of these varied significantly throughout the years. Prevalence of *Cytauxzoon* spp., *Mycoplasma* spp., *T. gondii* infections were variable among the 3 years, although differences were not significant. Prevalence of feline leukemia virus increased significantly over the 3 years. *Mycoplasma* spp. and flea infestations were significantly associated, but no other associations among the pathogens were detected. Over the 3 years, the rate of new cat introductions decreased, and the pathogens showed a tendency to disseminate throughout the colony; however, there was virtually no evidence of clinically detectable disease. Therefore, it seems that stabilizing the population by a judicious control program facilitated the distribution of the pathogens throughout the colony, while the general well-being of the cats was not seriously affected.

Keywords: Free-roaming cats; Retroviruses; Parasites; Sanitary conditions

1. Introduction

Among the pathogens circulating in domestic cat populations, *Toxoplasma gondii* (Nicole and Manceaux,

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doi:10.1016/j.vetpar.2007.03.035

1909) is, perhaps, the major public health concern. Toxoplasmosis is one of the zoonoses most frequently related to the presence of cats, which are a common source of oocysts in urban environments. Felines are generally asymptomatic but may develop nonspecific clinical signs, including fever, weight loss, dyspnea, polypnea, jaundice, abdominal discomfort, uveitis, or retinochoroiditis, if the disease manifests as toxoplasmosis (Dubey and Lappin, 2006). *T. gondii* is widely disseminated among mammals, known to be frequent among feral cats (Nutter et al., 2004) and detection of antibodies is an important screening tool to identify which cats have been previously infected because these animals are not expected to re-shed oocysts. Cats normally preserve their immunity and seldom re-shed oocysts (Martins and Viana, 1998; Dubey and Lappin, 2006), although there are isolated reports of cats that were previously seropositive that resumed shedding of oocysts (Dubey, 1995).

Arthropod-borne hemoparasites occur frequently in cats in Brazil (Almosny, 2002). *Mycoplasma haemofelis* (previously *Haemobartonella felis*) is a frequently diagnosed hemoparasite in cats of Rio de Janeiro (Neimark et al., 2001; Souza, 2002; Mendes-de-Almeida et al., 2004) that can cause hemolytic anemia and other nonspecific clinical signs (Tasker, 2001; Harvey, 2006; Tasker and Lappin, 2006). *Cytauxzoon felis*, a natural parasite of wild cats transmitted by ticks, can cause severe disease in domestic cats (Meinkoth, 2001; Bondy et al., 2005; Greene et al., 2006).

Cats are also susceptible to infections by viruses of different families, and persistent infections are often caused by viruses belonging to the family Retroviridae. Controlling transmission of these viruses is difficult because they are transmitted directly, causing both chronic and subclinical infections (Hartmann, 2006; Sellon and Hartmann, 2006). Feline leukemia virus (FeLV) exposes the infected host to highly malignant neoplasias. Detection of the virus may be intermittent, and transmission occurs through prolonged and intimate contact as well as by infected queens to her kittens either in utero or through the milk (Avery, 2001; Mehl, 2001; Hartmann, 2006). Cats infected with feline immunodeficiency virus (FIV) present with various clinical signs, depending on which opportunistic infection is present. The most common infections seen in these cats include calicivirus, herpesvirus, *Chlamydia* spp., *Mycoplasma* spp., and *T. gondii* (Sellon and Hartmann, 2006). Once cats develop detectable antibodies, they tend to remain seropositive.

There are few studies on the prevalence of diseases of free-roaming cat colonies worldwide. A colony of 52 free-ranging cats living on a farm in the United Kingdom had no animals infected with FeLV, *Chlamydia psittaci*, or *Ctenocephalides felis* (Yamaguchi et al., 1996). However, feline parvovirus antibodies were detected in 96% of cats, coronavirus antibodies in 84%, *T. gondii* antibodies in 62%, FIV antibodies in 53%, and poxvirus antibodies in 2%. *M. haemofelis* was detected in 42% of examined blood samples, and eggs of *Toxocara cati* (91%) and *Toxascaris leonina* (82%) were present in the feces. In the United States, a colony of 80 free-roaming cats living on the campus of the University of California, Davis were caught during a capture-neutering-release program. Among these animals, 12% were infected with *Mycoplasma haemominutum*, 8% with *Mycoplasma* spp., 54% by ascarids, 26% by tapeworms, and 13% by coccidia (Levy et al., 1999). During the 2001 study, pathogens shown to infect the free-roaming cats of the zoological garden of the city of Rio de Janeiro (RIOZOO) included piroplasms, *Mycoplasma* spp., and FIV (Mendes-de-Almeida et al., 2004). The only ectoparasite species found was *C. felis*. No FeLV antigens were detected.

Since domestic cats can transport pathogens between cages, which jeopardizes the health and well-being of the zoo animals, RIOZOO has attempted unsuccessfully to eliminate the presence of the free-roaming cat colony. Therefore, the present survey was carried out in an attempt to monitor the circulating pathogens in the cat colony to assist the RIOZOO in the development of adequate management protocols, which includes a program for hysterectomy of captured female cats (Mendes-de-Almeida et al., 2006).

2. Material and methods

2.1. Animals

The present study, conducted from 2002 to 2004, included domestic cats inhabiting the zoological garden of the city of Rio de Janeiro (RIOZOO), which occupies 13.8 ha in a municipal park located at 23°54′S and 43°13′W at an altitude of 44 m.

Each year, animals were caught once a week in the morning (06:00–10:00) or in the evening (17:00–20:00), from June to August using three hand nets and three one-door Tomahawk-traps (Mendes-de-Almeida et al., 2004, 2006). On each trapping day, five people operated the hand nets and the traps, attempting to capture as many cats as possible.