Veterinary Parasitology 171 (2010) 163–166

Contents lists available at ScienceDirect

Veterinary Parasitology

journal homepage: www.elsevier.com/locate/vetpar

Short communication

Prevalence of endoparasites in household cat (*Felis catus*) populations from Transylvania (Romania) and association with risk factors

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ARTICLE INFO

Article history:
Received 16 September 2009
Received in revised form 1 March 2010
Accepted 4 March 2010

Keywords:
Endoparasites
Household cats
Protozoa
Helminths
Zoonosis
Romania

ABSTRACT

There is no current information regarding the prevalence of parasites in Romanian cats. Consequently, we conducted a study to evaluate the prevalence of endoparasites in a sample of household cats in the Transylvania region, to point out the risk factors for parasite infection and to evaluate the knowledge of cat owners about the zoonotic potential of some parasites. Four hundred fourteen faecal samples were collected and examined by sodium chloride flotation followed by microscopy. Also, questionnaires were administered to cat owners (196). The overall prevalence of endoparasites in household cats was 34.3% (142/414; CI 29.8–39.1). Concurrent infections with two or more parasites were recorded in 17.6% cats. The detected parasites were *Toxocara cati* (20.3%), *Ancylostoma* spp. (10.1%), *Isospora rivolta* (8.9%), *Isospora felis* (5.3%), *Aelurostrongylus abstrusus* (5.6%), *Strongyloides* spp. (3.4%), *Capillaria aerophila* (3.1%), *Taenia taeniaeformis* (2.7%), *T. gondii*/*H. hammondi* (1.2%), *Sarcocystis* spp. (1%), *Giardia duodenalis* (0.7%) and *Dypillidium caninum* (0.2%). Risk factors for infection with parasites in cats were identified to be age and medium (rural or urban area). Thus, *I. felis*, *I. rivolta* and *T. cati* were more common in cats less than/equal to 1-year old, and *Ancylostoma* spp. and *A. abstrusus* were more prevalent in cats older than 1-year of age. 72.4% of the owners applied anthelmintic treatments to their cats, more commonly in urban areas (87.3%) (4 treatments/year) than in rural areas (12.7%) (1 treatment/year). 66.3% of the owners knew about the zoonotic potential of some parasites from cats, and the main source of information was veterinarians (65.4%). In conclusion the prevalence of endoparasites in household cats from Transylvania is high. Consequently, consideration should be given to the use of anthelmintics and to pet owner education.

1. Introduction

Gastrointestinal parasitism is one of the main causes of morbidity in domestic dogs and cats (Hendrix and Blagburn, 1983). Among feline intestinal parasites, *Toxoplasma gondii*, *Giardia duodenalis*, *Cryptosporidium* spp., *Sarcocystis* spp., *Echinococcus multilocularis*, *Toxocara cati*, *Ancylostoma* spp. and *Strongyloides* spp. have zoonotic potential.

The prevalence of intestinal parasites can vary due to geographical region, presence and frequency of veterinary care, season of the year and the type of population of cat (stray, feral, shelter, household).

In Romania, little information on the prevalence of endoparasites in cats is available. Most of them are data obtained during efficacy evaluation of some anthelmintic products (Şuteu et al., 1993). The aim of our study was to determine the prevalence of endoparasites in household cats from Transylvania according with age, gender, habitat and medium. Also, anthelmintic treatments provided

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doi:10.1016/j.vetpar.2010.03.005

(frequency in a year), the owner knowledge of zoonotic parasites and sources of information were investigated.

2. Materials and methods

During a period of 2 years (2007–2009), faecal samples were collected from 414 household cats in different counties from Transylvania. The information collected on each animal included age (169 young cats, ≤1-year old; 245 adult cats, >1-year old), gender (227 females; 187 males), breed (347 mixed-breeds and 67 pure-breeds), medium (285 from urban and 128 from rural areas) and habitat (152 indoor cats; 262 oudoor cats).

Owners were asked to fill in a questionnaire and 196 of them provided information about the cats' health, anthelmintic treatments provided, the treatment frequency per year, knowledge about parasitic zoonosis and source of information.

The faecal samples were examined for parasites by sodium chloride flotation followed by microscopy.

The prevalence and frequency distribution of overall infection and of each parasite were tested by EpiInfo 2000 software. Logistic regression was used to quantify the association between infection with each identified parasite and risk factors (age, gender, medium and habitat). The risk factors remained in the logistic regression analysis if the goodness of fit of the model was significant ($p \leq 0.05$).

3. Results

The overall prevalence of infection with endoparasites in household cats was 34.3% (142/414). 17.6% (73/414) of cats were infected with multiple species and 16.7% (69/414) with only one species of parasite. Overall protozoa and helminth infections were 25.6% and 27.5%, respectively. Overall helminth infection was more prevalent in rural areas (63.3%) than in urban areas (11.5%).

Cats were infected with the following parasites: *G. duodenalis*, *Isospora rivolta*, *Isospora felis*, *T. gondii*/*H. hammnondi*, *Sarcocystis* spp., *Dypilidium caninum*, *Taenia taeniaeformis*, *T. cati*, *Ancylostoma* spp., *Capillaria aerophila*, *Strongyloides* spp. and *Aelurostrongylus abstrusus*. The most prevalent species were *T. cati*, *Ancylostoma* spp. and *I. rivolta*. Their individual frequency and prevalence according with age, gender, medium and habitat are shown in Tables 1 and 2.

Risk factors for infection with parasites in cats were identified to be age (OR = 0.42; $p = 0.0005$), and rural area (OR = 7.59; $p = 0.00001$). Infection with *I. felis* (OR = 0.09; $p = 0.0001$), *I. rivolta* (OR = 0.46; $p = 0.03$) and *T. cati* (OR = 0.39; $p = 0.0007$) was more common in cats less than/equal to 1-year old and infection with *Ancylostoma* spp. (OR = 4.04; $p = 0.0008$) and *A. abstrusus* (OR = 2.95; $p = 0.03$) was more prevalent in cats greater than 1-year of age. Most of the parasites were significantly more frequent in rural areas than in urban areas (*Sarcocystis* spp., *I. rivolta*, *T. taeniaeformis*, *T. cati*, *Ancylostoma* spp., *C. aerophila*, *Strongyloides* spp. and *A. abstrusus*). Access of cats outside was also a risk factor for infection with *T. cati*.

72.4% (142/196) of the owners applied anthelmintic treatments to their cats, more commonly in urban areas (87.3%) (4 treatments/year) than in rural area (12.7%) (1 treatment/year). Among dewormed cats only 3.2% were infected with nematodes in urban areas, compared to 77.8% in rural areas. The most commonly used anthelmintics were praziquantel with pyrantel embonate (Cestal cat/CEVA) (52.2%) and praziquantel with pyrantel pamoat (Biheldon/GolashPharma, Bulgaria) (27.5%).

Table 1
The frequency, prevalence and 95% confidence interval (95% CI) of individual parasites by microscopy.

	Frequency ($n = 414$)	Prevalence (%)	95% CI
Giardia duodenalis	3	0.7	0.2–2.3
Sarcocystis spp.	4	1	0.3–2.6
T. gondii/*H. hammondi*	5	1.2	0.4–3
Isospora felis	22	5.3	3.4–8.1
Isospora rivolta	37	8.9	6.5–12.2
Taenia taeniaeformis	11	2.7	1.4–4.8
Dypilidium caninum	1	0.2	0–1.6
Toxocara cati	84	20.3	16.6–24.6
Ancylostoma spp.	42	10.1	7.5–13.6
Capillaria aerophila	13	3.1	1.8–5.4
Strongyloides spp.	14	3.4	1.9–5.7
Aelurostrongylus abstrusus	23	5.6	3.6–8.3
Overall protozoa	106	25.6	21.5–30.1
Overall helminth	114	27.5	23.3–32.2
Total parasite infection	142	34.3	29.8–39.1

Parasites with zoonotic potential were detected in 114 (27.5%; CI 23.3–32.2) faeces samples, including *G. duodenalis*, *Sarcocystis spp*, *T. gondii*/*H. hammondi*, *T. cati*, *Ancylostoma* spp., *Strongyloides* spp. 66.3% (130/196) of the owners knew about the zoonotic character of some parasites from cats and the main sources of information were vets (65.4%), followed by the media (36.6%).

4. Discussion

The prevalence of endoparasite in household cats from Transylvania region (Romania) was high (34.3%), and was associated with rural areas (69.5%), access of cats to outside (45.8%) and young age (46.2%). These findings are similar to those obtained in previous studies (Hill et al., 2000; Spain et al., 2001; McGlade et al., 2003). The true prevalence may be much higher because faecal samples were collected once only and egg/cyst shedding is intermittent. The most likely reason for the high parasite burden is the lack or absence of anthelmintic treatments and the access of cats to contamination sources. McGlade et al. (2003) found that for each anthelmintic treatment given in a year, the risk of parasitism decrease by 0.2 times.

The prevalence found by this survey is higher than in countries from west Europe, America and Australia, and lower than in countries from South America, Middle East and Africa. Prevalence of parasites has been reported as 24.3% in Germany (Barutzki and Schaper, 2003), 28% in Spain (Miró et al., 2004), 24.6% in USA (Carleton and Tolbert, 2004; Shukla et al., 2006) 58.3% in Argentina (Sommerfelt et al., 2006), 65% in necropsied cats from South Africa (Baker et al., 1989) and 80.3% in Quatar (Abu-Madi et al., 2008). The lowest prevalence was reported in Australia, between