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Asian Journal of Animal and Veterinary Advances

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Asian Journal of Animal and Veterinary Advances 6 (6): 642-647, 2011
ISSN 1683-9919 / DOI: 10.3923/ajava.2011.642.647

Prevalence and Intensity of *Otodectes cynotis* in Client-owned Cats in Ahvaz, Iran

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ABSTRACT

The objective of this study was to determine the prevalence of *Otodectes cynotis* in referred client-owned cats to Veterinary hospital of Ahvaz University, from January 2009 to February 2010. A total of 122 cats were examined in this study. The studied cats were divided into three groups based on age (<1 year, 1-3 years and >3 years). Breed, sex and session were scheduled for ectoparasite examination and sample collection. All cats were examined using an otoscope and otic cotton-tipped applicator, in order to identify the presence of *Otodectes* in the ear canal. In all positive cats, a washing of the ear using lukewarm water was performed in order to detect intensity of infection. Twenty eight out of 122 referred cats (22.95%) were positive for *O. cynotis*. Prevalence was higher in male cats (25%; 15 out of 60) than females (20.96%; 13 out of 62), aged above 3 years (40%; 6 out of 15) and in the season of winter (32.14%; 18 out of 56). The difference was not significant relative to host gender and age ($p>0.05$), but there was a significant difference between winter and summer season ($p<0.05$). Intensity of infection ranged between 5 and 33 (mean intensity 16.54) mites per infected cat. *Otodectes cynotis* was only the ectoparasite in ear canal of cats in this area. To the best of our knowledge this is the first study conducted in client-owned cats of Ahvaz district, South-west of Iran that examined the prevalence of *O. cynotis* infestations.

Key words: *Otodectes cynotis*, infestation, prevalence, intensity, ear manage

INTRODUCTION

Otoacariosis is caused by *Otodectes cynotis* (known as ear mite or ear canker mite), which belongs to the family Psoroptidae. They are highly contagious and occur worldwide. *Otodectes cynotis* is an obligate parasite which inhabits the vertical and horizontal ear canals of dogs and cats, although other species such as ferrets may become infested (Wall and Shearer, 2001; Scott *et al*., 1993; Chee *et al*., 2008). Ear mites of the genus *Otodectes* from different hosts and geographical origins belong to a single species, *O. cynotis* (Lohse *et al*., 2002). It does not burrow but lives on the surface of the skin. The mites feed on epidermal debris and tissue fluid from the superficial epidermis. In this way, the host is exposed to and immunized against mite antigen. There is no delayed hypersensitivity but a reaginic antibody develops early in the disease and precipitating antibodies later in its course. Environmental factors affecting survival off-the-host of *O. cynotis* (Scott *et al*., 1993; Otranto *et al*., 2004). The mite *O. cynotis* feed on organic matter and may stay viable for long periods of time in favorable environmental conditions that had been

occupied by infested animals (Coleman and Atwell, 1999). Human infestation with *O. cynotis* (transient popular dermatitis) has also been reported (Scott *et al.*, 1993). Animals infested with *O. cynotis* most commonly develop otitis externa characterized by vertical and horizontal canal erythema and dark brown, ceruminous otic exudates. In addition to otitis externa, ectopic infestations of the head, neck, tail head and rarely the trunk can occur when mites escape the ear canals and papulocrustous lesions (miliary dermatitis) may be observed. Superficial skin scraping is useful for finding surface mites such as *O. cynotis* (Weese *et al.*, 2002; Hill, 2002). Kittens appear to be most susceptible to otoacariosis, as older animals may acquire immunity. The mechanical irritation caused by the presence of the mites inside the ears may lead to a higher activity of ceruminal glands and, consequently, the establishment of a favorable environment for secondary infections by bacteria or fungi. Pruritis primarily located around the ears, head and neck; occasionally generalized (Scott *et al.*, 1993; Rhodes, 2002). Clinical importance of *O. cynotis* in pets is very high, as it is estimated that 85% of otitis externa cases in cats are caused by this mite (Wall and Shearer, 2001). Despite the importance of mites as causing agents of external otitis, scarce information is available on the epidemiology of *O. cynotis* in cats. Lack of descriptive epidemiology of *O. cynotis* infection in cats was also noted by other authors (Souza *et al.*, 2008). Of course Lefkaditis *et al.* (2009) reported infestation of 14.02% to *O. cynotis* in kittens from Greece. The results of this study can be important for pet clinicians. The objective of this study was to determine the prevalence and intensity of *O. cynotis* in client-owned cats in Ahvaz District, South-West of Iran.

MATERIALS AND METHODS

In the present investigation, *O. cynotis* was obtained from 122 client-owned cats [109 Domestic Short Hair (DSH), 12 Persian and 1 Domestic Long Hair (DLH)] during the four time periods. Samples were collected from 32, 22, 12 and 56 cats in spring, summer, autumn and winter seasons respectively. They had age range 2 months-11 years and were referred to Veterinary Hospital of Ahvaz University, in southwestern Iran from January 2009 to February 2010. This area is located at an elevation of 12 m above sea level and the climate is warm-humid. They were referred mainly for a healthy check up and vaccination. The studied cats were divided into three groups based on age (<1 year, 1-3 years and >3 years). Classification was made by sex, breed and season also. Age was estimated by dental formulary and owner information's. The examination and collection occurred immediately after induction of anesthesia using Ketamine 5% (10 mg kg^{-1}) and Acepromazine 1% (0.15 mg kg^{-1}). All cats were examined using an otoscope and otic cotton-tipped applicator, in order to identify the presence of *O. cynotis* in the ear canal. They were examined by a complete examination of the skin, clinical trials and skin scraping with mineral oil and scalpel blade for the detection of ectopic infestations of *O. cynotis*. In all positive cats, a washing of the ear using lukewarm water was performed in order to detect intensity of parasitism. For this purpose, using a 10 mL syringe, we introduced the lukewarm into the ear canal and all debris was collected into a Petri dish. This washing was subsequently examined using a binocular microscope and all mites were counted. Dermatologic findings (such as severe pruritis and debris or exudates in ear canals) were recorded for each cat examined throughout the study. All ear specimens were examined microscopically (at 40x for detection and 400x for species identification) within 24 h with mineral oil for the presence of mites. The visual presence of mite movement or black ceruminous exudates was indicative of *O. cynotis*, of course, not in all cases. Finally all samples were microscopically identified at 40x to species using the key provided by Soulsby (1982).

Statistics: Cats were grouped by age, sex, breed, intensity of infection and season to determine whether these factors were associated with *O. cynotis* infestation, using chi-square analysis and Fisher's exact test. Statistical comparisons were carried out using SPSS 16.0 statistical software. Differences were considered significant when $p<0.05$.

RESULTS

Twenty eight out of 122 referred cats (22.95%) were positive for *O. cynotis* (Fig. 1). Intensity of infection ranged between 5 and 33 (mean intensity 16.54) mites per infected cat. Variation of intensity by age and sex category is shown in Table 1. Prevalence was higher in adult cats above 3 years (40%; 6 out of 15) and 1-3 years (25.80%; 8 out of 31) compared with cats less than 1 years (18.42%; 14 out of 76), but the difference was not significant between different age groups ($p>0.05$). Prevalence was higher in male cats (25%; 15 out of 60) than females (20.96%; 13 out of 62) and in the season of winter (32.14%; 18 out of 56). Prevalence in other seasons (spring, summer and autumn) was, 21.88% (7 out of 32) and 4.54% (1 out of 22) 16.66% (2 out of 12), respectively. The difference was not significant relative to host gender ($p>0.05$), but there was a significant difference between winter and summer season ($p<0.05$). Most of infestations were in DSH cats (92.86%; 26 out of 28), without significant difference. Some of the infected cats (64.29%; 18 out of 28) showed the typical signs of mite infestation, such as severe pruritis and debris or exudates in ear canals. Otoscopic examination of both ears revealed mite movement and black ceruminous exudates in 15 out of 28 (53.57%) cats. Mite movement was not visibly seen in all cats even with the typical black ceruminous exudates. All skin scraping were negative for ectopic infestations. There was an association between the living environment and *O. cynotis* infestation, with higher

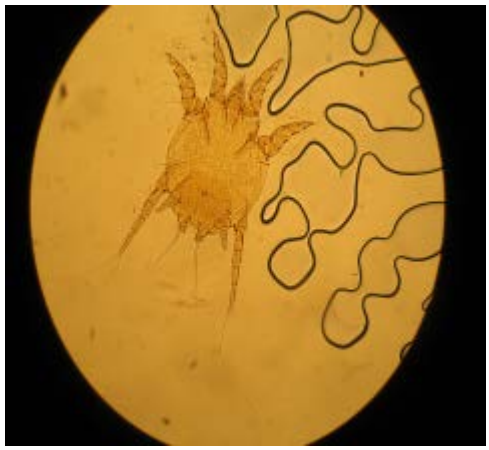

Fig. 1: The picture of ectoparasite (*O. cynotis*) found in client-owned cats of Ahvaz district, Iran

Table 1: Prevalence and intensity of *O. cynotis* infestation in the studied cats based on different ages and sexes in Ahvaz district, South-west of Iran, 2009-2010

Parameters	Females	Males	>3 years	1-3 years	<1 years	Total
Examined	62	60	15	31	76	122
Positive (%)	13 (20.96)	15 (25)	6 (40)	8 (25.8)	14 (18.42)	28 (22.95)
Intensity range (mean intensity)	7-28 (15.85)	5-33 (17.13)	7-28 (15.33)	7-28 (16.75)	7-28 (16.93)	5-33 (16.54)

prevalence in animals that had access to outside environment (89.29%; 25 out of 28). The average temperature for spring-winter was 29.83, 37.26, 23.2 and 17.86°C, respectively, in Ahvaz district. The average relative humidity for spring-winter was 31.0, 23.66, 52 and 61.66% also.

DISCUSSION

The present study that is the first report on prevalence of infestation in client-owned cats in Ahvaz district, Iran, revealed that 22.95% of the cats were infested to *O. cynotis*. The examination of the cats revealed infestation with only one species of ectoparasite, *O. cynotis*. These results indicate that infestation to *O. cynotis* is relatively common in cats of this area, as many parts of the world. No evidences were provided to support that age, sex and breed are potential factors of risk for *O. cynotis* infestation. Although utilization of an otoscope for the diagnosis of ear mite might has increased the detection rates of these mites, the skin scraping technique is necessary for ectopic infestations, of course there was a not ectopic infestation in the present study. These results were similar to research of Akucewich *et al.* (2002) that all superficial skin scrapes were negative.

In some studies, it is shown that kittens between 3-6 months were more susceptible to ectoparasite infestations, compared with kittens below 3 months (Lefkaditis *et al.*, 2009). Kittens appear to be most susceptible to ectoparasites, because older animals may acquire immunity (Lopez *et al.*, 2005). In contrast, in the present study, the higher prevalence was seen in cats above 3 years than cats below 3 years, of course the difference was no significant between age groups. In the present survey, we found that the prevalence of infestation was more frequent in male dogs (25%) than females (20.96%) without significant difference. This is similar to results of other researchers, who suggested that both sexes are susceptible (Lefkaditis *et al.*, 2009; Souza *et al.*, 2008; Xhaxhiu *et al.*, 2009). According to our studies and others, *O. cynotis* can be considered a prevalent parasite in client-owned cats in temperate regions. A prevalence of 33% was found in Oklahoma, USA, by Tonn (1961). In Canada, in an extensive study done in Ontario, more than 50% of the ectoparasitic infections in cats were Otodectes (Slocombe, 1973). In Australia, Coman *et al.* (1981) found a prevalence of less than 1% in feral cats. In Southern Europe, Sotiraki *et al.* (2001) reported a prevalence of 25.5% in adult cats from Greece. Akucewich *et al.* (2002) found a prevalence of 22.5% in Florida, USA. Lefkaditis *et al.* (2009) reported that of the 214 kittens examined, 30 (14.02%) were infected with *O. cynotis*. Duarte *et al.* (2010) revealed that of the 182 stray cats, 4 (2.2%) were infected to this mite.

The differences on the prevalence of *O. cynotis* can be partially explained by the use of different diagnostic methods, by the sampling procedures used and by the origin of the animals. Intensity of infection ranged between 7 and 85 mites for *O. cynotis* (Lefkaditis *et al.*, 2009) and 1-9 for *Ctenocephalides felis* (Xhaxhiu *et al.*, 2009). In the present study, intensity of infection ranged between 5 and 33 (mean intensity 16.54) mites per infected cat. Variation of intensity was relatively similar between different age and sex groups (15.33-17.13).

Companion cats that do not receive veterinary care have an increased likelihood of interacting and living in close contact with multiple cats where potential transmission may be higher. Sotiraki *et al.* (2001) showed that cats with mild-to-moderate degree of infestation had higher chance of exhibiting an ear discharge than those with a severe infestation.

There was an association between the living environment and *O. cynotis* infestation, with higher prevalence in animals that had access to outside environment in the present study and this was similar to research of Souza *et al.* (2008). Many authors have cited the direct contact with other animals as the most frequent method of *O. cynotis* transmission (Sampaio, 2002). It is indicating that low contact to other animals is an important factor in prevention of infestation.

It was shown that development of clinical signs reflects allergic hypersensitivity on the part of the host to antigenic substances introduced while the mites are feeding. This can lead to highly variable responses ranging from asymptomatic or mild cases to severe otitis (Lefkaditis *et al*., 2009). Sotiraki *et al*. (2001) reported that many infested cats were asymptomatic, having normal ear canal appearance with mild ceruminous. In the present study, 64.29% of the studied cats showed the typical signs of mite infestation. Mean of temperature and relative humidity were noted during the collection period in our study. Among the 28 positive cats, the highest involvement was recorded in winter season (32.14%) and the difference was significant between winter and summer seasons. Its may be due to high density of animals and low bathing in winter season.

Inflammation, exudates and secondary infection create a difficult environment for these mites to survive, stimulating them to exit the ear canal or die (Scott *et al*., 1993). This may result in significantly lower numbers of mites in an infested animal, therefore, making it more difficult to identify the mites on otoscopic exam alone (Scott *et al*., 1993). However, infested cats can be asymptomatic (Sotiraki *et al*., 2001). It has been previously reported that the majority of parasitized cats will have the suggestive ear discharge, however, a smaller percentage will not. It is possible that these cats had a more recently acquired ear mite infestation (Sotiraki *et al*., 2001).

The most common clinical signs in the present study were excess debris and exudates with pruritis in ear canals of cats. In present study, an otoscopic examination didn't reveal the presence of mite movement, discharge or inflammation to confirm the diagnosis of *O. cynotis* in all cases. Mite movement was not visibly seen in all cats even with the typical black ceruminous exudates. It is important to emphasize that examining an ear sample by cotton-tipped applicator must be done to enhance making an accurate diagnosis of *O. cynotis*. The use of an effective flea control product that stays on the animal for several days helps to control the spread of mites to other parts of the body. To prevent the possibility of continued transmission of ectoparasites from pet animals, practicing veterinarians should advice pet owners to pay attention to and be aware of ectoparasites of zoonotic importance.

CONCLUSION

To the best of our knowledge this is the first study conducted in Ahvaz district, South-West of Iran, that examined the prevalence of infestation to *O. cynotis* in a cat population, however, this survey was limited to the Ahvaz area and additional studies are required to complement these findings and help veterinarians prepare a complete program for the control of these parasite populations and their associated diseases.

ACKNOWLEDGMENT

We would like to mention the greatly appreciation of Research Council of Shahid Chamran University of Ahvaz for the financial support.

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