Prevalence and Risk Factors of *Otodectes cynotis* in Cats in Bangladesh

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By:

Saima Akter

Roll No: 17/08

Reg No: 01826

Intern ID: 06

Session: 2016-17

Faculty of Veterinary Medicine

Chattogram Veterinary and Animal Sciences University
Khulshi, Chattogram – 4225, Bangladesh

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Approved by:

(DR. Paritosh Kumar Biswas)

Professor

Department of Microbiology and Veterinary Public Health

Faculty of Veterinary Medicine

Chattogram Veterinary and Animal Sciences University
Khulshi, Chattogram – 4225, Bangladesh

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Abstract

Otodectes cynotis is extremely contagious and has zoonotic properties. It is the second most significant external parasite of pets. The present study was accomplished at the Teaching and Training Pet Hospital and Research Centre, Dhaka, from February to July 2022. The study aimed to know the prevalence and risk factors of *Otodectes cynotis* in pet cats. In this study, a total of 65 cats were examined for the presence of the parasite. In addition, epidemiological data were collected from the owners of the pets by interviewing them with questionnaire designed for the study. The final diagnosis of the mites in ear wax collected was made by microscopic examination. The results revealed that the prevalence of ear mite infestation in the cats investigated was 46.15%. The epidemiological data collected were divided into two categories: one was on demographic/population basic information related which included source of purchase, number of cats, age, BCS, neutered, types of hair, interaction with other cats/dogs), and the other was health-related which included ear hygiene, vaccination, deworming, and use of antibiotic therapy. Univariable analysis revealed age of cat -- less than one-year, poor BCS, interaction with other cats/animals, lack of ear hygiene practice, not vaccinated timely, and not dewormed as the risk factors for *Otodectes cynotis* in pet cats in Bangladesh.

Key words: Pet cat, *Otodectes cynotis*, Prevalence, Risk factors

1. Introduction

Ectoparasites are a frequent and significant contributing factor for both pruritic and non-pruritic skin problems in pets. They can infect animals with several diseases and lead to hypersensitive conditions (Bahrami et al., 2012). One of the most common ectoparasites in pets is Ear mites and is also considered the second most frequent external parasite (VCA).

In cats, ear mite infestation occurs mainly by *Otodectes cynotis*. It is a significant, widely distributed ectoparasite that causes 50% to 84% of feline otitis externa globally (Acar & Altinok Yipel, 2016). *Otodectes cynotis* is a non-burrowing and white parasite that is a member of the Psorptidae family (Maazi et al., 2010). Ear mite infestation is a contagious disease and is thought to have zoonotic characteristics (Kato, T., et al., 2011). This mite's host range included cats and dogs, foxes, ferrets, and infrequently humans (Viroj, 2012). Adult dogs, rabbits, and ferrets are all susceptible to ear mite infections from cats (Ahaduzzaman, 2014).

O. cynotis has a 3-week life cycle that is contained in cats' ear canals **(**Yang & Huang, 2016). The cat's tail may have ear mites because cats often sleep with their heads curled up (Mani et al., 2011). The egg hatches after four days of incubation and passes through four phases- larva, protonymph, deutonymph, and adult (Miller, W. H., et al., 2012). Depending on the temperature, the mites can live in the environment for up to 12 days, and a duration of 3–4 days was predicted for their infectivity away from the host (Yang & Huang, 2016).

The mite doesn't burrow; instead, it feeds on epidermal debris that irritates the ear and causes erythema and varied pruritus of the ear canal (Miller, W. H., et al., 2012). Infected ear canals with *O. cynotis* typically have dark brown cerumen when examined clinically (Perego et al., 2014). The relationship between clinical signs and the number of *O. cynotis* can be erratic (Bowman A., 2014). Early-stage *Otodectes cynotis* can also go undetected: In metropolitan regions of Greece, 14% of kittens up to 6 months old were found to be ear mite-positive despite showing no symptoms of otitis external (Lefkaditis et al., 2009). The mite can cause secondary bacterial and fungal infections, with *Staphylococcus* spp. and *Malassezia* spp. being the most often isolated pathogens (Roy et al., 2012). Otohematoma is another common adverse effect of such infestation in cats. Local inflammation may result from a hypersensitivity reaction coupled with irritation driven by *O. cynotis* activity (Roy et al., 2011).

In a study done in Greece, 25.5% of owned cats tested positive, with age being a risk factor **(**Beugnet et al., 2014). *O. cynotis* was shown to be the primary factor in external otitis in 53.3% of the 1087 stray cats evaluated in another Italian study (Perego et al., 2014). So, it can be said that *O. cynotis* infestation has a serious clinical significance for cats. Therefore, the objectives of this study were:

- To know the prevalence of ear mite (*O. cynotis*) infestation in cats in Bangladesh; and
- To identify the risk factors associated with ear mite infestation in pet cats

2. Materials and Methods

2.1 Study design

This study was conducted at the Teaching and Training Pet Hospital and Research Centre (TTPHRC), Purbachal, Dhaka, from February to July 2022. The information was gathered from owners of the cats that were registered to the hospital for routine checkups, vaccinations, deworming, and treatment purposes. A pre-structured questionnaire was used to collect epidemiological data from the owners of the cats by taking interviews with the questionnaire developed along with examining the cats physically.. In total, 65 cats were investigated for the study.

2.2 Data collection process and tools

Owners were interviewed in person about the study's goals according to a predetermined interview schedule to collect the data. Throughout the course of the study, data on a variety of qualitative and quantitative parameters, including general information about the cats (source of purchase, number of cats, age, BCS, sex, neutering, breed, type of hair, interaction with other cats/animals, etc.), and the health status of the cats (ear hygiene, vaccination, deworming, use of antibiotics, etc.), were gathered.

2.3 Sample collection and microscopic examination

Ear wax as a sample was collected directly from the ear channel (both ears) through cotton and then kept in a clear slide (Fig. 1, Fig.2). The sample was examined as described by Peregrine (2007). By pouring 1-2 drops of paraffin onto a glass microscope slide, this material was inspected under a microscope to ascertain the presence or absence of living mites and eggs of mites.

Figure 2: Dark brown ear wax

Figure 2: Collection of samples from the ear

The mite was identified by observing the first and second pairs of legs, unjointed pedicels, the decreased fourth pair of legs and the third & fourth pairs of legs with a pair of terminal whip-like setae (Wall, R. L., & Shearer, 2008) (Fig. 3). The egg of the mite was diagnosed by seeing an oval shape with a dark embryonated mass under the microscope (Dvm et al., 2022) (Fig. 4)

Figure 3: Dorsal view of *Otodectes cynotis*

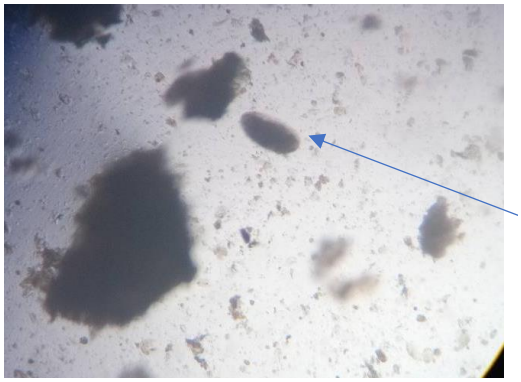

Figure 4: Egg of *Otodectes cynotis*

2.4 Data analysis

All data were sorted and imported into a spreadsheet. The association of ear mite infection with a risk factor was determined by using chi-square test, and significance of a risk association was based on $p<0.05$.

3. Results

3.1 Overall prevalence of *Otodectes cynotis* infestation

In this study, 30 out of the 65 cats were found to be infested with O*todectes cynotis* mite. So, the overall prevalence of *Otodectes cynotis* infestation was 46.15% (Fig. 5).

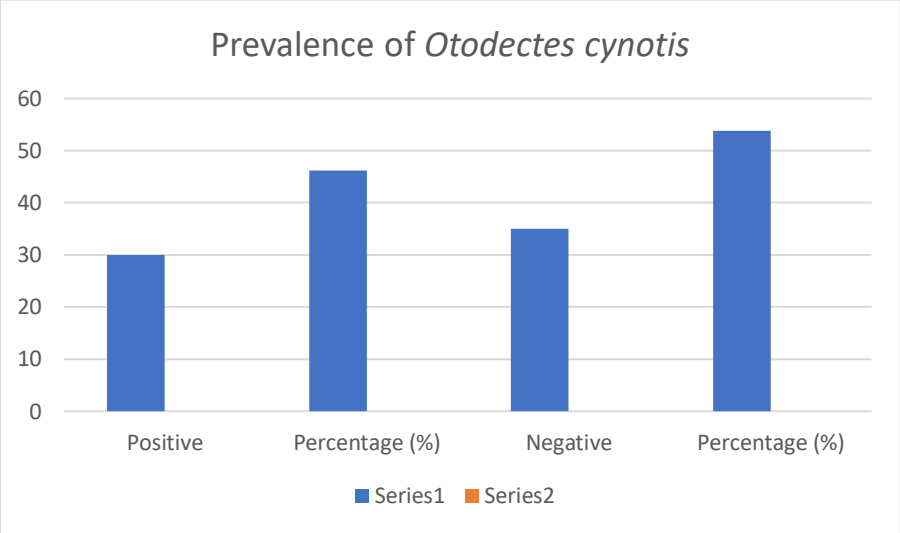

Figure 5: Prevelance of *Otodectes cynotis*

3.2 Risk factors associated with *Otodectes cynotis* infestation

The frequency and basic information-related risk factors in cats, such as sources of purchase, no. of cats, age, BCS, sex, neutered, breed, types of hair, and interaction with other cats/animals associated with *Otodectes cynotis* infestation are shown in Table 1. Young age – less than one year, poor BCS and interaction with other cats or animals had significant association with *Otodectes cynotis* infestation in the cats studied.

Table 1: Basic risk factors associated with ear mite infestation

Explanatory variable	Co-variable	Frequency (N)	Positive	Prevalence (%)	Negative	Prevalence (%)	P-value
Source of purchase	Adopt	29	12	41.38	17	58.62	0.743
	Stay	17	8	47.06	9	52.94	
No. of cat	1-2	22	6	27.27	16	72.73	0.107
	3	30	15	50	15	50	
	>3	13	9	69.23	6	46.15	
Age	Young	38	24	63.16	14	36.84	0.003*
	Adult	18	5	27.78	13	72.22	
	Old	9	1	11.11	8	88.89	
BCS	Poor	28	19	67.86	9	32.14	0.005*
	Good	34	11	32.35	23	67.65	
	Obese	3	0	0	3	100	
Sex	Male	33	16	48.48	17	51.52	0.531
	Female	32	18	56.25	14	43.75	
Neutered	Yes	27	14	51.85	13	48.15	0.437

	No	38	16	42.11	22	57.89	
Breed	Persian	37	20	54.05	17	45.95	0.195
	Local	22	9	40.91	13	59.09	
	Cross	6	1	16.67	5	83.33	
Type of Hair	Smooth	22	7	31.82	15	68.18	0.237
	Coarse	27	15	55.56	12	44.44	
	Irregular	16	8	50	8	50	
Interaction with other cats/animals	Yes	37	23	62.16	14	37.84	0.017*
	No	28	7	25	16	57.14	

3.3 Health status-related risk factors associated with *Otodectes cynotis* infestation

The frequency, prevalence and the health-related risk factors associated with *Otodectes cynotis* infestation in cats are shown in Table 2. Three health related risk factors that were positively associated with *Otodectes cynotis* infestation were lack of ear hygiene maintenance, not vaccinating the cats and also not practicing regular deworming

Table 2: Heath-status related risk factors associated with ear mite infection in cats

Explanatory variable	Co-variable	Frequency	Positive	Prevalence (%)	Negative	Prevalence (%)	P-value
Ear hygiene	Yes	27	8	29.63	19	70.37	0.024*
	No	38	22	57.89	16	42.11	
Vaccination	Yes	41	11	26.83	30	73.17	0
	No	24	19	79.17	5	20.83	
Deworming	Yes	28	8	28.57	20	71.43	0.013*
	No	37	22	59.46	15	40.54	
Antibiotics	Yes	22	7	31.82	15	68.18	0.097
	No	43	23	53.49	20	46.51	

4. Discussion

Otodectes cynotis is a significant external parasite that infects cats (Miller, W., et al., 2012). The results of this study revealed that the prevalence of this mite in cats in Bangladesh would be as high as 46%. A similar prevalence of the mite in cats was reported earlier by Degi et al.(2010).

Basic and population risk factors, such as source of purchase of cat, no. of cat, age, BCS, sex, neutered condition, breed, type of hair, and interaction with other cats/animals and their individual association with ear mite infestation are shown in Table 1. In case of a source of purchase the highest prevalence of ear mite infestation was found in cats that were bought from a pet shop (52.63%) and the lowest was found in adopted cats (41.37%). But there was no significant risk association found between the source of purchase with ear mite infection. For those owners who had more than 3 cats (69.23%) the ear mite infestation was higher than those who had less than 3 cats (50% and 27.27%), but it was not a statistically significant factor for the ear mite infestation.

In this study, young cats (63.15%) were mostly affected by the ear mite than adults (27.77%) (Table-1), and it supported the previous work which revealed that cats of all ages can be affected by *Otodectes cynotis*, but because it is transmitted from infected mother to kittens, it is most usually found in cats under the age of one year (Salib & Baraka, 2011) (Gross, T. L. et al, 2008). Young age (less than one year of age) was found to be a risk factor for ear mite infestation in this study. Some earlier studies showed that both males and females are vulnerable to *Otodectes cynotis* infestation (Souza et al., 2008) and on the other hand, according to the results of some other research reports sex had no impact on the occurrence of feline ear mite infestation (Topala et al., 2007). In this study, the prevalence of ear mite infestation in males and females was almost the same, 48.48% versus 56.25% (table 2), and thus, sex was not a risk factor for ear mite infestation in cats.

BCS (body condition score) was another significant risk factor for feline ear mite infestation and the highest prevalence of *Otodectes cynotis* was found in poor health conditioned animals (67.85%) followed by good (32.35%) and obese animals (0%). The result supported by the work done by Persichetti et al. (2018). The ear mite infestation creates stress for the cat which ultimately

affects the health (Borji et al., 2011). The prevalence of mite infestation in neutered cats was 51.85% but this was not a significant risk factor either.

In case of breed, Persian cats (54.05%) were found to be mostly susceptible to *Otodectes cynotis* than local (40.9%), and crossbreed (16.67%), and coarse-haired (55.56%) cats were found to be more vulnerable to feline ear mite infestation followed by irregular (50%) and smooth-haired cats (31.82%), but both of the factors were not significantly associated with the ear mite infection. These findings agreed with the work done by Degi et al., (2010).

Interaction with other cats and dogs was another significant factor for ear mite infestation in cats with a prevalence of 62.16% (Table 1). There was a relationship between lifestyle and infestation, with outdoor cats showing a greater incidence (60%) of the condition (Souza et al., 2008). Numerous authors reported that cats who interact with other cats or dogs are more likely to become infested (Mircean et al., 2010).

The ear hygiene was associated with ear mite infestation (Sotiraki et al., 2001). In this study, the disease was more common in those cats whose ear hygiene were not maintained properly. The occurrence of ear disease becomes lower when ear examination is made more frequently because quicker treatment can be ensured upon unveiling a developing ear illness. (Beugnet et al., 2014). There was no association found between vaccination (26.83% and 57.89%) and the use of antibiotics (31.82% and 53.48%) with *Otodectes cynotis* infestation in this study. These findings agreed with Russell et al. (2013).

Routinely, deworming in pets is associated with the reduction of ectoparasite infestation (Baker et al., 2021). The combination of broad-spectrum anthelmintics is highly effective against the primary ecto- and endoparasites that infest cats (Baker et al., 2021). In this study, the prevalence of *Otodectes cynotis* was higher in cats who were not dewormed (59.46%) compared with the cats treated regularly with anthelmintics.

5. Conclusion

The prevalence of *Otodectes cynotis* in cats in Bangladesh would be around 45%, which is quite high. Young cats under the age of one year, cats with poor BCS, cats having history of interacting with other cats/animals, cats whose air hygiene are neglected, cats who are not vaccinated regularly and absence of regular deworming practice in cats are some risk factors for *Otodectes cynotis* infestation in cats in Bangladesh. The risk factors identified from this study can be addressed in order to reduce the prevalence of ear mite infestation in pet cats in the country. To do that regular heath checking of pet cats by registered veterinarians is recommended.

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Biography of Author

This is SaimaAkter, the child of A. S. M. Mahabub-Ul-Alam and Khurshida Begum, doing her graduation in Doctor of Veterinary Medicine (DVM) at Chattogram Veterinary and Animal Sciences University under the Faculty of Veterinary Medicine. She passed the Secondary School Certificate Examination (SSC) in 2013 from Govt. City Girls' High School, Chattogram, and the Higher Secondary Certificate Examination (HSC) in 2015 from Govt. City College, Chattogram. Currently, she is doing her yearlong internship. She has a great interest in wildlife and also worked as a volunteer for the Wildlife Conservation Alliance.

Appendix

Questionnaire

Owner's details:

Owner's name: Phone:

Occupation:

General information of cat:

No. of cat:

Source of Cat:

Age (m): Sex: M/F

BCS: Poor/Good/Obese Breed:

Neutered: Yes/No

Types of Hair: Smooth/Course/Irregular

Interaction with dogs/cats: Yes/No

Health status of cat:

Ear hygiene: Yes/No Vaccination: Yes/No

Deworming: Yes/No Antibiotics: Yes/No