



Research article

First report on the prevalence of *Lynxacarus radovskyi* in cats in Can Tho City, Vietnam

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Abstract

The aim of the study is to investigate the prevalence of *Lynxacarus radovskyi* infestation in cats in Vietnam. This survey was conducted on 2,430 cats registered at the Center of Veterinary Clinic, Can Tho City, Vietnam from February to October 2022. Clinical findings and other influential factors such as age, sex, breed, and living conditions of cats were recorded to evaluate the potential risk factors associated with *L. radovskyi* infestation. The Trichogram technique was used for the microscopic identification of *L. radovskyi*. The results revealed that 60.25% (1,464/2,430) of cats were infested with *L. radovskyi*. The statistical analysis showed that *L. radovskyi* infestation was significantly ($P < 0.05$) associated with several risk factors, including age, sex, and living conditions of hosts. Of 1,464 cats detected with *L. radovskyi* infestation, the most common clinical signs were pruritus (95.77%), followed by a dull, dry coat (92.08%) and a “salt and pepper” appearance of hair coat (76.23%). The cat's body site harbors the mite *L. radovskyi* was mostly noticed in the perianal area (30.53%), followed by the hind limbs (25.48%) and the dorsal (20.22%). Thus, this present study provides the first report of *L. radovskyi* infestations in cats from Vietnam.

Keywords: *Lynxacarus radovskyi*, Trichogram, risk factors, clinical signs, cats, Vietnam

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INTRODUCTION

Lynxacarus radovskyi is a non-burrowing fur mite typically found on cats. Together with other ectoparasites such as ticks, mites, and fleas, their infestation on domestic cats can cause a wide range of dermatological problems for the hosts. These parasites are also vectors of infectious and zoonotic disease-causing agents (Moriello et al., 2003; Eisen et al., 2012); however, there is likely no confirmation of *L. radovskyi* spreading to humans (Beugnet et al., 2018).

L. radovskyi is widely distributed in many parts of the world. The mite was first reported on domestic cats in Hawaii in 1974 (Tenorio, 1974), and soon after, it was found in Australia in 1978 (Bowman and Domrow, 1978). Later, it has been reported in Newzealand (Heath and Mariadass, 1999), Malaysia (Han, 2015), Fiji (Munro and Munro 1979), Florida (Greve and Gerrish, 1981), Phillippines (Moya et al., 2004), Brazil (Romeiro et al., 2007; Campos et al., 2020), India (Jayanthi et al., 2017), Puerto Rico and St. Kitts (Bowman et al., 2002). Cats infested with these mites are usually subclinical but have also been associated with pruritus, alopecia, increased hairballs, and irritability (Beugnet et al., 2018). Other typical clinical signs include a “salt-and-pepper” appearance of the hair coat, hair loss, and itching (Foley, 1991; Jayanthi et al., 2017). Diagnosis can be done through physical examination and microscopic observation, either with adhesive tape impression or by trichogram technique (Ketzis et al., 2016; Han et al., 2019). Infested cats can be treated via sprays, weekly lime sulfur dips, or injections. Previously, a study reported that fluralaner or moxidectin/imidacloprid spot-on are effective in eradicating *L. radovskyi* in cats and able to prevent re-infestation for at least 42 days post-treatment (Han et al., 2016). However, lynxacariosis in cats has not been documented much in Vietnam, except for a previously mentioned cases from 2017 to 2018 (Colella et al., 2020). Therefore, the aim of this study was to investigate the prevalence of *L. radovskyi* infestation in cats in order to determine the current status of this fur mite in cats in Vietnam.

MATERIALS AND METHODS

Animals, sampling, and study period

A study of cat fur mite, *L. radovskyi*, was conducted at the center of the Veterinary Clinic of Can Tho City, Vietnam. From February 2022 to October 2022, a total of 2,430 cats were brought to the clinics for a variety of reasons, including various infectious as well as non-infectious diseases. These cats were examined for the presence of *L. radovskyi* based on the clinical history, physical observations, and microscopic examination of *L. radovskyi*. The Trichogram technique was used, and hair samples were examined under light to detect *L. radovskyi* as previously described (Serrano-Falcón et al., 2013; Ketzis et al., 2016). Briefly, hair plucks containing about 20-50 hairs were collected from each suspected cat's body sites, which included the legs, neck, thorax, dorsal, tail base, and perianal region. Each fur sample was then placed on a glass slide with paraffin liquid (CP, Xilong, Cas 8012-95-1), coverslip, and observed under a light microscope at 40x to 100x magnification. Under microscopic observation, an adult *Lynxacarus* sp. measures about 500 µm long, is elongated

and laterally compressed, and the first third of the body is sclerotized (Beugnet et al., 2018). To evaluate some potential risk factors associated with *L. radovskyi* infestation in cats, information including the cat's gender, age, breed, hair type, and living conditions were also recorded and analyzed.

Statistical analysis

Statistical analyses were performed by using the Minitab software (version 16.0). Chi-square tests were used to evaluate the relationships between some risk factors and *L. radovskyi* infestation in cats. Differences were considered significant if the *P*-value was < 0.05 .

RESULTS

Prevalence and clinical findings of *L. radovskyi* in cats

Based on clinical signs and physical examination of the cats, such as having signs of itching, hair loss, and a “salt and pepper” appearance on the hair coat, 1,715 cases were suspected of being infested with *L. radovskyi*. Trichography of hair samples was performed for confirmation of *L. radovskyi* infestation (Figure 1). The results indicated that 1,464 cats (60.25%) were detected with *L. radovskyi*.

During the physical examination, clinical observations and body sites of the infestation were recorded and measured for all cases of *L. radovskyi* detection (Figures 2 to 4). As a result, the most common clinical presentation in cats infested with *L. radovskyi* included a “salt and pepper” appearance, alopecia, dull and/or dry coat, and pruritus. All these signs appeared to be as high as 76.23% to 95.77%, except dermatitis, which was observed at 44.95% (Table 1).

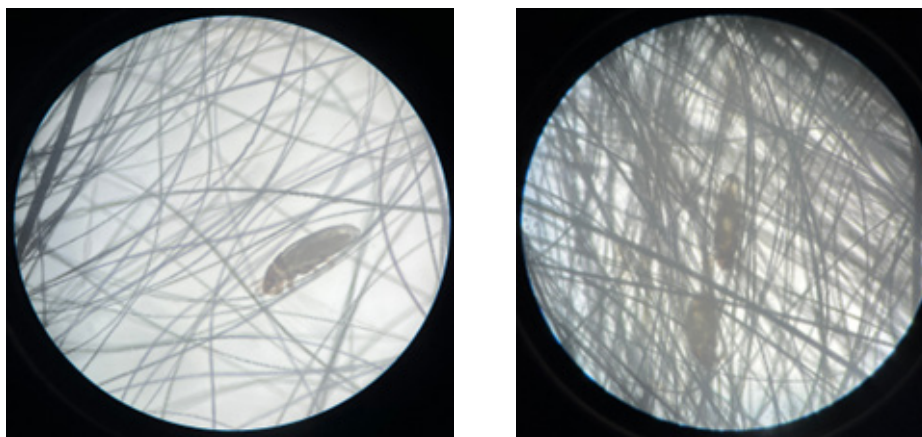


Figure 1 Adults *L. radovskyi* under microscopic examination (100x)

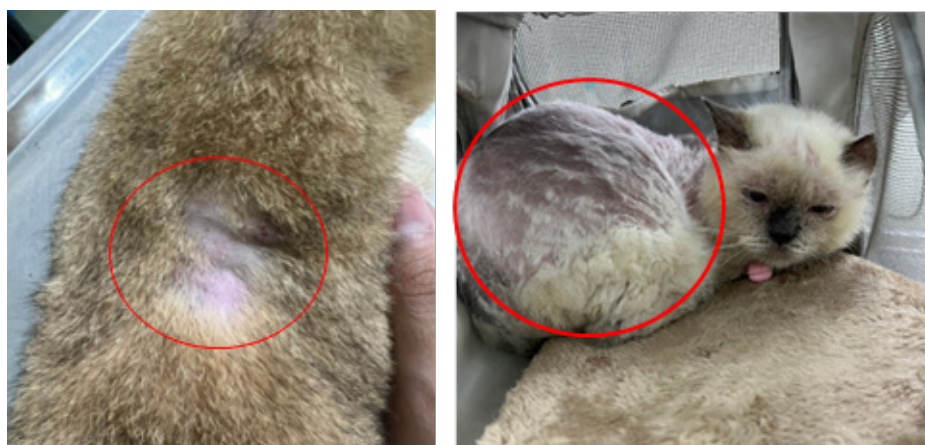


Figure 2 Alopecia associated with *L. radovskyi* infestation in cats

Table 1 Clinical findings at physical examination and body locations positive for *L. radovskyi* by using the trichogram techniques (n = 1,464)

Clinical findings	Number of positive cats	Percentage of positive (%)
Pruritus*	1,402	95.77
“Salt and pepper” appearance	1,116	76.23
Alopecia	1,248	85.25
Dull, dry coat	1,348	92.08
Dermatitis*	658	44.95
Body locations		
Forelegs	215	14.69
Hind legs	373	25.48
Dorsal	296	20.22
Neck	206	14.07
Thorax – Abdomen	187	12.77
Tail	120	8.20
Perianal region	447	30.53

* varied from mild to severe, considering of co-infestation with other ectoparasites

Additionally, the different body sites that harbored *L. radovskyi* were also investigated. As presented in Table 1, *L. radovskyi* was found more frequently in the perianal region (30.53%), hind legs (25.48%), and dorsal area (20.22%). Other body locations included forelegs (14.68%), neck (14.07%), and thorax-abdomen (12.77%). It seemed that the tail was a less common position for *L. radovskyi* infestation (8.20%).



Figure 3 “Salt and pepper” appearance on hair coat of cat

Risk factors associated with *L. radovskyi* infestation

Information on individual characteristics regarding age, gender, hair type, and living conditions was collected and analyzed for potential risk factors associated with *L. radovskyi* infestations. Overall, factors consisting of age, gender, hair type, and living style were significant differences ($P < 0.05$) associated with lynxacariosis in cats. Among these, the prevalence of *L. radovskyi* was remarkably higher in females (63.21%), long-haired type (62.52%), indoor-and-outdoor living style (62.00%), and over 1-year-old cats (61.78%). There was no significant difference between the breeds (local and mixed) in the infestation of *L. radovskyi* in cats (Table 2).



Figure 4 Dermatitis associated with *L. radovskyi* infestation

Table 2 Risk factors associated with *L. radovskyi* infestation in cats (n = 2,430)

Variables	Number of examined cats	Number of positive cats	Percentage of the positive (%)	P-values
Ages (year)				
< 1	808	462	57.18	0.029
≥ 1	1,622	1,002	61.78	
Gender				
Male	1,052	593	56.37	0.001
Female	1,378	871	63.21	
Breed				
Local breed	881	525	59.59	0.681
Mixed and foreign	1,549	939	60.62	
Hair type				
Short-haired	768	425	55.34	0.001
Long-haired	1,662	1,039	62.52	
Living condition				
Indoor-only	830	472	56.87	0.014
Indoor-and-outdoor	1,600	992	62.00	

DISCUSSION

The mite, *L. radovskyi* (Tenorio, 1974) belongs to the class *Arachnida*, order *Acariforme*, suborder *Astigmata*, family *Listophoridae*. It is described as the hair-clasping mite of tropical cats. The life cycle is not well known but occurs entirely in the hair coat of the host, including four stages: eggs, larvae, nymphs, and adults. Transmission is assumed to occur by direct contact between animals and has been suggested to occur through fomites (Clare et al., 2004). Unexpectedly, the mites were once detected in the cat's feces, likely from ingestion while grooming (Wyrosdick et al., 2017). To date, *L. radovskyi* infestation has only been associated with the clinical presentation of cats more than other hosts. In Vietnam, although several ectoparasites in dogs and cats, including fleas, ticks, lice, and mites such as *Sarcoptes scabiei*, *Demodex* spp., and *Otodectes cynotis* have been reported, so far, *L. radovskyi* has not been detected in cats (Colella et al., 2020).

In order to identify *L. radovskyi* by microscopic examination, either trichograms technique or adhesive tape impression is commonly applied. According to Ketzis et al. (2016), the adhesive tape test was shown to be quite suitable for ectoparasite visualization when fewer false negative results were observed. On the other hand, the trichogram technique seems preferred to be an effective method for *L. radovskyi* detection (Han et al., 2016; Campos et al., 2020).

In the present study, the trichogram technique was applied for *L. radovskyi* detection in cat fur. The prevalence of *L. radovskyi* was found to be high, 60.25%. This result was lower than those reported in India (Ketzis et al., 2016) and in Brazil (Romeiro et al., 2007), where the prevalence of *L. radovskyi* in cats was 71.0% and 75.82%, respectively. In contrast, the prevalence of *L. radovskyi* revealed in this study was much higher than the values reported in some previous studies (Jeffery et al., 2012; da Rocha et al., 2019; Kamaruddin et al., 2020). The difference in our results and those of previous reports might be related to the number of cats examined, the length of the study, and the particular region of distribution of the mite.

Clinical findings indicated that “salt and pepper” appearance, alopecia, dull and/or dry coat, and pruritus were the most frequently appeared in infested cats, approximately from 76.0% to 96.0%. These rates were in agreement with those in studies elsewhere, such as Malaysia (Jeffery et al., 2012; Han et al., 2016), Brazil (da Rocha et al., 2019), and India (Jayanthi et al., 2017). Among these symptoms, pruritus had the highest rate (95.77%) in cats infested with *L. radovskyi*, which was similar to the result from a previous study in Brazil that 100% of cases had pruritus (da Rocha et al., 2019). The less common sign found in this study was dermatitis, which accounted for 44.95%. The intensity of dermatitis varied from mild to severe, as shown in pruritus. This outcome could be due to the co-infestation with other parasites, such as lice, fleas, or ear mites (Divya et al., 2021).

It was revealed that the mite resided more frequently in the perianal region (30.53%), hind legs (25.48%), and dorsal area (20.22%) of the infested cat. Similarly, some previous studies reported that the back, neck, thorax, and hindlimbs, particularly of the tail head, tail tip, and perineal areas, were commonly affected by *L. radovskyi* (Craig et al., 1993; Miller et al., 2013; Ketzis et al., 2016). Another concluded that the caudal half of the cat’s body harbored more *L. radovskyi* than the cranium (Ketzis et al., 2016). Nonetheless, in our study, it was noticed that the less common site for *L. radovskyi* was the tail region (8.20%).

There was no difference in the prevalence of *L. radovskyi* infestation between local and mixed cats. In fact, age, gender, hair type, and living style were significant factors associated with *L. radovskyi* infestation, which was found to be higher in female cats, long-haired type, and indoor-and-outdoor living conditions. Previously, some studies indicated that females may be more susceptible to *L. radovskyi* infestation, whereas another report found males or equal infestation among sex, race, and age was recorded (Romeiro et al., 2007). According to da Rocha et al. (2019), most of the affected cats were under 1 and a half years old; however, in our study, over 1-year-old cats showed statistically higher than cats under 1 year. The observed outcome might stem from variations in sample sizes and the impact of selecting specific age groups on the obtained results.

CONCLUSIONS

The results revealed a high prevalence of *L. radovskyi* infestation in cats in Can Tho City. This is the first report of the detection of *L. radovskyi* in cats in Vietnam. Further studies should be considered to provide deeper knowledge on lynxacariosis in cats, which is one of the most popular pets in Vietnam.

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AUTHOR CONTRIBUTIONS

Chau Thi Huyen Trang, Pham Huu Trong, Nguyen Thanh Lam;

Conceptualization and design of the study, investigation, supervision, editing, and finalization.

Nguyen Trong Ngu, Nguyen Phuc Khanh, Truong Anh Thy; contributed to drafting the manuscript and critically revising the paper and intellectual content.

All authors read and approved the final manuscript.

CONFLICT OF INTEREST

We have no conflict of interest.

REFERENCES

- Bowman, W.L., Domrow, R., 1978. The cat fur-mite (*Lynxacarus radovskyi*) in Australia. Aust. Vet. J. 154(8), 403–404.
- Bowman, D.D., Hendrix, C.M., Lindsay, D.S., Barr, S.C., 2002. Feline Clinical Parasitology. Iowa State University Press. Blackwell Science Company, USA, 400-402.
- Beugnet, F., Halos, L., and Guillot, J., 2018. Textbook of Clinical Parasitology in Dogs and Cats. Servet Editorial - Grupo Asís Biomedica, S.L., 284-285.
- Campos, D.R., Chaves, J.K.O., Assis, R.C.P., Fernandes, J.I., Scott, F.B., 2020. Efficacy of oral sarolaner against *Lynxacarus radovskyi* in naturally infested cats. Vet. Dermatol. 31(5),355-e92.
- Craig, T.M., Teel, P.D., Dubuisson, L.M., Dubuisson, R.K., 1993. *Lynxacarus radovskyi* infestation in a cat. J. Am. Vet. Med. Assoc. 202(4), 613-614.
- Clare, F., Mello, R.M.L.C., Bastos, T.V., Lessa, C., Conceição, L.G., 2004. P-30 Use of fipronil for treatment of *Lynxacarus radovskyi* in outdoor cats in Rio de Janeiro (Brazil). Vet. Dermatol. 15(1), 50.
- Colella V., Nguyen V.L., Tan D.Y., Lu N., Fang F., Zhijuan Y., Wang J., Liu X., Chen X., Dong J., Nurcahyo, W., Hadi, U.K., Venturina, V., Tong, K.B., Tsai, Y.L., Taweethavonsawat, P., Tiwananthagorn, S., Le, T.Q., Bui. K.L., Watanabe, M., Rani, P.A., Annoscia, G., Beugnet, F., Otranto, D., Halos, L., 2020. Zoonotic vectorborne pathogens and ectoparasites of dogs and cats in Eastern and Southeast Asia. Emerg. Infect. Dis. 26,1221–1233.
- da Rocha, C.M., Farias, P.C.G., Gorza, L., Soares, F.E.F., Ferraz, C.M., Souza, R.L.O., Renon, L.B.S., Braga, F.R., 2019. Association between infestation by *Lynxacarus radovskyi* (Acari: Lystrophoridae) and the occurrence of Feline Eosinophilic Granuloma Complex. J. Parasit. Dis. 43(4),726-729.
- Divya, V., Gopalakrishnan, M.A., Anju Anna James, R.R.S., Linija, M.L., Ranjith Mohan, M., 2021. Concurrent infestation of *Lynxacarus radovskyi* and *Otodectes cynotis* in a Persian cat. Pharma. Innovation. SP-10(10), 325-328
- Eisen, R.J., Gage, K.L., 2012. Transmission of flea-borne zoonotic agents. Annu. Rev. Entomol. 57,61-82.
- Greve, J.H. & Gerrish, B.S. 1981. Fur mites (*Lynxacarus*) from cats in Florida. Feline Pract. 11(8), 28-30.
- Jayanthy, C., Nagarajan, B., Latha, B.R., 2017. Cat fur mite *Lynxacarus radovskyi* in India. J Parasit. Dis. 41(4),1102-1104.
- Jeffery, J., Norhidayu, S., Mohd Zain, S.N., Noor Hayati, M.I., Nurazila, B., 2012. The cat fur mite, *Lynxacarus radovskyi* Tenorio, 1974 (Acarina: Astigmata: Listrophoridae) from cat, *Felis catus* in peninsular Malaysia. Trop. Biomed. 29(2),308-10.
- Foley, R. H., 1991. Parasitic mites of dogs and cats. The compendium on continuing education for the practicing veterinarian (USA). 13(5),794-796.

- Han, H.S., 2015. A survey of the prevalence of *Lynxacarus radovskyi* in cats in Malaysia. Vet. Dermatol. 26(1), 68-75.
- Han, HS., Noli, C., Cena, T., 2016. Efficacy and duration of action of oral fluralaner and spot-on moxidectin/imidacloprid in cats infested with *Lynxacarus radovskyi*. Vet. Dermatol. 27(6), 474-e127.
- Han, H.S., Chua, H.L., Nellinathan, G., 2019. Self-induced, noninflammatory alopecia associated with infestation with *Lynxacarus radovskyi*: a series of 11 cats. Vet. Dermatol. 30(4), 356-e103.
- Heath, A.C.G, Mariadass, B., 1999. A New Zealand record for the cat fur-mite, *Lynxacarus (Felistrophorus) radovskyi* Tenorio (Acarina: Astigmata: Listrophoridae). N. Z. Vet. J. 47(6), 211-212.
- Kamaruddin, N. C., Adrus, M., Ismail, W.N.W., 2020. Prevalence of ectoparasites on a stray cat population from "Town of Knowledge" Kota Samarahan, Sarawak, Malaysian Borneo. Turkish J. Vet. Anim. Sci. 44(6), 1212-1221.
- Ketzis, J.K., Dundas, J., Shell, L.G., 2016. *Lynxacarus radovskyi* mites in feral cats: A study of diagnostic methods, preferential body locations, co-infestations and prevalence. Vet. Dermatol. 27, 425-428.
- Moya, G.C., Bisa, B. & Patricio, C., 2004. Occurrence of *Lynxacarus radovskyi* (Tenorio, 1974) in cats in Batong Malake, Los Banos, Laguna. Philipp. J. Vet. Med. 41(2), 105-108.
- Moriello, K.A., 2003. Zoonotic skin diseases of dogs and cats. Anim. Health Res. Rev. 4(2), 157-168.
- Miller, W.H., Griffin, C.E., Campbell, K.L., 2013. Parasitic skin diseases. Muller and Kirk's Small Animal Dermatology, 7th edition. St. Louis, MO: Elsevier Health Sciences. 296-297.
- Munro, R. & Munro, H.M.C., 1979. *Lynxacarus* on cats in Fiji. Aust Vet J. 55(2): 90.
- Romeiro, E.T., Alves, L.C., Soares, Y.M., Matoso, U.N., Faustino, M.A., 2007. Infestation by *Lynxacarus radovskyi* (Tenorio, 1974) in domestic cats from Metropolitan Region of Recife, Pernambuco, Brazil. Rev. Bras. Parasitol. Vet. 16, 159-162.
- Serrano-Falcón, C., Fernández-Pugnaire, M.A., Serrano-Ortega, S., 2013. hair and scalp evaluation: The trichogram. Actas Dermo-Sifiliográficas (English Edition), 104 (10), 867-876.
- Tenorio, J.M., 1974. A new species of *Lynxacarus* (Acarina: Astigmata: Listrophoridae) from *Felis catus* in the Hawaiian islands. J. Med. Entomol. 11(5), 599-604.
- Wyrosdick, H.M., Chapman, A., Martinez, J., Schaefer, J.J., 2017. Parasite prevalence survey in shelter cats in Citrus County, Florida. Vet. Parasitol. Reg. Stud. Rep. 10, 20-24.

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