



RESEARCH ARTICLE

Prevalence of Fur Mites in Canine Dermatologic Disease in Henan, Hebei, Heilongjiang Provinces, and Xinjiang Uygur Autonomous Region, China

Dongjie Cai[§], Qingfeng Zhang[§], Limei Zhang, Hongchao Zhang¹, Zhixin Fu², Gaoming He³, Guodong Liu⁴ and Jianzhu Liu*

College of Veterinary Medicine, Research Center for Animal Disease Control Engineering Shandong Province, Shandong Agricultural University, Tai'an 271018, China; ¹Henan Vocational College of Agriculture, Zhengzhou, 453000, China; ²Animal Clinic, Hebei Normal University of Science & Technology, Qinhuangdao, 066004, China ³College of Animal Science & Technology, Shihezi University, Shihezi 832000, China; ⁴Xifeng Animal Clinic, Harbin, 150080, China

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*Corresponding Author

Jianzhu Liu
liujianzhu@hotmail.com

ABSTRACT

The aim of this study was to estimate the epidemic situation of fur mites, *S. scabiei var. canis*, *D. canis*, and *O. cynotis*, in canine dermatologic disease in Henan, Hebei, Heilongjiang provinces, and Xinjiang Uygur Autonomous Region, in the middle, northwest, and northeast of China. Four-hundred eighty-four cases of dermatologic disease from the four provinces were investigated by conducting deep skin scraping and skin surface tape-stripping between December 2011 and December 2012. A total of 111 dogs were diagnosed with *S. scabiei var. canis*, with an overall prevalence of 22.9%; 121 dogs were diagnosed with *D. canis*, with an infection rate of 25.0% and 12 diagnosed with *O. cynotis*, with an infection rate of 2.4%. These results show that fur mites are heavily prevalent in dogs in China, which can be an important indicator for identifying strategies and measures to control canine fur mites in China.

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INTRODUCTION

The symptoms of canine dermatologic diseases include pruritus, alopecia, and dermatitis. Fur mites, *Sarcoptic scabiei var. canis*, *Demodex canis*, and *Otodectes cynotis*, are the most important mange mites that cause a variety of dermatoses in dogs (Nayak *et al.*, 1997). It is informed that *S. scabiei var. canis* has been isolated from rabbits, guinea pigs, sheep, goats, calves, and cats (Arlian and Vyszynski-Moher, 1988; Curtis, 2004). Although *D. canis* usually inhabit the hair follicle and glandulae sebaceae of dogs, they have not been documented in humans and other mammals. *O. cynotis*, also known as ear mites, are none burrowing, white, and very active parasites that occur worldwide in the external auditory canal of dogs, foxes, cats, ferrets, and other carnivores (Lefkaditis *et al.*, 2009).

Although canine dermatologic disease is widespread (Chee *et al.*, 2008) and can do harm to dogs' healthy, limited research has been performed on the prevalence of fur mites in canine dermatologic disease, especially *S. scabiei var. canis*, *D. canis*, and *O. cynotis*. Thus, we aim to investigate the prevalence of infestation of these three fur mites in four provinces, in the middle, northwest and northeast of China.

MATERIALS AND METHODS

Dogs and surveyed areas

The presented study was carried out in veterinary clinics in Henan, Hebei, Heilongjiang provinces, and Xinjiang Uygur Autonomous Region. The clinical signs of alopecia, pruritus and dermatologic lesion in dogs were presented to the clinics for diagnostic test. These four provinces are located in the middle, northwest and northeast of China. Table 1 shows the geographical

[§]These authors contributed equally to this work

location and climate of each province. A total of 484 cases of dermatologic diseases from the four provinces were examined between December 2011 and December 2012. The dogs were differentiated by gender (male, female), age (≤ 1 year old or >1 year old), and rearing condition (gregarious or backyard).

Parasitological procedure

The presence of mites was detected by the microscopic examination of deep skin scrapes, plucked hairs. Samples were collected from the frontal area of the head, pinna, ear canal, back, thoracic-abdominal areas, and the limbs. As a result, 7 samples were obtained from each dog. Areas of the skin with dermatologic lesions were moistened with mineral oil and scraped with a scalpel blade. The scrapings or hair follicles were placed on glass slides with a drop of 10% KOH solution and were examined microscopically for the presence of mites.

Statistical analysis

Differences in the prevalence of fur mite infection in pet dogs among different age, gender, and rearing condition groups were analyzed using a χ^2 goodness-of-fit test on SPSS for Windows (Release 18.0 standard version, SPSS Inc, Chicago, Illinois), as well as the fur mite incidence of four provinces. A 95% confidence level ($P < 0.05$) was required to identify a risk factor.

RESULTS

The total prevalence of fur mite infection in all four provinces in China was 50.4% (Table 5). Specifically, the prevalence of fur mite infection in Henan, Hebei, Heilongjiang provinces, and Xinjiang Uygur Autonomous Region were 51.9, 56.0, 46.6 and 40.5% respectively.

The prevalence of *Sarcoptes mangle var. canis*

Microscopic analysis of samples from the 484 dogs revealed that 111 (22.9%) were positive for *S. scabiei var. canis*. Overall, the cases of canine scabies infection were 43.4% (76/235) for the males and 11.3% (35/309) for the females (Table 2) ($P=0.04$, OR=0.550, 95% CI=0.35-0.86). Scabies was also observed in 65 (27.7%) ≤ 1 year old dogs and 46 (18.5%) >1 year old dogs ($P=0.01$, OR=1.52, 95% CI=0.99-2.33). And the prevalence of fur mite infection in Henan, Hebei, Heilongjiang provinces, and Xinjiang Uygur Autonomous Region were 20.1, 28.7, 23.2 and 19.0% respectively.

The prevalence of *Demodex canis*

Out of the 484 dogs with dermatologic disease, 121 (25.0%) were infected with *D. canis*, 76 (35.0%) male and 45 (16.9%) female (Table 3) ($P=0.04$, OR=0.75, 95% CI=0.49-1.15). Moreover, 78 (42.4%) ≤ 1 year old dogs and 43 (14.3%) >1 year old dogs were infected ($P=0.01$, OR=2.13, 95% CI=1.4-3.3). And the prevalence of fur mite infection in Henan, Hebei, Heilongjiang provinces, and Xinjiang Uygur Autonomous Region were 31.2, 23.1, 20.5 and 17.7%, respectively.

The prevalence of *Otodectes cynotis*

Twelve (2.5%) dogs were found to be infected with *O. cynotis* (Table 4). The incidences of infection of male

and female dogs were 1.1% and 4.4% respectively, with little difference of $P > 0.05$. The prevalence in dogs ≤ 1 year was 1.6% (4 of 245), whereas in dogs >1 year, the prevalence was 3.3% (8 of 239). The age thus was not significantly associated with the presence of *O. cynotis* infestation in the current study. And the prevalence of fur mite infection in Henan, Xinjiang, Heilongjiang, and Hebei provinces were 0.53, 4.0, 2.7 and 3.7% respectively.

The prevalence of fur mite in different rearing condition

A total 74.8% of dogs infected with fur mites were raised in a gregarious society, whereas 27.6% were brought up in a backyard. The two rearing conditions have a significant difference in fur mite infestations ($P=0.01$, OR=7.78, 95% CI=5.19-11.67). Moreover, the prevalence of fur mites in Henan and Hebei provinces is higher than those in other provinces, but it didn't have statistical differences ($P > 0.05$).

DISCUSSION

The present study provides the first systematic assessment of fur mite infection in dogs in the Henan, Hebei, Heilongjiang provinces, and Xinjiang Uygur Autonomous Region in the middle, northwest, and northeast of China. Three kinds of fur mites were examined for this study. *D. canis* (25.0%) was the most frequently occurring mite, followed by *S. scabiei var. canis* (22.9%) and *O. cynotis* (2.4%). *D. canis* infection, which accounted for 25.0% of canine dermatosis cases, was far beyond the findings reported from Orissa in India (3%) (Nayak *et al.*, 1997) and Guangzhou in China (13.31%) (Chen *et al.*, 2012), but was lower than that from Gdynia, Poland (42%) (Izdebska, 2010). These investigations are similar to this report, in which dermatosis cases are regarded as the main objects. *D. canis* infection in dogs has been detected in different parts of the world, with varying differences in prevalence among regions (Chee *et al.*, 2008; Ugbomoiko *et al.*, 2008). Although most of the results of the earlier literatures were lower than those of the presented study, because healthy dogs were included in previous studies, the current investigation only included dermatosis cases.

S. scabiei var. canis was the second most abundant fur mite in this study (22.9%), followed by *O. cynotis*. Zhang *et al.* (2009) found that *S. scabiei var. canis* had a higher prevalence than *O. cynotis* in Beijing, China, which was supported by our results. However, this finding is contrary to those of Ugbomoiko *et al.* (2008) and Rodriguez-Vivas *et al.* (2003). The prevalence of *Sarcoptes canis* in this report is higher than that in Yucatán, Mexico (7%) (Rodriguez-Vivas *et al.*, 2003) and in Ilorin, Central Nigeria (2%) (Ugbomoiko *et al.*, 2008).

O. cynotis (2.5%) was the least frequently occurring among the three fur mites in infested dogs. The *O. cynotis* infection rate was also significantly lower than that of the other findings (Park *et al.*, 1996; Chee *et al.*, 2008; Souza *et al.*, 2008).

The prevalence of the three fur mites varies from country to region. The variation found in different countries may be attributed to certain factors such as seasonality, sex, and innate resistance.

Table 1: Geographical location and climate differences

Province	Latitude	Longitude	Climate
Henan	N34°45'59.42"	E113°44'50.88"	warm temperate-subtropical
Xinjiang	N43°47'30.44"	E87°37'29.81"	temperate continental
Heilongjiang	N45°44'25.32"	E126°39'20.40"	temperate continental monsoon
Hebei	N38°02'10.65"	E114°27'44.97"	temperate monsoon

Table 2: *S. mange var. canis* infection obtained from the four provinces in China

Variables	Number of Dogs	Positive Dogs (%)	Odds ratio (95%CI)	P
Total	484	111(22.9)		
Gender				
Females	309	35(11.3)	1	
Males	175	76(43.4)	0.55(0.35-0.86)	0.04
Age(years)				
0-1	235	65(27.7)	1	
>1	249	46(18.5)	1.52(0.99-2.33)	0.01

Table 3: *D. canis* infection obtained from the four provinces in China

Variables	Number of Dogs	Positive Dogs (%)	Odds ratio (95%CI)	P
Total	484	121(25.0)		
Gender				
Females	267	45(16.9)	1	
Males	217	76(35.0)	0.75(0.49-1.15)	0.04
Age (years)				
0-1	184	78(42.4)	1	
>1	300	43(14.3)	2.13(1.39-3.26)	0.01

Table 4: *O. cynotis* infection obtained from the four provinces in China

Variables	Number of Dogs	Positive Dogs (%)	Odds ratio (95%CI)	P
Total	484	12(2.5)		
Gender				
Females	205	9(4.4)	1	
Males	279	3(1.1)	3.76(1.01-14.05)	0.37
Age(years)				
0-1	245	4(1.6)	1	
>1	239	8(3.3)	0.45(0.13-1.50)	0.81

Table 5: Fur mite infection of rearing condition and region obtained from the four provinces in China

Variables	Number of Dogs (%)	Positive Dogs (%)	Odds ratio (95%CI)	P
Total	484(100)	244(50.4)		
Rearing condition				
Gregarious	234(48.3)	175(74.8)	1	
Backyard	250(51.7)	69 (27.6)	7.78(5.19-11.67)	0.01
Region				
Henan	189(39.0)	98(51.9)	1	
Xinjiang	79 (16.3)	32(40.5)	1.58(0.93-2.69)	0.37
Heilongjiang	73 (15.1)	34(46.6)	1.24(0.72-2.12)	0.61
Hebei	143(29.5)	80(56.0)	0.85(0.55-1.31)	0.80

With regard to the sex factors that may have a relationship with fur mite, Table 3 shows that the prevalence of *D. canis* infection in males was twice that in females, with a significant difference ($P < 0.05$). This finding is consistent with the result of previous studies (Chen *et al.*, 2012), but is contrary to the findings of Nayak *et al.* (1997) and Rodriguez-Vivas *et al.* (2003), who found a similar prevalence of *D. canis* in both sexes.

In Table 2, the prevalence of scabies infection was significantly different in susceptibility between sexes ($P < 0.05$), which is similar to that of the *D. canis* infection. Moreover, Chen (2011) found that males had more susceptibility to *O. cynotis* in Taizhou, Jiangsu province, but in this study, gender did not have more relationship with *O. cynotis* infection ($P > 0.05$) (Table 4).

Dogs ≤ 1 year old were more prone to scabies and *D. canis* than the older group (Table 2) ($P < 0.05$), a finding that is consistent with those in Beijing (Zhang, 2009), Jiangsu (Chen, 2011), and Jilin (Li, 2012). In addition, no statistical difference in *O. cynotis* infection was found between the age groups ($P > 0.05$) (Table 4).

In the present study, we also recorded other factors, such as rearing conditions, that may be the main reason causing the prevalence of fur mites. Based on Table 5, the infected dogs raised in a gregarious environment surpassed those raised in backyards, indicating that gregarious dogs have a higher probability of infection with fur mites through direct contact ($P < 0.01$). Moreover, through statistical analysis there were no differences among these four regions ($P > 0.05$).

The zoonotic nature of the canine dermatologic diseases, *S. scabiei var. canis*, *D. canis*, and *O. cynotis*, investigated in this study could be regarded as a public health alert. To prevent the possibility of continued transmission of mites from dogs, instructions should be provided to the dog owners.

REFERENCES

- Arlan L and D Vyszynski-Moher, 1988. Life cycle of *Sarcoptes scabiei var. canis*. J Parasitol, 74: 427-430.
- Che JH, JK Kwon, HS Cho, KO Cho, Y Lee, A Abd El-Aty and SS Shin, 2008. A survey of ectoparasite infestations in stray dogs of Gwang-ju City, Republic of Korea. Kor J Parasitol, 46: 23-27.
- Chen X and SB Wang, 2011. Epidemiological Investigation of Canine Acarinoses in Taizhou. Guizhou Agric Sci, 39: 156-158.
- Chen YZ, RQ Lin, DH Zhou, HQ Song, F Chen ZG Yuan, XQ Zhu, YB Weng and GH Zhao, 2012. Prevalence of Demodex infection in pet dogs in Southern China. Afric J Microbiol Res, 6: 1279-1282.
- Curtis CF, 2004. Current trends in the treatment of *Sarcoptes*, *Cheyletiella* and *Otodectes* mite infestations in dogs and cats. Vet Dermatol, 15: 108-114.
- Izdebska JN, 2010. Demodex sp.(Acari, Demodecidae) and Demodecosis in dogs: characteristics, symptoms, occurrence. Bull Vet Inst Pulawy, 54: 335-338.
- Lefkaditis M, S Koukeri and A Mihalca, 2009. Prevalence and intensity of *Otodectes cynotis* in kittens from Thessaloniki area, Greece. Vet Parasitol, 163: 374-375.
- Li M and TN Dun, 2012. Investigation and Prevention of mite infection in pet dogs in Jilin city. Heilongjiang Anim Sci Vet Med, 9: 89-90.

- Nayak D, S Tripathy, P Dey, S Ray, D Mohanty, G Parida, S Biswal and M Das, 1997. Prevalence of canine demodicosis in Orissa, India. *Vet Parasitol* 73: 347-352.
- Park G, J Park, B Cho, W Lee and J Cho, 1996. Mite infestation rate of pet dogs with ear dermatoses. *Kor J Parasitol*, 34: 143-150.
- Rodriguez-Vivas R, A Ortega-Pacheco, J Rosado-Aguilar and G Bolio, 2003. Factors affecting the prevalence of mange-mite infestations in stray dogs of Yucatan, Mexico. *Vet Parasitol*, 115: 61-65.
- Souza CP, RR Ramadilha, FB Scott and MJS Pereira, 2008. Factors associated with the prevalence of *Otodectes cynotis* in an ambulatory population of dogs. *Pesquisa Veterinária Brasileira* 28: 375-378.
- Ugbomoiko US, L Ariza and J Heukelbach, 2008. Parasites of importance for human health in Nigerian dogs: high prevalence and limited knowledge of pet owners. *BMC Vet Res*, 4: 49.
- Zhang Z, GM He and DG Lin, 2009. Epidemiological investigation of dog mites. *Livestock Poultry Ind*, 240: 68-69.