



SHORT COMMUNICATION

Prevalence on Canine Gastrointestinal Nematodes in China

Xiao Zhang^{1†}, Qingfeng Zhang^{1†}, Zhihong Jing^{2†}, Peng Zhao¹, Shujing Wang¹, Ruixue Xu¹ and Jianzhu Liu^{1*}

¹College of Animal Science & Veterinary Medicine, Shandong Agricultural University, Taian 271018, China

²College of Foreign Languages, Shandong Agricultural University, Tai'an 271018, China

ARTICLE INFO

Received: September 11, 2014

Revised: September 21, 2014

Accepted: October 10, 2014

Key words:

China

Dogs

Gastrointestinal nematode

Prevalence

Risk factors

*Corresponding Author

Jianzhu Liu

liujz@sdau.edu.cn

ABSTRACT

The objective of our study is to investigate the prevalence of canine gastrointestinal nematodes and identify the potential risk factors in different areas of China. Total 358 fecal samples from different regions were examined by the method of flotation-centrifugation and precipitation. The results suggested that the overall prevalence rate was about 41.1%; no differences of prevalence rate were discovered in age and gender, however, significant difference in regions. Different prevalence of common nematodes were *Ancylostoma caninum*, *Toxocara canis*, *Strongyloides stercoralis*, *Physaloptera*, *Trichuris vulpis*, and the percentage were 19.0, 16.5, 7.8, 4.2 and 0.3% respectively. From our finding, it is concluded that canine gastrointestinal nematodes are heavily prevalent in China, which increase the transmission of zoonotic pathogens from sick dogs to human.

Cite This Article as: Zhang X, Q Zhang, Z Jing, P Zhao, S Wang, R Xu and J Liu, 2014. Prevalence on canine gastrointestinal nematodes in China. *Inter J Vet Sci*, 3(4): 232-235. www.ijvets.com

INTRODUCTION

Canine gastrointestinal nematodes common as *Ancylostoma caninum*, *Toxocara canis*, *Strongyloides stercoralis*, *physaloptera*, *Trichuris vulpis*, usually threaten dogs via touching contaminated water, soil and food, which also lead to infection in human as well (Robertson *et al.*, 2000). Past studies showed that the infection was 35.5% in Venezuela, 51.0% in Australia and 68.4% in Nigeria (Ramírez-Barríos *et al.*, 2004; Fontanarrosa *et al.*, 2006; Ugbomoiko *et al.*, 2008). Gastrointestinal nematodes usually parasitize on animal's intestine result in great influences on the appetite and absorption of nutrients, finally suppress the growing speed of animals, even more serious. Gastrointestinal nematodes may cause serious clinical symptoms, like anemia, diarrhea, edema etc (Gujja *et al.*, 2012; Martínez-Valladares *et al.*, 2013).

In China, about 28,000,000 people keep dogs, surprisingly, a mount of dogs were not vaccinated in rural areas, and many hosts were close to their pets. Dogs are the intermediate and definitive hosts of many parasitic zoonosis, however, people know few about the diseases that dogs have, and lack consciousness of protecting themselves, these behaviors threaten public health and

safety seriously. In China, no paper has been reported that prevalence of canine gastrointestinal nematodes in our knowledge. Hence, our survey on canine gastrointestinal nematodes in China was made with purpose of discovering the prevalence of canine gastrointestinal nematodes and identifying the potential risk factors in different areas.

MATERIALS AND METHODS

Total 358 fecal samples collected from 358 dogs in 10 regions in China (75°E to 130°E and 44°N to 20°N) including Harbin, Guangzhou, Haikou, Jinan, Qinhuangdao, Shanghai, Shenzhen, Tai'an, Xinjiang, Zhengzhou were examined (Figure 1). The study was beginning from May 2013 to end of December 2013. Harbin, also called "city of ice", the climate belongs to cold temperate continental monsoon climate. Guangzhou is one of the starting points of the Maritime Silk Road, known as China's "southern gate". Haikou sited in tropical coastal, showing the diversity of tropical resources, rich in natural features seaside scenery landscape. Jinan, known as the "Spring City", is south besides Tarzan, north across the Yellow River. Qinhuangdao located in Hebei Province. Shanghai's climate is subtropical monsoon climate, four distinct seasons, sunshine and abundant rainfall. Shenzhen has a subtropical maritime climate

[†]These authors contributed equally to this work



Fig. 1: The map of mainland China. The red color regions is the sampling location in this study, including Harbin, Guangzhou, Haikou, Jinan, Qinhuangdao, Shanghai, Shenzhen, Tai'an, Xinjiang, Zhengzhou.

Table 1: The infection between single and mixed about Canine Gastrointestinal Nematodes

Area	Single infection (%)	Mixed infection (%)
Ha'erbin	52.4	0
Guangzhou	53.3	10.0
Haikou	38.7	16.1
Jinan	24.0	1.3
Qinhuangdao	20.7	10.3
Shanghai	35.0	0
Shengzhen	43.3	6.7
Tai'an	44.4	15.6
Xinjiang	29.6	0
Zhengzhou	20.0	14.3
Total	34.6	6.1

zone, mild climate, plenty of sunshine. Tai'an is located at the foot of Mount Tai. Xinjiang is the most distant from the sea inland in the world. Zhengzhou is a plain city, north temperate monsoon climate.

The 358 dogs, consisting of 193 females and 165 males, were divided into four groups according to ages: <1 years old group, 1~3 years old group, 3~5 years old group, >5 years old group. The fecal samples were gathered into sterile centrifuge tubes on which we marked ages, genders and breeds, and stored at 4°C. Flotation technique allowed to detected cestodes (eggs) and protozoa (cysts and oocysts), it using larger proportion of saturated salt water makes the proportion of smaller eggs float in the surface of solution, concentration and to achieved (Sechi *et al.*, 2010).

The dates we collected were analyzed by SPSS version 17.0. The differences of prevalence were estimated by the risk estimate and the chi-square(X^2) test. The standard we set is a 95% confidence coefficient and $P < 0.05$.

RESULTS

In present study, 358 fecal samples from different regions of China were examined, the results shown in Table 1 suggested that the overall infection was 41.1%, consisted of single infection 34.6% and mixed infection 6.1%. In addition, several common gastrointestinal

nematodes were discovered with different frequencies: *Ancylostoma caninum* (19.0%), *Toxocara canis* (16.5%), *Strongyloides stercoralis* (7.8%), *Physaloptera* (4.2%) *Trichuris vulpis* (0.3%) (Table 2).

The unitary infection rates of female (42.0%) and male (41.2%) have no significant difference in the all canine, only the infection of female is more than male in Xinjiang. *Trichuris vulpis* were only found in females (Table 2).

The age groups show no significant difference in the whole survey. The infection is 39.4% in dogs <1 years old group, 39.2% in the 1~3 years ole group, 46.4% in the 3~5 years old group, 57.9% in the >5 years old group, but the rate in the >5 years old group is the most. The overall infection showed increasing trend along with the increasing age (Table 3).

The infection rate is 35.0% in Shanghai, 52.4% in Harbin, 63.3% in Guangzhou, 54.8% in Haikou, 25.3% in Jinan, 31.0% in Qinhuangdao, 50.0% in Shenzhen, 60.0% in Tai'an, 29.6% in Xinjiang, 23.3% in Zhengzhou. It is easy for us to see that the infection rate of gastrointestinal nematodes in Guangzhou is higher than others among all of the cities and the infection rate in Harbin has no significant difference with other areas besides Jinan and Zhengzhou.

DISCUSSION

Five nematode species were found out in our study, the infection rate is 41.1%, higher than others compared to 35.5% in Venezuela (Ramirez-Barrios *et al.*, 2004), 18.0-42.0% in Japan (Asano *et al.*, 2004), methods of others are consistent with ours. The possible reason of the higher infection rate in our research is that the sample we collected came from pet clinics, the dogs from the veterinarian were sick and the surveyed dogs were expelled parasites in childhood, and there was no disinsectization in old. The previous articles have reported that the most common nematodes in canine are *Toxocara canis* and *Ancylostoma caninum* (Fontanarrosa *et al.*, 2006). The study gained the same results as above.

In general, the infection of nematode should be higher in the young than the old, because the old should acquire the immunity. However, in our research, the infection rates of *Toxocara canis* and *Ancylostoma caninum* are lower in the young than the old, which has some differences from previous studies (Oliveira-Sequeira *et al.*, 2002; Fontanarrosa *et al.*, 2006). The reason for the lower rate in the young dogs may be they have fewer opportunities to be exposed to the conditions, on the contrary, the old are often exposed to the surrounding environment. The eggs of *Strongyloides stercoralis* and *Trichuris vulpis* were found in the feces of the old dogs, which is same to previous result described by Fontanarrosa (Fontanarrosa *et al.*, 2006).

No significant difference between male and female were found in our study, which is in conformity with forefathers' researches (Ramirez-Barrios *et al.*, 2004; Fontanarrosa *et al.*, 2006). We can acquire a preliminary determination that the infection has no relationships with gender, however, the rate of female is higher than male in Xinjiang, which may result from random searching.

Table 2: The dogs infected with different gastrointestinal nematodes in different cities in China

Area	<i>Toxocara canis</i> (%)	<i>Ancylostoma caninum</i> (%)	<i>Trichuris vulpis</i> (%)	<i>Strongyloides stercoralis</i> (%)	<i>Physaloptera</i> (%)
Ha'erbin	23.8	19.1	0	9.5	0
Guangzhou	13.3	16.7	0	20.0	23.3
Haikou	25.8	38.7	3.3	9.7	0
Jinan	8.0	8.0	0	8.0	2.7
Qinhuangdao	13.8	20.7	0	0	6.9
Shanghai	25.0	10.0	0	0	0
Shenzhen	26.7	10.0	0	10.0	10.0
Tai'an	22.2	48.9	0	6.7	0
Xinjiang	7.4	3.7	0	14.8	3.7
Zhengzhou	6.7	16.7	0	3.3	0
Total	16.5	19.0	0.3	7.8	4.2

Table 3: Infected dogs with the gastrointestinal nematode in different city in China

Variable	Number of dogs (%)	Positive dogs (%)	Odds ratio (95% ci)	P
Total	358	147 (41.7)		
Gender				
Females	193 (53.9)	81 (42.0)	1	
Males	165 (45.1)	63 (41.2)	1.171(0.766~1.790)	0.466
Age(years)				
<1	155 (43.3)	61 (39.4)	1	
1~3	102 (28.5)	40 (39.2)	1.006(0.603~1.678)	0.982
3~5	56 (15.6)	26 (46.4)	0.749(0.404~1.387)	0.357
>5	45 (12.6)	19 (57.9)	0.888(0.435~1.742)	0.730
Region				
Haerbin	21 (5.9)	11 (52.4)	1	
Guangzhou	30 (8.4)	19 (63.3)	0.637(0.205~1.978)	0.434
Haikou	31 (8.7)	17 (54.9)	0.906(0.298~2.751)	0.862
Jinan	75 (21.0)	19 (25.3)	3.242(1.190~8.831)	0.018
Qinhuangdao	29 (8.1)	9 (31.1)	2.444(0.764~7.820)	0.128
Shanghai	40 (11.2)	14 (35.0)	2.043(0.697~5.985)	0.190
Shenzhen	30 (8.4)	15 (50.0)	1.100(0.360~3.358)	0.867
Taian	45 (12.6)	27 (60.0)	0.733(0.258~2.082)	0.560
Xinjiang	27 (7.5)	8 (29.6)	2.613(0.795~8.586)	0.110
zhengzhou	30 (8.4)	7 (23.3)	3.300(0.984~11.071)	0.049

There is no significant difference among areas, besides Jinan and Zhengzhou. The reason may be that the dogs from hotel are locked up in cages for long periods, and have less chances of contact with the outside environment, so the infection rate in Jinan is lower than others. The prevalence of Guangzhou (63.3%) is higher than others because the species of animals are more than other regions, which increase the possibility of dogs are infected with nematodes, on the other hand, characteristic of the climate in Guangzhou is the semitropical climate, no cold winter and summer without the heat, plentiful rainfall, which is appropriate for the growth and dissemination of nematodes.

Nowadays, people know little about the danger of nematodes to animals and human beings, thus veterinarians should play an important role, they should increase the level of awareness of parasitic zoonoses of canine to help to reduce the spread of the disease (McCarthy and Moore, 2000; Robertson *et al.*, 2000). However, there may be lack of communication between the veterinarian and owner (McCarthy and Moore, 2000). Some parasitic disease is the zoonosis, so we need to take more precautions, use anthelmintic to pets, and keep the environment clean.

In conclusion, our study shows that canine gastrointestinal nematodes are heavily prevalent in China, which would increase the possibility of the transmission of zoonotic pathogens from sick dogs to human. It was

important to investigate the prevalence of canine gastrointestinal nematodes, as well as the factors that might increase the infection of this disease in China.

REFERENCES

- Asano K, K Suzuki, T Matsumoto, T Sakai and R Asano, 2004. Prevalence of dogs with intestinal parasites in Tochigi, Japan in 1979, 1991 and 2002. *Vet Parasitol*, 120: 243-248.
- Fontanarrosa MF, D Vezzani, J Basabe and DF Eiras, 2006. An epidemiological study of gastrointestinal parasites of dogs from Southern Greater Buenos Aires (Argentina): age, gender, breed, mixed infections, and seasonal and spatial patterns. *Vet Parasitol*, 136: 283-295.
- Gujja S, T Terrill, J Mosjidis, J Miller, A Mechineni, D Kommuru, S Shaik, B Lambert, N Cherry and J Burke, 2012. Effect of supplemental sericea lespedeza leaf meal pellets on gastrointestinal nematode infection in grazing goats. *Vet Parasitol*, 191: 51-58.
- Martínez-Valladares M, D Robles-Pérez, JM Martínez-Pérez, C Cordero-Pérez, M del Rosario Famularo, N Fernández-Pato, C González-Lanza, L Castañón-Ordóñez and FA Rojo-Vázquez, 2013. Prevalence of gastrointestinal nematodes and *Fasciola hepatica* in sheep in the northwest of Spain: relation to climatic

- conditions and/or man-made environmental modifications. *Parasite Vector*, 6: 282.
- McCarthy J and TA Moore, 2000. Emerging helminth zoonoses. *Inter J Parasitol*, 30: 1351-1359.
- Oliveira-Sequeira T, A Amarante, T Ferrari and L Nunes, 2002. Prevalence of intestinal parasites in dogs from São Paulo State, Brazil. *Vet Parasitol*, 103: 19-27.
- Ramírez-Barrios RA, G Barboza-Mena, J Muñoz, F Angulo-Cubillán, E Hernández, F González and F Escalona, 2004. Prevalence of intestinal parasites in dogs under veterinary care in Maracaibo, Venezuela. *Vet Parasitol*, 121: 11-20.
- Robertson I, P Irwin, A Lymbery and R Thompson, 2000. The role of companion animals in the emergence of parasitic zoonoses. *Inter J Parasitol*, 30: 1369-1377.
- Sechi S, M Giobbe, G Sanna, S Casu, A Carta and A Scala, 2010. Effects of anthelmintic treatment on milk production in Sarda dairy ewes naturally infected by gastrointestinal nematodes. *Small Ruminant Res*, 88: 145-150.
- 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.