Peertechz

Life Sciences Group

International Journal of Veterinary Science and Research

DOI http://dx.doi.org/10.17352/ijvsr.000019

CC By

Ngetich Wyckliff[1]*, Jafred Kitaa[1], Andrew Thaiyah[1], Ndichu Maingi[2], Jamleck Bundi Muriuki[1] and Evaline Chepkirui[1,2]

[1]Department of Clinical Studies, University of Nairobi, Nairobi, Kenya
[2]Department of Veterinary Pathology, Microbiology and Parasitology, University of Nairobi, Nairobi, Kenya

Dates: Received: 10 March, 2017; **Accepted:** 17 April, 2017; **Published:** 18 April, 2017

***Corresponding author:** Dr.NgetichWyckliff, Graduate Student, Department of Clinical Studies, University of Nairobi, P.O. Box 29053 00625,Nairobi, Kenya, Tel: +254723291893; E-mail: wyckymos@gmail.com

Keywords: Dogs; Helminthes; Prevalence; Zoonosis; Nairobi; Kenya

https://www.peertechz.com

Research Article

Coprological Study to Determine the Prevalence of Intestinal Helminthes in Dogs of Nairobi, Kenya- A Potential Zoonotic Threat

Abstract

A cross sectional coprological study was undertaken to determine the prevalence of intestinal helminths. Demographic data on sex, age, purpose of dog keeping, sleeping area, fecal disposal and deworming status in dogs in Kangemi area of Nairobi, Kenya was also taken. A total of 255 dog feacal samples were collected from August to October, 2016 for parasitological analysis. Laboratory examination for worm eggs identification and enumeration was done using modified Mc Master technigue. Ninety samples were positive for intestinal parasites giving an overall prevalence of 35.29%. On average there were 952 and 512.5 epg for hookworms and ascarids respectively. In the sampled dogs, Ancylostoma eggs were found in 79 (30.98%), Toxocara eggs in 24 (9.41%), Trichuris eggs in 2 (0.0078%), Isosporaoocysts in 3 (0.011%) and Tapeworms in 1 (0.0039%) of samples. *Ancylostomumcaninum* (90.48%) and *Toxocaracanis* (71.54%) were the most prevalent species identified. There was no signifigant statistical difference between dog sex and worm load (P=0.9). There was high prevalence of Ascarid infection among puppies (62.5%) as compared to adults (37.5%). Most dogs (92.55%) were kept for security purposes with 53.33% not housed. In households from which samples were collected, 43.64% dispose dog feces to the nearest bush while 26.36% and 30% dispose it to garbage and pit latrines respectively. The high prevalence of potential zoonotic gastrointestinal helminthes in the study area poses health risk to the residents and calls for regular dog deworming and creation of public awareness.

Introduction

Companion animals, especially dogs, are important in the lives of people in different societies throughout the world. They contribute to the physical, social and emotional wellbeing of both children and adults, as they reduce diseases caused by stress Kutdang et al. 2010, along side use in therapeutic programs, life-saving actions, hunting, sports, income generation through breeding and sale and in scientific research [1].

Despite the signifcant benefits dogs offer to the society, they are associated with various health hazards, including the possibility of transmission of zoonotic diseases [2]. The potential health risk of enteric parasites harboured by dogs to humans remains a signifcant problem in most parts of the world [3]. With the rise in urbanisation, the dog population is on the rise with stray or semi-domesticated dogs taking the lead [4]. In urban settings, especially in slums that are densely populated and have poor sanitation, dog feces is one of the major important environmental pollutant as it is not regurlaly removed. Parasite eggs hatch in the environment to infective stages that pose a risk to humans especially children who may ingest these eggs or larvae and consequently become infected Kutdang et al. 2010. Infected dogs accessing public places such as parks and picnic sites may be sources of infection to other animals and humans. Dog ownership is considered to be a risk factor for the occurrence of Human infections by dog gastrointestinal parasites [5].Toxocariosis and ancylostomosis are the most important parasites affecting companion animals worldwide [6], and have been recognized as zoonosescausing severe diseases in immunosuppressed individuals, fetus or very young or old and malnutritioned individuals [5].

Approximately 36% of dogs in United States are infected with helminths of zoonotic importance Samuel et al. 2001. Mahmuda et al. 2012, reported 89.3% infection in Ethiopia while Muhairwa et al. 2008, estimated 67.2% prevalence of dog helminthic infection in Tanzania. Makau et al. [7], reported prevalences of dog hookworms and ascarids of 33.7% and 6% respectively in Kawangware slums of Nairobi, Kenya.

Citation: Wyckliff N, Kitaa J, Thaiyah A, Maingi N, Muriuki JB, et al. (2017) Coprological Study to Determine the Prevalence of Intestinal Helminthes in Dogs of Nairobi, Kenya- A Potential Zoonotic Threat. Int J Vet Sci Res 3(1): 025-029. DOI: http://dx.doi.org/10.17352/ijvsr.000019

The aim of this study was to determine the prevalence ofgastrointestinalhelminths of dogs from Kangemi area of Nairobi, with particular emphasis on Hookworms and Toxocara species.

Materials and Methods

Study area

This study was conducted in Kangemi ward, a low social class location in Westlands sub-county, Nairobi County in Kenya. Kangemi is located on the outskirts of the city at 1.2693° S, 36.7442° E. The study area was purposively selected because there were no previous studies on Dog gastrointestinal parasites in this slum compared to the adjacent neighbourhood of Kawangware slum [7].

Sampling

A total of 255 fecal samples were collected from dogs in the study area between August and October, 2016. A systematic random sampling technique was used whereby the first dog was selected randomly and every fifth other dog was sampled. The dog was restrained and approximately 10 gramms of faecal sample collected directly from the rectum. Recently defecated faeces (within the last 10 minutes prior to collection in the kennels) were also collected using gloved hands. The samples were then transported in a cool box to the parasitology laboratory in the department of Veterinary Pathology, Microbiology and Parasitology, University of Nairobiand stored at 4°C before examination. All the samples were examined and analysedusing the modified McMaster technique described in the MAFF manual [8], and by Urquhart et al. [9]. In the laboratory, samples were examined with the naked eye for adult worms, worm larvae or presence of tapeworm segments. Microscopic examination was done to identify and enumerate parasite eggs as per morphological characteristics and keys as outlined by Soulsby [10], and MAFF manual [8]. The identification of Toxocara species was based on the egg morphology according to Thiepont et al. [11]. Hookworm positive samples were cultured and larvae recovered according to Kaufmann (1996). The identification of different species was done based on the keys outlined by Nolan, [12].

The sampled dogs were classified according to the purposes for which they were kept including breeding, companionship, security or hunting. The age of the dogs was categorised as puppy for those less than one year and adults for those more than one year. Other demographic characteristics obtained were sex and breed (purebreedsvs crossbreeds). A dog was termed purebreed if it belonged to a recognised breed while a crossbreed was a combination of a number of genes including the local dogs. A dog was considered positive when atleast one parasite egg, adult worm, tapeworm segment or an oocyst was found in the fecal sample regardless of wether it is of zoonotic importance or not.

Ethical clearance

Permission was obtained from Faculty of Veterinary Medicine Ethical committe on Biosafety, Animal Care and Use, University of Nairobi, Kenya. Individual consent from dog owners was obtained prior to sample collection from their dogs.

Data analysis

Data were entered in Microsoft Excel and analysed using Stata® statistics (version 9.0; Stata Corporation, College Station, USA) for determination of frequencies in demographics and parasitic infestations and densities as shown by coprological results on Eggs per gram analysis. Descriptive statistics were computed and descriptive tables generated from the laboratory results. The association between variables was tested using Pearson Chi square test and $p<0.05$ significance level.

Results

Characteristics of sampleddogs

A total of 255 dogs were sampled and feces (204 from the rectum and 51 from the ground) collected for coprological analysis. Out of these, 127 (49.8%) were females and 128 (50.2%) were males. There were 124 (48.63%) adults and 131 (51.37%) puppies. Of the sample size, 223 (87.45%) were crossbreed dogs while 32 (12.55%) were pure breeds. For these dogs sampled, 236 (92.55%) were kept for security purposes while the remaining 19 (7.45%) were companion animals. On assessment on where the dogs sleep during the night, 7 (2.75%), 111 (43.53%) and 137 (53.73%) were found to be sleeping in the Human houses, Kennels and outdoors respectively. Out of 110 households that were included in this study, 33 (30%) disposed dog feces into the pit latrines, 29 (26.36%) to the nearby garbage and the remaining 48 (43.64%) disposed it into the bush. Out of 255 dogs sampled, 26 (10.2%) were dewormed within 3 months prior to sample collection, 81 (31.76%) were dewormed more than 3 months prior to collection and the remaining 148 (58.04%) have never been dewormed.

Prevalence of gastrointestinal parasites

A total of 90 out of 255 dogs were infected with intestinal parasites giving an overall prevalence of 35.29%. In terms of sex, the overall prevalence in males was 37.50% (48/128) and 33.07% (42/127) for females however in terms of age, the overall prevalence in puppies was 37.40% (49/131) and in adults was 33.06% (41/124). Out of 90 positive cases, 48 (53.33%) were males and 42 (46.67%) were females, wherebypuppies were 54.44% (49/90) and 45.56% (41/90) adults. Ancylostoma eggs were found in 79 (30.98%) (Table 1), Toxocara eggs in 24 (9.41%) (Table 2, Figure 1), Trichuris eggs in 2 (0.0078%) and Isosporaoocysts in 3 (0.011%). One (0.0039%) sample was positive for dog tapeworm (Table 3). Out of the 90 positive samples, those with single parasitic infections were, Hookworms 63 (70%), Toxocara species 6 (6.67%), *Trichurisvulpis* 2 (2.22%), Isospora species 1 (1.11%) and there was no sample that was positive for Dog tapeworm alone. There was 20 sample with multiple parasitic infections (Figure 2) and 15 of them were those of Hookworms and Toxocara (Table 4). In the Hookworm positive samples (singly or in multiple infection), 43 (54.43%) were puppies while 36 (45.56%) were adults, however,in terms of sex, 34 (43.04%) were females and 45 (56.96%) were males. There was no significant statistical

Citation: Wyckliff N, Kitaa J, Thaiyah A, Maingi N, Muriuki JB, et al. (2017) Coprological Study to Determine the Prevalence of Intestinal Helminthes in Dogs of Nairobi, Kenya- A Potential Zoonotic Threat. Int J Vet Sci Res 3(1): 025-029. DOI: http://dx.doi.org/10.17352/ijvsr.000019

association between the age and the Ancylostomuminfection with p-value=0.514 at a confidence interval of 95%. In the Toxocara positive samples (singly or in multiple infection), 15 (62.5%) were puppies while 9 (37.5%) were adults. Out of these, 13 (54.17%) were females while 11 (45.83%) were males.

Table 1: Density of hookworm infection in dogs in Kangemi area.

Hookworm (EPG)	Freq	Percent	Cum.
0	176	69.02	69.02
100	21	80.4	77.25
200	16	6.27	83.53
300	5	1.96	85.49
400	7	2.75	88.24
500	2	0.78	89.02
600	2	0.78	89.8
700	4	1.57	91.37
800	2	0.78	92.16
900	2	0.78	92.94
1000	1	0.39	93.33
1100	2	0.78	94.12
1200	2	0.78	94.9
1300	1	0.39	95.29
1400	3	1.18	96.47
1500	1	0.39	96.86
2400	1	0.39	97.25
2600	1	0.39	97.65
2900	1	0.39	98.04
4100	1	0.39	98.43
4300	1	0.39	98.82
6000	1	0.39	99.22
7900	1	0.39	99.61
14400	1	0.39	100
Total	255	100	

Table 2: Density of Ascarid infections in dogs in Kangemi area.

Ascarids (EPG)	Freq.	Percent	Cum.
0	231	90.59	90.59
100	9	3.53	94.12
200	1	0.39	94.51
300	2	0.78	95.29
400	1	0.39	95.69
500	1	0.39	96.08
600	3	1.18	97.25
700	2	0.78	98.04
900	1	0.39	98.43
1100	1	0.39	98.82
1200	1	0.39	99.22
1400	1	0.39	99.61
1800	1	0.39	100
Total	255	100	

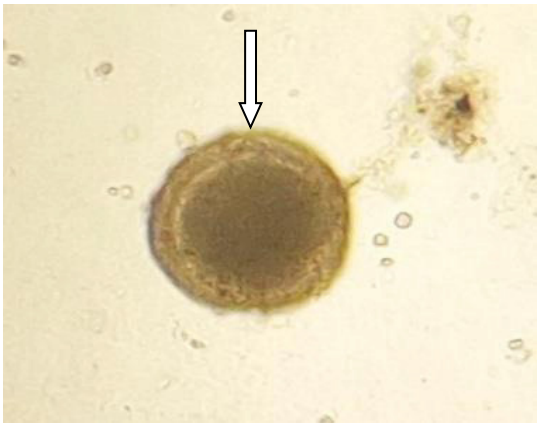

Figure 1: Single Toxocara egg.

Table 3: Density of other (specific) intestinal helminthes in dogs in Kangemi area.

Others	Freq.	Percent	Cum.
0	249	97.65	97.65
100 Dypilidium sp.	1	0.39	98.04
100 Oocysts	1	0.39	98.43
100 Trichuris sp.	1	0.39	98.82
1600 Trichuris sp.	1	0.39	98.22
400 Coccidia Oocysts	1	0.39	99.61
500 Coccidia Oocysts	1	0.39	100
Total	255	100	

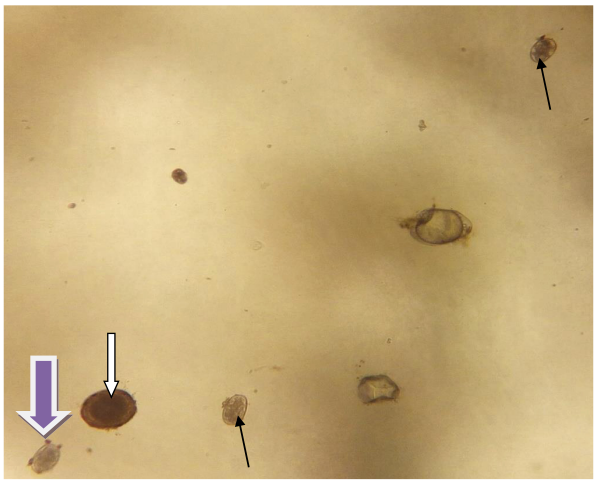

Figure 2: 2 Ancylostomum species eggs (→),Toxocara egg (⟶) and, Trichuris species egg (⟹)

There was no significant statistical association between the age and the Toxocara infection (p=0.355) at a confidence interval of 95%and there was no statistical significant difference (P=0.9) between EPG counts in males and females. There was no statistically significant correlation between deworming and worm loads (Pearson chi^2 of 1.2 and p-value=0.277) though it appeared that those dogs who had never been dewormed were at a higher risk of infection.

The parasitic egg densities were analysed and the average Eggs per Gram for intestinal parasites are presented in table 5.

Citation: Wyckliff N, Kitaa J, Thaiyah A, Maingi N, Muriuki JB, et al. (2017) Coprological Study to Determine the Prevalence of Intestinal Helminthes in Dogs of Nairobi, Kenya- A Potential Zoonotic Threat. Int J Vet Sci Res 3(1): 025-029. DOI: http://dx.doi.org/10.17352/ijvsr.000019

The most prevalent species of Hookworm was *Ancylostomumcaninum* (90.48%) while 9.52% was a combination of *Ancylostomumbraziliense* and *Uncinariastenocephala*while the most prevalent Toxocara species was confirmed to be *Toxocaracanis* (71.54%) and *Toxocaraleonina* (28.46%).

Discussion

The overall prevalence of gastrointestinal parasites (35.29%) in this study was higher than that reported by Papazahariadou et al. [13], of 26.0 % on farm and hunting dogs in Greece and Gracenea et al. [14], of 26.9% on shelter dogs in Spain. This difference could be because of the environmental conditions that may not be conducive for developments and transmission of parasitic larvae in temperate climates. However, the findings of this study were lower than those that have been reported elsewhere by other authors; Fontanarrosa et al. [15], reported 52.4% prevalence in owned dogs in Argentina while Ugbomoiko et al. [16], reported 68.4% prevalence of intestinal parasites in owned dogs in Nigeria. Another study by Okoye et al. [17], reported overall prevalence of 52.6% in stray dogs in Nigeria, while Sherry et al. [18], reported 62.6% prevalence in the Greater Accra Region, Ghana. Anene et al. [19], reported slightly higher overall prevalent of 37.6% in dogs in South Africa.

This study has established that the most prevalent dog intestinal worms in Kangemi area were hookworms at 70% with *Ancylostomumcaninum* comprising 90.5% of this. These findings were similar with what those reported by Kanyari and Kagira. [20], and Makau *et al.* [7], that the most prevalent helminthes in dogs in Kenya was *Ancylostomumcaninum.* However, Kanyari and Kagira [20], reported an overall infection density of 41%, which was higher than the findings of this study of 35.29%. The difference in the findings could be explained by the fact that the source, mode and number of samples collected as well as the ecological and epidemiological settings between the two studies were not similar. Moreover, this study obtained samples directly from the rectum whereas the latter obtained data from necropsy records of a period of 15 years.

Table 4: Multiple parasitic infections.

Parasite present	frequency	percentage
Hookworm+Toxicara	15	75
Toxocara + Trichuris	2	10
Toxocara + Tapeworm	1	5
Hookworm + Toxocara + Trichuris	1	5
Hookworm+Toxicara + Isospora	1	5

Table 5: Average egg counts for different intestinal worms.

Dog intestinal parasite	Average eggs count per gram	Range per gram
Hookworms species	952	100-14400
Toxocara species	512.5	100-1800
Trichuris vulpis	850	100-1600
Isospora oocycts	333.3	100-500
Dipylidium caninum	100	100

The other prevalent gastrointestinal parasite in this study was Toxocara species (9.41%), with *Toxocaracanis* (71.54%) and *Toxocaraleonina* (28.46%) being prevalent. Anene et al. [19], in South Africa reported a lower prevalence of 31.5% for *T. canis*. However, the lower prevalence observed in this study for *Toxocaraleonina* was similar to that reported by Neves et al. [21]. It was also noted that the prevalence of *Trichurisvulpis* in this study was higher than 0.6% reported by Makau et al. [7], in Kawangware. The average eggs per gram counts of Hookworms and Ascarids in this study were moderately lower than what was reported by *Makau et al.* [7]. The high prevalence of both hookworms and ascarids in puppies is consistent with the findings of Overgaauw and van Knapen. [22].

There was a correlation between age and ascarids worm infestation. Puppies were more infested (62.5%) than adults (37.5%). Similar findings were reported in a study done by *Swai et al.* [23], who found 24% of puppies positive for Toxocara infection while only 3% of adults were positive. This could be attributed to the lifecycle and transmission of ascarids in dogs. A part from being infected by dirt pica, puppies are also infected in utero and trans-mammarilly through suckling infected mothers. There was no significant difference between sex and worm infestation on this study (X^2= 2.1 at 1df and margin of error of 5%). Hadizadeh and Sharifi [24], in their study also concluded that there was no statistical significance between dogs as far as gender was concerned.

In general, this pattern of helminthosis densities in dogs found by this study is consistent with other studies [7,15]. The observations in this study may be attributed to poor sanitation, close interaction between dogs and children and lack of or insufficient toilets for disposal of human wastes noted in the study area. The existence of stray or semi-domesticated dogs that move around was implicated as a factor contributing to the observed worm load as they may contaminate soil with parasites eggs present in their feces. Disposal of human and dog feces in the garbage or bush may also provide a crucial source of infections to dogs and probably children in the study area. This is consistent with a study done by *Rubel et al.* [25], who reported high densities of gastrointestinal parasites in dogs from lower social-economic level.

The presence of helminthes of zoonotic importance is noteworthy because most dogs were not housed and were likely to be infected and therefore pose a potential health risk to persons living in the slum of Kangemi area.

Conclusion

The results of this study showed that dog gastrointestinal worms are prevalent in lower socio-economic area of Kangemi. Among those present, zoonotic canine hookworms and Toxocara densities are high posing a potential risk to persons living and working in this area. This implies that regular deworming of dogs, improving hygienic conditions and public awareness creation would help control and or prevent these infections on both dogs and humans. There is need for research to be done on helminth eggs and larvae in soil and worm load in children to ascertain environmental contamination and zoonotic aspects of these helminthes, respectively.

Citation: Wyckliff N, Kitaa J, Thaiyah A, Maingi N, Muriuki JB, et al. (2017) Coprological Study to Determine the Prevalence of Intestinal Helminthes in Dogs of Nairobi, Kenya- A Potential Zoonotic Threat. Int J Vet Sci Res 3(1): 025-029. DOI: http://dx.doi.org/10.17352/ijvsr.000019

Acknowledgement

We are grateful to the University of Nairobi and particularly the department of Veterinary Pathology, Microbiology and Parasitology together with Otieno, Edith, Rose and Kipruto for the technical support offered in sample analysis.

References

1. Anene B, T Nnajiand Chime A (1995) Internal parasitic infections of dogs in the Nsukka area of Enugu State, Naigeria. Prev Vet Med 27: 89-94.

2. Chomel BB, Ben S (2011) Zoonoses in the bedroom. Emerg Infect Diseases 17: 167–172. Link: https://goo.gl/pZNBJx

3. Fontanarrosa MF, Vezzani D, Basabe J, Eiras DF (2006) An epidemiological study ofgastrointestinal parasites of dogs from Southern Greater Buenos Aires (Argentina): Age, gender, breed, mixed infections, and seasonal and spatial patterns. Vet Parasitol136: 283–295. Link: https://goo.gl/F5CBsk

4. Gracenea M, Soledad Gomez, M Torres J (2009) Prevalence of intestinal parasites in shelterdogs and cats in the metropolitan area of Barcelona (Spain). ActaParasitol 54: 73–77. Link: https://goo.gl/82btMv

5. Hadizadeh T, Sharifi I (1994) The prevalence of intestinal helminths in stray dogs in Kermancity, Iran. Iran JournalofPublic Health 23: 13-24. Link: https://goo.gl/Ft8MXx

6. Kagira JM, Kanyari PW (2001) Parasitic diseases as causes of mortality in dogs in Kenya.Department of Pathology, Microbiology and Parasitology University of Nairobi. Israel Journal ofVet Med. Link: https://goo.gl/K4kacz

7. Lee AY, Vlasuk GP (2003) Recombinant nematode anticoagulant protein c2 and otherInhibitors targeting blood coagulation factor VIIa/tissue factor. Journal of Internal Medicine 254: 313–321. Link: https://goo.gl/SEny4Y

8. MAFF (1986) Manual of Veterinary Parasitological Laboratory Techniques. Ministry ofAgriculture, Fisheries and Food, Reference Book 418. HMSO, London, pp. 5.

9. Makau DN, Mulei CM, Mutembei HM, Muraya J, J W Aleri (2015) Assessment offecal parasitism for decision making in continued deworming of slum stray dogs in Nairobi areas of Kenya. Jounal of Veterinary Medicine and Animal Health 7: 328-330. Link: https://goo.gl/xBmYuT

10. McCarthy, J Moore A (2000) Emerging helminthes zoonoses. Int J Parasitol 30: 1351–1360. Link: https://goo.gl/Yb5L0j

11. Neves D, Lobo L, Simoes PB, Cardoso L (2014) Frequency of intestinal parasites in pet dogs from an urban area (Greater Oporto, Northern Portugal). Vet Parasitol 200: 295–298. Link: https://goo.gl/D83aLa

12. Nolan Thomas (2008) Lungworms, strongyloides, Spirurids and Filarids. In VPTH 603Veterinary Parasitology, University of Pennsylvania School of Veterinary Medicine. Lab 4 appendix.

13. Okoye IC, Obiezue NR, Okorie CE, Ofoezie IE (2011) Epidemiology of intestinalhelminth parasites in stray dogs from markets in south-eastern Nigeria. Journal of Helminthol 85: 415–420. Link: https://goo.gl/hNdG4i

14. Overgaauw PAM, VanKnapen F (2013) Veterinary and public health aspects of Toxocaraspp.Vet Parasitol, 193: 398–403. Link: https://goo.gl/Dj53ZU

15. Overgaauw PAM, van Zutphen L, Hoek D, Yaya FO, Roelfsema J, et al. (2009) Zoonotic parasites in fecal samples and fur from dogs and cats in The Netherlands. Vet Parasitol 163: 115–122. Link: https://goo.gl/9EEjnC

16. Papazahariadou A, Founta A, Papadopoulos E, Chliounakis S, Antoniadou-Sotiriadou K et al. (2007) Gastrointestinal parasites of shepherd and hunting dogs in the Serres prefecture, Northern Greece. Vet Parasitol 148: 170–173. Link: https://goo.gl/3FO9Fb

17. Rubel D, Zunino G, Santillan G, Wisnivesky C (2003) Epidemiology of toxocaracanisinthe dog population from two areas of different socioeconomic status, Greater Buenos Aires, Argentina. Vet Parasitol 115: 275–286. Link: https://goo.gl/wy0Wto

18. Sherry AM, Daniel WG, Paul GM, John DM, NdichuM (2015) Prevalenceof gastrointestinal helminths and management practices for dogs in the Greater Accraregion of Ghana. Heliyon 1: e00023. Link: https://goo.gl/kV0bYr

19. Sousby E J L, 1982. Helminths, arthropods and protozoa of domesticated Animals.7thedn Lea &Lebiger, Philadelphia, PA, pp: 203–206. Link: https://goo.gl/aOR8a5

20. Swai ES, Kaaya EJ, Mhanga DA, Mbise EW (2010) A survey on gastro Intestinal Parasites ofNon Descript design and around Arusha Municipality, Tanzania. IntJournal ofAnim Vet Adv 3: 63-67. Link: https://goo.gl/ynBimZ

21. Szabova E, Juris P, Miterpakova M, Antolova D, Papajova I et al. (2007) Prevalence of important zoonotic parasites in dog populations from the Slovak Republic. Helminthologia 44: 170–176. Link: https://goo.gl/40DBlQ

22. Thienpont D, F Rochette, Vanpariji OFJ (1986)Diagnosing helminthosis byCoprological examination.Second Edition. Jansen Research Foundation, Beerse, Belgium. 112-125. Link: https://goo.gl/LHrG4q

23. Traversa D (2012) Pet roundworms and hookworms: A continuing need for global warming Parasites & Vectors. Journal of Parasites & Vectors 5: 91. Link: https://goo.gl/ULS72P

24. Ugbomoiko U S, Ariza L, Heukelbach J (2008) Parasites of importance for human health inNigerian dogs: High prevalence and limited knowledge of pet owners. BMC Vet Res 4: 49. Link: https://goo.gl/nsQsA7

25. Urquhart GM, Armour J, Duncan JL, Dunn AM, Jennings FW (1996) Veterinary Parasitology, 2ndedn Blackwell Science Ltd, Oxford, pp: 53–73. Link: https://goo.gl/IF1VuR

Citation: Wyckliff N, Kitaa J, Thaiyah A, Maingi N, Muriuki JB, et al. (2017) Coprological Study to Determine the Prevalence of Intestinal Helminthes in Dogs of Nairobi, Kenya- A Potential Zoonotic Threat. Int J Vet Sci Res 3(1): 025-029. DOI: http://dx.doi.org/10.17352/ijvsr.000019