SCREENING FOR OVA OF ENDOHELMINTHS OF DOMESTICATED DOGS IN OWERRI, NIGERIA

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Abstract:

Dogs are hosts of zoonotic helminths in countries that are socio-economically disadvantaged including Nigeria. Therefore, a randomized survey of gastrointestinal helminthic infections of domesticated dogs in metropolitan Owerri of Imo State, Nigeria, was undertaken to evaluate the current status of helminthiasis in domesticated dogs in Owerri using the direct smear method to parasitologically identify the helminthes in faecal dog samples. An infection rate of 63.3% was obtained from the faecal samples of one hundred and eighty (180) dogs. The highest occurring helminth egg was of *Ancylostoma caninum* (35.1%) while the least helminth egg recovered was of *Toxocara canis* (1.75%). An equivalent prevalence value of 5.26% was recorded for *Taenia multiceps*, *Toxascaris leonina* and *Echinococcus granulosus.* Although mixed infections with more than one helminth species was noted, the main objective was to isolate and record the occurrence of each parasite per dog. Community health control measures should be mounted in households with dog companions since these helminths are of significance in zoonoses of hydatidosis, visceral and ocular larval migrans, covert helminthiasis or neurohelminthiasis especially in children who mostly belong to the infection risk group.

Key words: Screening, ova, endohelminths, domesticated, dogs, Owerri, Nigeria

Introduction

Canines especially dogs are pivotal in the transmission of a number of zoonotic helminths in both developing countries that are socio-economically disadvantaged and developed ones (Gualazzi *et al*., 1986; Gillespie *et al*., 1991; Deplazes *et al*., 2011; Dagmawi *et al*., 2012; Abulude, 2019; Safarov *et al*., 2022). In affected communities, poor hygiene practices and a lack of veterinary attention have jointly exacerbated the risk of disease transmission. The varying prevalent rates of reported gastrointestinal (GI) helminthic infections were due to different risk factors such as age, sex, locality and the management methods adopted by the owners.

Bitches are the main sources of infection for their offspring during pregnancy and lactation periods via colostrum and milk but they can also be re-infected by ingesting immature larvae defecated by their suckling puppies. However, dogs of all ages can acquire infections by ingesting embryonated eggs contained in the environment and eating paratenic hosts such as ruminants, birds, rodents and invertebrates that harbour tissutal larvae (Morgan, 1997; Traversa, 2012). It is not uncommon to find infected dogs that show no symptoms of helminthiasis though most helminthes such as the hookworm, cause serious acute gastrointestinal haemorrhage due to their blood-sucking activity. The resultant anaemia due to rapidly developing blood loss, especially in puppies, may lead to death (Miller, 1965).

In Nigeria, surveys have been conducted on the prevalence and morbidity associated with intestinal parasitism of dogs (Idika *et al*., 2017; Chanding *et al*., 2018; Amadi *et al*., 2021, Jajere *et al*., 2022). Nigerians share a close relationship with semi-domesticated dogs, and often allow them to roam freely in their houses without kernels. Stray dogs occasionally are also found within homes. In other locations, traditional husbandry is practiced where dogs are raised for consumption as meat but generally, most dogs are used for security purposes. Since dogs live in close proximity to humans, contamination of man's food, water and hands with infective stages of these helminths can lead to helminthic infections with serious consequences (Robertson *et al*., 2000).

The complete lack of veterinary and/or public health attention, places such households or communities at increased risk of acquiring canine parasitic zoonoses. An accurate taxonomic identification of these helminthes, is the first prerequisite to successfully implement control measures because one of the most significant risk factors for human infections with dog-transmitted helminths could be signified by deficiency of effective anti-helminthic management associated with the absence of parasitological surveys (Fernandes *et al*., 2022; Safarov *et al*., 2022).. Thus, the present study, in the light of a previous survey (Awujo *et al*., 2004) was undertaken to evaluate the current status of helminthiasis in domesticated dogs in Owerri so as to provide an updated data, suggest implementable measures to minimize the risks to the human population, medically manage and drastically reduce the infection rates.

Materials and Methods

Study area and sample collection

Faecal samples, over a one-month period, were collected from one hundred and eighty (180) domesticated dogs from homes spread across Owerri municipality in Imo State, Nigeria. Faecal samples deposited within the premises of the homes of dog owners, were variously retrieved in the early morning hours, packaged into wide-mouthed plastic container, kept at 4^0C and promptly transported in an ice-packed box to the laboratory within 24 hours for parasitological processing and examination.

Microscopic examination of faecal samples

The direct smear method was used to parasitologically identify the helminthes.

A small quantity of faecal sample (approximately 0.5mg) was taken (by a dipping a swab stick into the stool) and transferred to a drop of normal saline previously placed on a glass slide. The faecal sample was emulsified and spread evenly whilst ensuring that any large particle present was

removed. The faecal emulsion was then covered with a cover slip and the slide mounted on the stage of a binocular microscope under low power (x40 magnification). The slide was thoroughly examined to confirm the presence or absence of the eggs of helminthes. This method is particularly useful for the identification of eggs of *Ascaris*, *Taenia* and *Toxascaris* species. This process was repeated but this time using the 10% Lugol's iodine instead of the normal saline. This method is particularly useful for the identification of the cysts of helminthes (Oyerinde, 1999).

Results and Discussion

Out of a total of 180 dogs examined, the rate of helminthic infection was 63.3% (Table 1). Furthermore, infection with the hookworm, *Ancylostoma caninum* was the most prevalent helminthic infection (35.1%) whilst *Toxocara cati* had the least prevalence (1.75%). The prevalence of *Taenia multiceps*, *Toxascaris leonina* and *Echinococcus granulosus* was of the same magnitude (5.26%). The results in Table 2 show that generally, more male dogs (59.6%) were infected than female dogs (40.4%). The prevalence of helminthes was highest (45.6%) in younger dogs (0.3 years) and least (19.3%) in older dogs i.e. dogs that were more than 7 years old (Table 3).

Table 1: Occurrence of intestinal helminthes in domesticated dogs in Owerri (n=180)

Type of helminth	Number of infected dogs	Percentage (%) infectivity
Ancylostoma caninum	40	35.1
Dipylidium caninum	34	29.8
Taenia multiceps	6	5.26
Trichuris vulpis	8	7.02
Ascaris lumbricoides	12	9.84
Toxascaris leonina	6	5.26
Echinococcus granulosus	6	5.26
Toxocara canis	2	1.75
Toxocara cati	0	0
Total	114	63.3

Table 2: Distribution of GI helminths in male and female domesticated dogs

Helminth	Male	Female
A. caninum	22(32.4)	18(39.1)
D. caninum	24(35.3)	10(21.7)
T. multiceps	5(7.35)	1(2.17)
T. vulpis	6(8.82)	2(4.35)
A. lumbricoides	4(5.88)	8(17.4)
T. leonina	5(7.35)	1(2.17)
E. granulosus	2(2.94)	4(8.7)
T. canis	0	2(4.35)
T. cati	0	0
Total	68(59.6)	46(40.4)

Figures in parentheses represent percentages

Table 3: Prevalence of helminthes in faecal samples of dogs of different ages

Age of dogs (years)			
Helminth	0-3	4-7	≥8
Ancylostoma caninum	24(46.2)	16(40.0)	0
Dipylidium caninum	4(7.69)	15(37.5)	15(68.2)
Taenia multiceps	5(9.62)	0	1(4.55)
Trichuris vulpis	3(5.77)	4(10.0)	1(4.55)
Ascaris lumbricoides	11(100)	1(2.50)	0
Toxascaris leonina	2(3.85)	2(20.0)	2(9.09)
Echinococcus granulosus	2(3.85)	1(2.50)	3(13.6)
Toxocara canis	1(1.92)	1(2.50)	0
Toxocara cati	0	0	0
Total	52(45.6)	40(35.1)	22(19.3)

Figures in parentheses represent percentages

This current study has shown that helminths continue to be major parasites of dogs in Owerri. The overall prevalence of helminthic infection of 63.3% obtained in this current study is higher than the prevalence of 39.8% of GI parasites

detected in dogs surveyed in eleven Nigerian States (Kimani *et al.*, 2021), comparable with the prevalence of 61.4% reported by Abulude (2019) however, in stray dogs in Lagos but lower than the reports of 77.9% by Jajere *et al*. (2022) in Northeastern Nigeria. The results obtained previously (Awujo *et al*., 2004) and herein shows that *Ancylostoma caninum* continues to be the most prevalent parasite of dogs just as was also recorded by Idika *et al.* (2017), Abulude (2019), Amadi *et al*. (2021) and Jajere *et al*. (2022) who variously recovered the parasite at a highest prevalence of 33.2%, 44.2%, 62.5% and 40.2% in Enugu, Lagos, Abia and Northeastern States of Nigeria respectively. The prevalence of GI helminths noticeably varies from one geographic region to another depending on the animal species, genera of helminth involved and local environmental conditions such as temperature, humidity, rainfall, vegetation and management practices (Robertson *et al*., 2000, Oliveira-Sequeira *et al*., 2002; Traversa *et al*., 2014). Therefore, for any formulation and implementation of a worm control strategy to be successful, it is essential that surveillance of the prevalence of these parasites within a given locality be conducted periodically. The prevalence of *Ancylostoma caninum* and *Dipylidium caninum* eggs recorded in this present study, is worrisome even though it is slightly lower than the prevalence of 67.8% that was obtained in the same study area more than a decade and half ago (Awujo *et al*., 2004). This infers that while dogs are still a common sight in the community, the level of dog care still begs for attention. No *T. cati* egg was recovered perhaps due to the fact that none of the dog owners bred cats and since it is mostly a parasite of cats than dogs, the possibility of its transmission is rare (Oyerinde, 1999).
Again in this present study, no reason could be adduced to explain why male dogs were more susceptible to helminthic infections than their female counterparts.

Conclusion

Given the high prevalence of zoonotic helminths in dogs, it should best be assumed that in this modern time, the problem of using prophylactic, metaphylactic and chemotherapeutic measures against helminthiasis in dog populations and protecting domestic animals and humans from them, has not lost its significance; on the contrary, its importance is growing. GI helminths are proven zoonotic and human parasites and therefore, public health control measures including proper environmental and personal hygiene such as housing of dogs in kernels and routine de-worming of both dogs and humans are essentially recommended for enhancement especially with children who are prone to infection due to their close relationship with their companion dogs.

Competing interests

The author declares no conflict of interests

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References

Abulude OA 2019. Prevalence of intestinal helminth infections of stray dogs of public health significance in Lagos metropolis, Nigeria. *International Annals of Science*, 9(1): 24-32.

Amadi ANC, Obeten PI & Chukwuemeka BC 2021. Prevalence of helminths parasites among dogs and risk factors of zoonotic infections by dog owners in Bende Local Government Area, Abia State, Nigeria. *Nigerian Journal of Parasitology*, 42(2): 275-286.

Awujo NC, Chinweike-Umeh SN, Udujih O, Anyanwu, UJ & Uzochukwu C 2004. Helminthic parasites of dogs in an eastern state of Nigeria [Abstract 55]. Book of Abstracts of the 28th Annual Conference of the *Nigerian Society for Parasitology*, Owerri, Imo State, Nigeria, September 22nd-25th, 2004. P. 63.

Chanding AY, Umar YA, Tenshak JT & Ibrahim S 2018. Prevalence study of gastrointestinal helminth in domestics dogs (*Canis familiaris*) slaughtered in selected abattoirs in Plateau State, Nigeria. *Open Science Journal*, 3(1): 1-13.

Dagmawi P, Mekonnen A, Abebe F & Berhanu M 2012. Prevalence of gastrointestinal helminthes among dogs and owners perception about zoonotic dog parasites in Hawassa Town, Ethiopia. *Journal of Public Health and Epidemiology*, 4(8): 205-209.

Deplazes P, van Knapen F, Alexander S & Paul AM 2011. Role of pet dogs and cats in the transmission of helminthic zoonoses in Europe, with a focus on echinococcosis and toxocarosis. *Veterinary Parasitology*, 182: 41–53.

Fernandes FD, Guerra RR, Ries AS, Cargnelutti JF, Sangioni LA & Vogel SFF 2022. Gastrointestinal helminths in dogs: occurrence, risk factors, and multiple antiparasitic drug resistance. *Parasitology Research*, 121(9): 2579-2586.

Gillespie SH, Pereira M & Ramsay A 1991. The prevalence of *Toxocara canis* ova in soil samples from parks and gardens in the London area. *Public Health*, 105(4): 335-339.

Gualazzi DA, Embil JA & Pereira LH 1986. Prevalence of helminth ova in recreational areas of Peninsular Halifax, Nova Scotia. *Canadian Journal of Public Health*, 77(2): 147-51.

Idika IK, Onuorah EC, Obi CF, Umeakuana PU, Nwosu CO, Onah DN & Chiejina SN 2017. Prevalence of gastrointestinal helminth infections of dog in Enugu State, South Eastern Nigeria. *Parasite Epidemiology and Control*, 2(3): 97-104.

Jajere SM, Lawal JR, Shittu A, Waziri I, Goni DM & Fasina FO 2022. Epidemiological study of gastrointestinal helminthes among dogs from Northeastern Nigeria: a potential public concern. *Parasitology Research*, 121(7): 2179-2186.

Kimani J, Massetti L, Olubade T, Balami JA, Samdi KM, Traub RJ, Colella V & Gonzalez-Miguel J 2021. Canine gastrointestinal parasites as a potential source of zoonotic infections in Nigeria: a

nationwide survey. *Preventive Veterinary Medicine*, 192: 105385.

Miller TA 1965. Influence of age and sex on susceptibility of dogs to primary infection with *Ancylostoma caninum*. *The Journal of Parisitology*, 51(5): 701-704.

Morgan U 1997. High prevalence of *Ancylostoma* species infection in dogs associated with endemic focus of human cutaneous larval migrans in Tacuarembo, Uruguay. *Veterinary Parasitology*, 3: 131-134.

Oliveira-Sequeira TC, Amarante AF, Ferrari TB & Nunnes LC 2002. Prevalence of intestinal parasites in dogs from Sao Paulo State, Brazil. *Veterinary Parasitology*, 103(1-20): 19-27.

Oyerinde JPO 1999. *Essentials of Tropical Medical Parasitology*. 1st (English) edition. University of Lagos Press, Lagos, Nigeria. Pp 422. ISBN 13: 978-9780176150.

Robertson ID, Irwin PJ, Lymbery AJ & Thompson RC 2000. The role of companion animals in the emergence of parasitic zoonoses. *International Journal of Parasitology, 30I*(12-13): 1369-1377.

Safarov A, Mihalca AD, Park G-M, Akramova F, Ionicã AM, Abdinabiev O, Deak G & Azimov D 2022. A survey of helminths of dogs in rural and urban areas of Uzbekistan and the zoonotic risk to human population. *Pathogens*, 11(10): 1085.

Traversa D 2012. Pet roundworms and hookworms: a continuing need for global warming. *Parasites and Vectors*, 5: 1-19.

Traversa D, Frangipane di Regalbono A, Di Cesare A, La Torre F, Drake J & Pietrobelli M 2014. Environmental contamination by canine geohelminths. *Parasites and Vectors*, 7: 1-9.