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Survey of zoonotic gastrointestinal parasites of dogs (*Canis familiaris*) slaughtered at Zuru area, Kebbi state, Nigeria

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ABSTRACT

A survey of zoonotic gastrointestinal parasites in dogs (*Canis familiaris*) slaughtered at Zuru and Bedi dog markets in Zuru Local Government Area of Kebbi state was conducted between the May, 2007 to July, 2007. A total of 52 faecal samples (33 males and 19 females) were collected after the evisceration of the intestinal contents. The faecal samples were collected from the intestines immediately after evisceration. The faecal samples were analyzed using Zinc sulfate floatation technique. The study showed an overall prevalence of gastrointestinal parasites to be 41(78.85%), with all the parasites found to have zoonotic potential. The prevalence for the various helminth eggs observed were: *Uncinaria stenocephala* 21(32.31%), *Ancylostoma spp.* 10(15.38%), *Toxocara canis* 7(10.77%), *Isospora spp*. 6(9.23%), *Dipylidium caninum* 5(7.69%), *Taenia spp*. 5(7.69%), *Strongyloides stercoralis* 5(7.69%), *Alaria spp*. 4(6.15%) and *Toxocara leonina* 2(3.07%). Parasites of zoonotic importance are highly prevalent in Nigerian dogs, as such public health enlightenment should target dog consumers, butchers, owners; and the prohibition of stray dogs through policy legislation and enforcement as possible control measures.

1. Introduction

The domestic dog *(Canis familiaris*) is generally considered as the first domesticated mammal and has co-existed with man as a working partner and house pet in all eras and culture since days of the cave dwellers (Davis and Valla, 1978; Brickner, 2002). However, in spite of the beneficial effects, close bonds of dogs and humans (in combination with inappropriate human practices and behavior) remain a major threat to public health, with dogs harbouring a bewildering number of infective stages of parasites transmissible to man and other domestic animals (McCarthy and Moore, 2000; Robertson *et al*., 2000; Molyneux, 2004). Zoonotic disease such as visceral and ocular larva migrans caused by *Toxocara canis* and cutaneous larva migrans caused by *Ancylostoma brasiliense* are some zoonotic aspects of some intestinal helminth infections in dogs (Belding, 1965; Smyth, 1994; Andresiuk *et al.*, 2007). In addition, dogs have been reported to act as transport host of many roundworms of man when they ingest infected human faeces (Hayward, 2004).

The clinical signs of parasitic infections in dogs are varied and occasionally some infected animals may present no symptoms (Ramirez *et al*., 2004). These factors, coupled with inadequate information by dog keepers on the risk of disease transmission, control of zoonoses transmitted by domestic animals, control of stray dogs and poor level of hygiene has resulted in an increased risk of exposure to zoonoses transmitted by these animals (Oliveira-Sequeira *et al.*, 2002; Sowemimo and Asaolu, 2008).

In Nigeria, in addition to the role of dog as a companion animal, dog serves to provide an important source of protein to man. Dog meat is a delicacy and highly sought for in many parts of the country (Dada *et al.*, 1979). In many African countries, including Nigeria, appropriate policies regarding pet ownership and their effects on individual and community health are nonexistent. Prevalence of parasite infection in dogs with importance for human health is usually high, resulting in risk of zoonotic transmission from dogs to humans. The risk is further increased by unfavourable ecological and behavioral factors (Dada *et al.*, 1979; Malgor *et al.*, 1996; Patz, 2002).

The main objective of the study was to determine the diversity and prevalence of the zoonotic intestinal helminths in slaughtered dogs (*Canis familiaris*) in Zuru Local Government Area, Kebbi state, Nigeria and the potential zoonotic significance of the parasites.

2. Materials and methods

2.1. Study Area

The study was conducted at Zuru Local Government Area of Kebbi state, Nigeria. Zuru is in the Southeastern part of Kebbi state, Northwest, Nigeria. It lies between the latitudes $11^0$15' to $11^0$55'N and longitudes $4^0$35' to $5^0$47'E (John, 1993). It falls within the Sudan Savanna with a mean annual rainfall of 1022mm and the mean minimum and maximum temperatures of 24.6^0C and 28.0^0C respectively (Yatsawako *et al*., 2007). The human population according to the 2006 census was 165,547 out of which 82,941 were males and 82,606 were females; occupying a landmass of 653 kilometres square (National Bureau of Statistics, 2007).

2.2. Sample Collection

Samples were collected from two locations, within and around Zuru. The sampling method was sampling by convenience. A total of 52 samples were collected for analysis, 14 samples were obtained from Unguwar Zuru and 38 from Bedi area of Zuru town. The samples were collected in a well labeled sterile 10ml plastic bottle following evisceration of the gastrointestinal tracts of the slaughtered dogs. The collected samples were transported to the Department of Veterinary Public Health and Preventive Medicine laboratory within 24 hours of collection and were either examined immediately or refrigerated at 4^0C.

2.3. Parasitological Examination

3.3.1. Zinc Sulphate Centrifugal Floatation Technique

An approximate 1gm of faeces was mixed in 5ml of water in a test tube, the mixture was sieved through a tea strainer into a 15ml centrifuge tube and the floatation solution was added until almost full. The Zn_2SO_4-faecal mixture (Specific gravity 1.20) was then centrifuged at 2000 rpm for 4 minutes, the tube was then removed from the centrifuge and more floatation solution was added until a convex meniscus was visible at the top of the tube (WHO, 1991). A cover slip was gently placed on the top of the tube and was left for ten minutes, the cover slip was then removed and then transferred to a light microscope slide and examined under 10x objective first and 40x objective for magnification.

2.4. Identification of the Parasite Eggs, Cysts and Larvae

This was based on the microscopic and morphological appearance of the eggs, cysts and larvae encountered during examination of each sample under magnification X10 and X40 objectives. Microscopic appearance of the eggs and cysts were then carefully compared with those in standard texts, literature and micrographs for proper identification.

3. Results

Out of the 52 faecal samples collected from the gastrointestinal tracts of the slaughtered dogs, 78.85% were found to harbor nematodes, cestodes, trematodes, protozoan or occurring as mixed infections.

Five species of nematodes, two of cestodes, one each of trematode and protozoan were the parasites found infecting the slaughtered dogs in the area. *Uncinaria stenocephala* had the highest prevalence of 32.31%, while *Alaria* spp. has the lowest prevalence of 6.15% (Table 1). The prevalence of the various intestinal helminths recovered in relation to the sex of the animals sampled is presented (Table 2).

Table 1
Overall prevalence of gastrointestinal helminths recovered from dogs slaughtered at Zuru Local Government Area, Kebbi state, Nigeria (n=52).

Parasite	No. of Infected dogs	Prevalence (%)
Nematode		
Uncinaria stenocephala	21	32.31
Ancylostoma spp.	10	15.38
Toxocara canis	7	10.77
Strongyloides stercoralis	5	7.69
Toxocara leonine	2	3.07
Cestode		
Dipylidium caninum	5	7.69
Taenia spp.	5	7.69
Trematode		
Alaria spp	4	6.15
Protozoan		
Isospora spp	6	9.23

Table 2
Prevalence of gastrointestinal helminths recovered in relation to the sex of the dogs slaughtered in Zuru Local Government Area, Kebbi state, Nigeria.

Sex	No. of dogs examined	No. of dogs infected	Percentage Infected (%)
Male	33	25	48.08
Female	19	16	30.77
Total	52	41	78.85

P>0.05

4. Discussion

Most of the dog intestinal helminths identified in this study are cosmopolitan in their distribution (Richter and Elmarsdottir, 1997; Oliveira-Sequeira *et al*., 2002). The overall prevalence of the intestinal parasites found in this study was 78.85%, revealing a very high level of infection. This is in agreement with other studies on stray and un-housed dogs from different part of the country. In North Western part of Nigeria, Kaduna state, a study was carried out on dogs slaughtered within Kaduna metropolis and revealed a prevalence of 95.12% (Umar, 2009). In Ilorin, North Central part of Nigeria, a similar study was conducted revealing a prevalence of 60.40% (Uade *et al*., 2008).

High prevalence of these helminthes recorded in the dogs examined is an indication of the poor level of environmental hygiene, degree of environmental contamination with infective stages, availability of intermediate host and favourable climatic conditions for the survival of infective stages outside the host (Dada *et al*., 1979). Other factors may include lack of adequate knowledge by dog owners on the role of dogs in disease transmission and the need for veterinary care. Dogs are important sources of infection for humans and constitute a relevant public health problem. Reports have shown that dogs well cared for by their owners and given proper veterinary attention had lower incidence of intestinal helminths than dogs lacking such privileges (Hayward, 2004).

Dogs killed for meat in Zuru area are mostly free ranging dogs of the local breed. These dogs scavenge in rubbish bins and are hardly dewormed or treated with acaricides by their owners thus exacerbating the risk of infection by helminths and ectoparasites.

The result also shows a high prevalence (78.85%) of parasites with the potential to infect man. All the 9 parasites identified are zoonotic in nature: *Alaria* spp. (causes of larva migrans), *Ancylostoma* spp. (causes cutaneous larva migrans and eosinophilic enteritis), *Toxocara canis* (causes visceral larva migrans), *Strongyloides stercoralis* (a cause of severe diarrhea in human infants), *Dipylidium caninum* (adult worm causes a mild enteritis in children) and *Uncinaria stenocephala* (a cause of larva migrans), *Taenia spp* larval form causes hydatid cyst disease in numerous domestic animals and man. *Isospora* spp causes Isosporiasis especially in HIV-AIDS patient.

5. Conclusion

Results of this investigation showed a high prevalence (78.85%) of gastrointestinal parasites in dogs slaughtered for human consumption in the study areas. All the parasites found in this study have zoonotic potential. The transmission of parasites between humans and dogs is principally due to contamination with dog faeces. The possibility of acquiring parasitic infection transmitted by dogs could therefore be reduced if legislation on the restriction of stray dogs are formulated and enforced. In addition, relevant agencies should embark on mass enlightenment of dog keepers on the role of dogs in disease transmission and the need to take their dogs for periodic veterinary checkup; and treatment any time dog exhibit signs of ill health.

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