Nigerian Veterinary Journal 2008 Vol. 29(2): 31 - 36

A TEN-YEAR RETROSPECTIVE STUDY OF THE PREVALENCE OF PARASITIC INFECTIONS OF DOGS AT THE UNIVERSITY OF MAIDUGURI VETERINARY TEACHING HOSPITAL, NIGERIA

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SUMMARY

A retrospective analysis of endoparasitic infections and ectoparasitic infestations among dogs brought to the Veterinary Teaching Hospital (VTH), University of Maiduguri from January, 1995 - December 2005, was undertaken. Out of a total of 651 dogs examined, 105 (16.13%) and 75 (11.52%) were positive for ectoparasites and endoparasites respectively. The endo and ectoparasitic infections showed a significantly (P<0.05) higher prevalence of 90 (52.02%) and 48 (18.68%) cases during the rainy season as opposed to the dry season prevalence of 15 (3.14%) and 27 (6.85%) cases due to endoparasitic infections and ectoparasitic infestations respectively. Peak prevalence of 14 (21.0%) due to endoparasitic infections and 18 (35.3%) due to ectoparasitic infestations were recorded from the months of July to August while the lowest prevalence of 2 (5.9%) for endoparasitic infections and 7 (20.6%) for ectoparasitic infestations were recorded in the month of December. Puppies (less than 24 months of age) had significantly (P<0.05) higher infection rate 95(16.78%) due to endoparasitic infections and 25(29.41%) due to ectoparasitic infestations than the adult dogs (greater than 24 months) while males had a significantly (P<0.05) higher prevalence 65(18.31%) due to endoparasitic and 60(16.90%) due to ectoparasitic infections than the females. The various species of endoparasites encountered in the dogs were *Ancylostoma caninum*, 41 (39.05%), *Toxocara canis* 18 (17.14%), *Diphyllidium caninum* 8 (7.62%), *Isospora canis* 36 (34.29%) and *Strongyloides canis* 1 (0.95%). The ectoparasites encountered were *Rhipecephalus sanguineous* 30 (40.0%), *Ctenocephalides canis* and *Demodex follicularum* 7 (9.33%). Regular deworming of dogs and public health education are recommended as ways of controlling parasitic infections of dogs in the arid zone.

KEY WORDS: Retrospective study, Parasitic infections, Dogs, Maiduguri, Nigeria

INTRODUCTION

Endoparasitic infections and ectoparasitic infestations are common in dogs in Nigeria (Bobade *et al.*, 1983; 1984; Baba *et al.*, 1983; Nwosu *et al.*, 1990). Following either single or mixed endoparasitic infections or ectoparasitic infestations, clinical signs such as unthriftness, anaemia, diarrhea, dehydration, electrolyte imbalance and mortality has been reported in pet and stray dogs by several workers (Soulsby, 1982; Baba *et al.*, 1983; Bobade *et al.*, 1983; 1984; Nwosu *et al.*, 1990).

The zoonotic problems associated with the occurrence of echinococosis due to the metacestode stage of the cestode *Echinicocus granulosus* or toxocariasis due to visceral larval migrans of *Toxoacara canis* larvae in man, have been attributed to close association between man and his dog (Soulsby, 1982). Sylvatic associations between bush dogs (*Spethos venaticus*) and non-human primates such as the gorillas (*Gorilla gorilla*) have also been responsible for severe outbreaks of echinococosis in zoological gardens (Grady *et al.*, 1982).

In spite of these factors, information on the prevalence of both endo and ectoparasitic infections in the arid zone of northeastern Nigeria is sparse (Nwosu *et al.*, 1990) when compared to similar reports from other geographical zones. Similarly, the recent over population of stray dogs in the area necessitated a more recent survey due to zoonotic implications.

MATERIALS AND METHODS

Study area

The Veterinary Teaching Hospital of the University of Maiduguri where the study was conducted is located in Maiduguri, the largest urban city in Borno State, in the north-eastern part of Nigeria (Udoh, 1981). Borno State lies between latitude 11° 05'N and 11° 40'N and longitude 13° 05'E and 13° 25'E within the Sahel Savannah which consist of the sub-desert lands and the transition zones between the true dessert (Sahara) and the (Sahel), with rainfall under 700mm. The rainy season lasts for only 3 to 4 months (June - September). This is followed by a prolonged dry season (October May) (Udoh, 1981).

Data collection

Records of all diagnosed and confirmed cases of endoparasitic infections and ectoparasitic infestations of dogs from January 1995 to December 2005 were collated and analyzed. Information regarding sex and age were also considered while meteorological data were collected from the National Airport Maiduguri Weather Station and Department of Geography University of Maiduguri.

Statistical analysis

The Student's *t*- test was used in pair wise comparison of prevalence rates and "p" values less than 0.05 were considered significant (Maed and Curnow, 1983) for Table II while Tables I and III were subjected to 2 x 2 contingency table for analysis of relative risk at 95% confidence limit. Chi-square for independence and trend was also employed to give a measure of strength of association between the variables under study (GraphPad Instat, 2000).

RESULTS

It was found that out of a total of 651 dog cases presented at the Hospital from January 1995 to December 2005, 105 (16.13%) were positive for endoparasitic infections while 75 (11.52%) were positive for ectoparasitic infestations. There existed a significantly ($P<0.05$) higher prevalence of 90 (52.02%) and 48 (18.68%) occurring during the rainy season as opposed to 15 (3.14%) and 27 (6.85%) due to endoparasitic infections and ectoparasitic infestations in the dry season respectively (Table I).

Peak prevalence of 14 (21.0%) due to endoparasitic infections and 18 (35.3%) due to ectoparasitic infestations were recorded in the months of July - August while the least values of 2 (5.9%) for endoparasitic infections and 7 (20.6%) for ectoparasitic infestations were both recorded for the month of December (Figure 1).

Table II summarizes the various species of endoparasites encountered in the dogs examined at the Hospital for the period. The species of endoparasites mainly encountered were *Ancylostoma caninum*, 41 (39.05%), *Toxocara canis* 18 (17.14%), *Diphyllidium caninum* 8(7.62%), *Isospora canis* 36 (34.29%), and *Strongyloides canis* 1(0.95%). The ectoparasites mainly encountered were *Rhipecephalus sanguineous* 30 (40.0%), *Ctenocephalides canis* 7 (9.33%), *Demodex follicularum* occurred in 7 (9.33%) while *Sarcoptes scabei* occurred in 11(14.67%) of the cases of ectoparasitic infestations.

The effect of age and sex on the prevalence of parasitic infections infestations in the dogs examined at the Hospital for the period is summarized in Table III. The results showed that dogs less than 24 months of age had significantly ($P<0.05$) higher prevalence of infection as compared to those greater than 24 months of age while the male dogs were significantly ($P<0.05$) more infected than the female dogs.

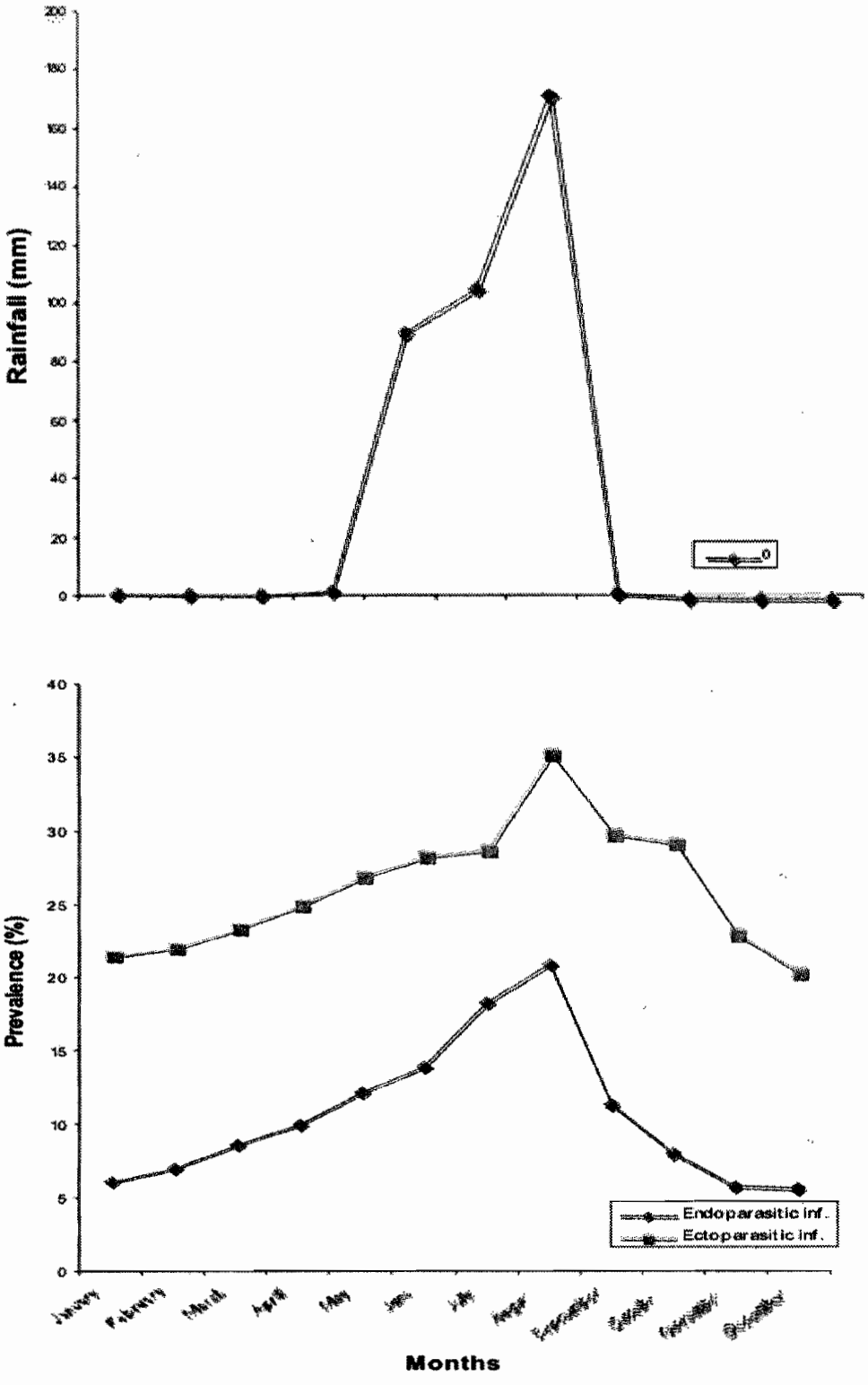
Rainfall (mm)
200
180
160
140
120
100
80
60
40
20
0
Prevalence (%)
40
35
30
25
20
15
10
5
0
Endoparasitic inf.
Ectoparasitic inf.
Months

FIGURE 1: Monthly prevalence of parasitic infections of dogs examined at the Veterinary Teaching Hospital University of Maiduguri from 1995 - 2005 in relation to rainfall.

TABLE I:Seasonal prevalence of parasitic infections of dogs examined at the Veterinary Teaching Hospital, Maiduguri from 1995 2005

	Endoparasitic infections		Ectoparasitic infestations	
	No. Examined	No. Infected (%)	No. Examined	No. Infected (%)
Wet season	173	90(52.02) [a]	257	48(18.68) [a]
Dry season	478	15(3.14) [b]	394	27(6.85) [b]
All seasons	651	105(16.13)	651	75(11.52)

Superscripted values ([a, b]) in columns differed significantly, (P<0.05) (2 x 2 contingency table, at 95% confidence for relative risk); Chi-square for independence and trend.

TABLE II: Various species of parasites encountered in dogs examined at the Veterinary Teaching Hospital Maiduguri from 1995 - 2005

	No. Examined	No. infected (%)	Species of parasites encountered		Number infected (%)
Endoparasites	651	105 (16.13) [a]	*(i)*	*Ancylostoma caninum*	41 (39.05) [a]
			(ii)	*Toxocara canis*	18 (17.14) [b]
			(iii)	*Dipylidium caninum*	8 (7.62) [c]
			(iv)	*Isospera canis*	36 (34.29) [d]
			(v)	*Strongyloide canis*	1 (0.95) [e]
Ectotoparasites	651	75 (11.52) [b]	*(i)*	*Rhipecephalus sanguineous*	30 (40.0) [a]
			(ii)	*Ctenocephalides canis*	
			(iii)	*Demodex folliculorum*	7 (9.33) [b]
			(iv)	*Sarcoptes scabei*	7 (9.33) [c]
					11 (14.67) [d]

Superscripted values ([a, b, c, d]) in columns differed significantly, (P<0.05) (*t*-test).

TABLE III: Prevalence of parasitic infections of dogs examined at the Veterinary Teaching Hospital Maiduguri according to age and sex from 1995 - 2005

		Endoparasitic infections		Ectoparasitic infestations	
		No. Exam.	No. Inf. (%)	No. Exam.	No. Inf. (%)
Parameters					
Age:	< 24 months	566	95 (16.78) [a]	85	25 (29.41) [a]
	> 24 months	85	10 (11.76) [b]	566	50 (8.83) [b]
Total		651	105 (16.13)	651	75 (11.52)
Sex:	Male	355	65 (18.31) [a]	355	60 (16.90) [a]
	Female	296	40 (13.51) [b]	296	15 (5.07) [b]
Total:		651	105 (16.13)	651	75 (11.52)

Superscripted values ([a, b]) in columns differed significantly, (p<0.05) (2 x 2 contingency table, at 95% confidence for relative risk); Chi-square for independence and trend.

DISCUSSION

The results of the present study are consistent with previous reports in other geographical zones, which revealed that endoparasitic infections are frequently encountered in dogs in Nigeria (Folaranmi *et al.*, 1982; Fabiyi, 1983; Ezeokoli, 1984; Bobade *et al.*, 1984; Nwosu *et al.*, 1990). However, the overall prevalence of 16.13% appears lower than those reported from other geographical zones of the country. A prevalence of 77.4 % was reported in the rainforest zone of the country (Baba *et al.*, 1983) while in the guinea savannah, a prevalence of 83.5% was reported (Umoh and Asake, 1982; Ezeokoli, 1984). Nwosu *et al.* (1990) reported a prevalence of 50.3% in the arid zone, which was higher than the result presented in this study but lower than the results from other regions.

The low prevalence could be attributed to the fact that high ambient temperatures (35.5°C to 45 °C) in the arid region of north-eastern Nigeria as this, has been reported to affect the development, survival and the translocation of the preparasitic stages of helminthes in the environment (Udoh, 1981; Mbaya *et al.*, 2006). Lack of strategic anthelmintic medication, coupled with high proportion of stray dogs (Nwosu, 1990) are factors that might contribute immensely to the epidemiology and enzootic nature of endo and ectoparasitism in dogs in the area.

In this study, *Ancylostoma caninum* was the most commonly encountered endoparasite followed by *Isospora canis* then *Toxocara canis*. Although *Isospora canis* is being reported to occur significantly for the first time among dogs in this area. Recent outbreaks due to *Toxocara canis* and *Ancylostoma caninum* have been reported among captive lions (*Panthera leo*) in the area (Mbaya and Nwosu, 2004; Mbaya and Aliyu 2006), while high prevalence of *Toxoascaris vitulorum* had earlier been reported in calves of less than 6 months in the area (Mbaya *et al.*, 1999). These parasites have also been reported to occur in a reservoir status among captive and free living carnivores in the arid region of north-eastern Nigeria (Mbaya *et. al.*, 2006). It is therefore probable that the two parasites are endemic in this environment.

The results also show that there exist considerable seasonal variations in the prevalence of both endoparasitic infections and ectoparasitic infestations in dogs examined in the course of the study with infections reaching their peak by mid - late rainy season. The monthly variations in the prevalence of endo and ectoparasitic infections in this present study were also greatly influenced by the peak of rains (July - August) in the arid zone. This is in consonance with earlier reports by Ezeokoli (1984) in Zaria located in the Sudan Savannah. Bobade *et al* (1984) also reported highest incidence of hookworm infection at the beginning of the rainy season in Ibadan. The prevalence of ectoparasitic infestations in dogs during the study was more during the rainy season, possibly due to the presence of the tick *Rhipecephalus sanguineous* which occurs more during the rainy season (Soulsby, 1982; 1994).

According to the results of the study, there was a significant monthly variation on the prevalence of infection. Peak prevalence for endoparasitic infection and ectoparasitic infestation recorded in the months of July to August in both cases might be associated with the effect of rainfall in the translocation and acquisition of L_3 infective larvae in the environment (Soulsby, 1994). Similarly, the prevalence of infection was highest among males than in females for both infections. The reason for the higher prevalence of infection among the males could be attributed to roaming particularly during the mating season, which increases their exposure to both endoparasitic infections and ectoparasitic infestations Bobade *et al.* (1984). On the other hand, puppies of less than 24 months had significantly ($P<0.05$) higher prevalence of infection, which might be attributed to age susceptibility, and lack of premunity (Soulsby, 1994).

Apart from the adverse effect of these parasites in dogs, *Ancylostoma caninum, Toxocara canis* and *Diphylidium caninum* are a source of public health concern (Soulsby, 1982), especially in the arid-region of northeastern Nigeria where population of stray dogs are high coupled with their indiscriminate defecation. Children of the age bracket (1-5 years) frequently adopt the habit of dirt eating, particularly soil around doorsteps, which may be heavily contaminated with *Toxocara* eggs. The ingestion of even moderate amount of soil may result in the acquisition of large amount of infective larvae of *Toxocara canis*. The extensive soiling of public parks, school playgrounds and sidewalks with faeces of dogs may be another source of infection to children (Soulsby, 1982).

Similarly, the larvae of *Ancylostoma caninum* especially in the rainy season when most children in this area walk bare footed may be susceptible to cutaneous larvae migrans (Soulsby, 1982). The presence of *Diphylidium caninum* among the dogs examined during the study in conjunction with its vector *Ctenocephalides canis* is also of public health concern. It is known that the parasite invades the tissues of man, following accidental ingestion of the dog flea *Ctenocephalides canis* (Soulsby, 1982).

CONCLUSION

From the foregoing, there is need therefore, to properly educate dog owners on the need to provide strategic anthelmintic medications and proper disposal of dog faeces. Local authorities should also be involved in controlling the increasing population of stray dogs in the area.

ACKNOWLEDGEMENTS

The cooperation of the Management and staff of the Veterinary Teaching Hospital, University of Maiduguri, Nigeria, is highly appreciated.

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