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Original Research

Prevalence of Haemoprotozoan Parasites of Dogs in Umuahia metropolis, Abia state: A Retrospective Study

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ABSTRACT

This retrospective study investigated the prevalence of haemoprotozoan parasites of dogs in Umuahia, Southern Nigeria. The study population included sick dogs presented to the Abia State Veterinary Clinic, Umuahia from 2015 to 2022. A total of 560 case files of dogs were reviewed and data were presented using descriptive statistics and analysed using Chi square to determine association of various factors with prevalence of haemoprotozoan parasite. The overall prevalence of haemoprotozoan parasite in surveyed dogs was 118 (21.10%). The young dogs had a higher prevalence of 79 (22.40%) compared to the adult 39 (18.80%). The female dogs had a higher prevalence of 77 (25.50%) than male 41 (15.90%). The local breed had a higher prevalence of 28.80% than the exotic breeds 18.50%. There was a significant association ($P < 0.05$) between haemoparasitism and sex, as well as breed of dogs surveyed. Babesia spp was the most common haemoprotozoan parasite, representing 63 (53.49%) while Anaplasma was the least abundant 3 (2.54%). Haemoprotozoan parasite spp was found to be more prevalent in young dogs than adult dogs. It was concluded that haemoparasites are prevalent among sick dogs presented at the Abia State veterinary clinic, Umuahia, and there is need to raise awareness on the prevention and control of haemoprotozoan parasite infections in dogs.

Keywords: *Babesia* spp, Dog, Haemoprotozoan, Parasite, Umuahia,

INTRODUCTION

The domestic dog (*Canis lupus familiaris*) is a member of genus Canis (canines) that forms part of the wolf-like canids (Wang & Tedford, 2010). Dogs are most likely the oldest domesticated animal and have, for many millennia, been human companions (Thalmann *et al*., 2013). They have also been of benefit to humanity in the areas of guard, meat and hunting (Duranton & Gaunet, 2016). Dogs are infected with various haemoprotozoan parasites and some of which could have zoonotic importance; referred to as canine vector-borne diseases (CVBD) in tropical countries (*Ezema et al*., 2021). The common haemoprotozoan parasites of dogs in Nigeria associated with high morbidity and mortality are *Babesia spp*, *Trypanosoma spp*, *Ehrlichia spp*, *Anaplasma spp* and *Theileria spp* (Anise *et al*., 2018). Haemoprotozoan parasites in dogs have been reported to occur worldwide (Nwoha *et al*., 2013). Haemoprotozoan infections are mainly transmitted by arthropod vectors, which poses a major health challenge in dogs because they inhabit the bloodstream and affect the cardiovascular system of the living host (Stuen, 2020). Some studies have examined the prevalence of haemoparasitic infection in different states and regions of Nigeria (Obeta *et al*., 2009; Amuta *et al*., 2010). However, there is a scarcity of data on the prevalence of haemoparasites and their associated risk factors in Abia State. Therefore, the objective of the present investigation was to determine the prevalence and risk factors (age, breed, and gender) of haemoparasites in dogs presented to the Abia State Veterinary Clinic, Umuahia.

MATERIALS AND METHODS

STUDY AREA

This study was conducted in Umuahia, the capital and largest city of Abia State, South Eastern part of Nigeria. Abia State is bordered to the North and Northeast by the States of Enugu, and Ebonyi respectively and by Imo State to the

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West, Cross River State to the East, Akwa Ibom State to the Southeast, and Rivers State to the South. Its coordinates are 5°25′N and 7°30′E. The temperature ranges from 22°C to 36°C for most part of the year. It is characterized by two distinct seasons, a long rainy season (March – November) and a short dry season (November – March).

STUDY DESIGN AND DATA COLLECTION

The population used for the study were dogs presented to the Abia State Veterinary Clinic Umuahia from 2015 to 2022. The data were based on findings after routine parasitological examinations for blood parasites and a total of 560 case files of all dogs presented to the Abia State Veterinary Clinic Umuahia within the period were used for the study. To ensure that data generated from the records were correct, three of the authors checked the records separately and documented their individual findings. Variations in the data recorded by the individual authors were crosschecked for correctness and accuracy. From the records analysed, vector-borne pathogens including *Babesia*, *Ehrlichia* and *Trypanosoma* were diagnosed using direct, thin and thick smears, as well as the buffy coat techniques. Variables such age (young and adult), sex (male and female) and breed (exotic and local) of dogs presented were also recorded.

STATISTICAL ANALYSIS

The data were presented using descriptive statistics, frequency, and percentage, and were analyzed using SPSS version 22. The prevalence was computed for every variable as the number of infected individuals divided by the total number of dogs examined and was expressed in percentage by multiplying by 100. The Chi-square test was used to determine the association between haemoparasitism and age/sex/breed. Values of $P< 0.05$ were considered significant.

RESULTS

PREVALENCE OF HAEMOPROTOZOAN PARASITE INFECTION IN DOG

A total of five hundred and sixty (560) case files of dogs of various ages, sexes and breeds were examined. The results are summarized in tables 1 to 5. The overall prevalence of haemoprotozoan parasite in dog was 118 (21.10%) (Table 1). The young dogs had a higher prevalence of 79 (22.40%) compared to the adult 39 (18.80%). Female dogs had a higher prevalence of 77 (25.50%) than male 41 (15.90%). Local breed had a higher prevalence of 28.80% than exotic breeds 18.50%. Chi-square showed association ($P < 0.05$) between haemoparasitism and sex, breed of dog (Table I).

SPECIES DISTRIBUTION OF HAEMOPROTOZOAN PARASITE SPP

The species distribution of the haemoparasite is presented in Table II. Babesia spp was the most common haemoprotozoan parasite, representing 63 (53.49%) while Anaplasma was the least abundant 3 (2.54%).

DISTRIBUTION OF HAEMOPROTOZOAN PARASITE SPP IN THE YOUNG AND ADULT DOGS

The distribution of the haemoprotozoan parasite spp across the age groups is presented in Table III. The young dogs had a higher prevalence of the haemoprotozoan parasite spp isolated when compared to the adult dogs.

DISTRIBUTION OF HAEMOPROTOZOAN PARASITE SPP IN THE MALE AND FEMALE DOGS

The female dogs had a higher prevalence of Babesia spp, Ehlirchia spp and Trypanosoma spp when compared to the male dogs. The prevalence of Babesia spp, Ehlirchia spp and Trypanosoma spp in the female dogs are 61.90%, 60.00% and 64.71% respectively (Table IV).

DISTRIBUTION OF HAEMOPROTOZOAN PARASITE SPP IN LOCAL AND EXOTIC BREEDS OF DOGS

The exotic dogs had a higher prevalence of Babesia spp, Ehlirchia spp and Trypanosoma spp when compared to the local dogs. The prevalence of Babesia spp, Ehlirchia spp and Trypanosoma spp in the exotic dogs are 68.25%, 65.71% and 70.59% respectively (Table V).

DISCUSSION

In this study, a total of 560 case files were reviewed to determine the prevalence of haemoprotozoan parasite in dogs presented to Abia State Veterinary Clinics between 2015 to 2022. The overall prevalence of 118 representing 21.10% of haemoprotozoan infection were recorded. These finding are in line with the results of Okubanjo *et al*. (2013) and Obeta *et al*. (2009) who reported a prevalence rates of 17.30% and 23.30% in Zaria and Abuja, respectively. Also, Ehimiyein *et al*. (2018) and Ezema *et al*. (2021) reported prevalence of 19.60% and 14.10% in Zaria and Maiduguri, respectively. These results however, differ from the findings of Ifeoma (2013) and Kamani *et al*. (2011) who reported a higher prevalence of 59.30% and 42.10% in Bukuru and Vom in Plateau state, respectively. These variations could be due to the sample size, or due to different ecology, which affects the population of the vectors and hence the presence of the haemoprotozoan parasites they transmit.

Babesia spp were the most prevalent haemoprotozoan parasite recorded with a rate of 53.39% and followed by *Ehrlichia spp* with a rate of 29.66% respectively. These results were in line with Ifeoma (2013) who reported a prevalence of 59.30% for haemoprotozoan parasite in dogs

Table 1: Demographic distribution and prevalence of clinical cases of haemoprotozoan parasite infection in dogs presented at Abia State Veterinary Clinic Umuahia from 2015 to 2022

Characteristic	Group	Population size	Negative sample (%)	Positive sample (%)	x^2	p-value
Age	Young	353	274 (77.60)	79 (22.40)	0.983	0.189
	Adult	207	168 (81.20)	39 (18.80)		
Sex	Male	258	217 (84.10)	41 ((15.90)	7.718	0.004*
	Female	302	225 (74.50)	77 (25.50)		
Breed	Local	139	99 (71.20)	40 (28.80)	6.601	0.008*
	Exotic	421	343 (81.50)	78 (18.50)		
Total		560	442 (78.90)	118 (21.10)		

* P<0.05 statistical significant

Table II: Prevalence of haemoprotozoan parasites species in dogs presented at Abia State Veterinary Clinic Umuahia from 2015 to 2022

Parasite genus	Number of positive isolates (N = 118)	Number of negative isolates (N = 118)	% Prevalence
*Babesi*a spp	63	55	53.39
Ehlirchia spp	35	83	29.66
Trypanosoma spp	17	101	14.41
Anaplasma spp	3	115	2.54

Table III: Distribution of the haemoprotozoan parasites species in young and adult dogs

Parasite type	Group	Number positive	Prevalence (%)
Babesia spp	Young	47	74.6
	Old	16	25.4
Ehlirchia spp	Young	23	65.71
	Old	12	34.29
Trypanosoma spp	Young	11	64.71
	Old	6	35.29
Anaplasma spp	Young	2	66.67
	Old	1	33.33

Table IV: Distribution of the haemoprotozoan parasites species in male & female dogs

Parasite type	Sex	Number of positive	Prevalence (%)
Babesia spp	Male	24	38.10
	Female	39	61.90
Ehlirchia spp	Male	14	40.00
	Female	21	60.00
Trypanosoma spp	Male	6	35.29
	Female	11	64.71
Anaplasma spp	Male	2	66.67
	Female	1	33.33

Table V: Distribution of the haemoprotozoan parasites species in local and exotic breeds of dogs

Parasite type	Breed	Number of positive	Prevalence (%)
Babesia spp	Local	20	38.75
	Exotic	43	61.25
Ehlirchia spp	Local	12	34.29
	Exotic	23	65.71
Trypanosoma spp	Local	5	29.41
	Exotic	12	70.59
Anaplasma spp	Local	3	100
	Exotic	0	0

presented to ECWA Veterinary clinic in Jos, Nigeria. Adamu *et al*. (2014) also reported a prevalence of 53.00% in dogs in Plateau State. The prevalence of Babesia spp reported herein is at variance with the findings of Kamani *et al*. (2013) and Adamu *et al*. (2012), who documented a very low prevalence of 6.60% and 2.80% for *Babesia* and *Ehrlichia spp*, respectively. These differences may be due to the seasonal variation with tick infestation and the abundant vegetative cover which serves as a conducive environment for the vectors to thrive. Abia State is in the rainforest zone with dense vegetation while Maiduguri is in the sahel savanna region with scanty vegetation (Igbawua *et al*., 2016)

In terms of age, the younger dogs were more frequently infected with haemoprotozoan parasites as compared to adult dogs in this study. This disagrees with the findings of Pam *et al*. (2013) and Phuyal *et al*. (2017) who reported a higher infectivity rate of haemoprotozoa in adult dogs. The higher prevalence in the young is in agreement with the findings of Adamu *et al*. (2017) and Okubanjo *et al*. (2013), who reported a higher prevalence in younger dogs. This could be linked to easy of clinical manifestation of disease in the young than the adult. Thus, often attract the attention of their owners and it is also, a general believe that the older dogs are strong enough to withstand disease (Adamu *et al*., 2017; Okubanjo *et al*., 2013).

A higher prevalence was recorded in female dogs (25.45%) compared to the males (15.8%) and this agrees with the works of previous researchers (Adamu *et al*., 2017; Shitta, 2009; Gadahi *et al*., 2008). This high prevalence of infection in females could be linked to increase in exposure to haemoprotozoan parasitic vectors during oestrus, and consequent contact with many males who may harbor these vectors, as well as stress being posed on female animals due to demand of reproduction, causing their immunity to be compromised (Opara *et al*., 2017). This finding is in contrast with the submissions of Subedi (2009) and Amissah-Reynolds (2016) who reported that male dogs have a significantly higher prevalence than female dogs, and attributed it to the greater propensity of male dogs to move long distances in search of bitches on oestrus and territorial establishment with consequent contact with the haemoprotozoan parasite vectors.

This study revealed that local dogs had higher prevalence (28.80%) than exotic dogs with a prevalence of (18.50%). The lower prevalence in the exotic dogs could be linked to confinement by their owners. Confined dogs have a lower prevalence rate compared to those unconfined (Ezema *et al*., 2021). It could also be due to a lack of proper care and attention given to the local dogs compared to the exotic breeds that are provided with good veterinary care (Oguche *et al*., 2020; Amuta *et al*., 2010). This finding (higher prevalence in local dogs) is at variance with the observation made by Okubanjo *et al*. (2013) who reported a lower prevalence of 17.3% in local dogs.

In conclusion, this study confirms the endemicity of haemoparasites in Abia state, Nigeria. The haemoprotozoan parasites identified in this study were *Babesia spp* (most common), *Ehrlichia spp, Trypanosoma spp and Anaplasma spp.* These findings, necessitate the adoption of sustainable control and preventive measures against the parasites and its vectors to safeguard animal and human health in the study areas.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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