

## Prevalence, Sex and Seasonal Variation of Parasitic Diseases in Dogs Presented at the Veterinary Teaching Hospital University of Jos, Plateau State between January 2015 and December 2018

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### ABSTRACT

A retrospective study of the data from clinical records of all the diagnosed parasitic infections in dogs brought for routine clinical visits to the veterinary teaching hospital, university of Jos was undertaken to determine the prevalence, sex and seasonal variation of parasitic diseases diagnosed in animals between January 2015 and December 2018. Out of the 6113 cases examined, within the study period, Helminthosis had the highest occurrence of 2846(70.83%) followed by Piroplasmosis 657(67.32%), Mange, Ectoparasitism, Ticks, Myiasis, Ehrlichiosis, fleas with 135(97.83%), 117(92.13%), 49(96.08%), 30(85.71%), 9(56.25%) and 3(100.00%) number of cases respectively. During the period under review, the year 2016 recorded Helminthosis with the highest occurrence of 1976(49.12%) followed by Piroplasmosis 245(25.08%), Ectoparasitism, Mange, Ticks, Myiasis, Ehrlichiosis and Fleas with 215(57.33%), 95(22.73%), 19(23.46%) 19(11.45%), 11(68.75%), 4(80.00%) followed by 2017 with Helminthosis 1308(32.51%), Piroplasmosis 598(61.21%), Mange 225(53.83%), Ectoparasitism 88(23.47%), Ticks 10(12.35%), Ehrlichiosis 5(31.25%) and Fleas 1(20.00%). The year 2018 recorded Helminthosis to have the highest occurrence with 737(18.32%), Piroplasmosis 134(13.72%), Mange 98(23.44%), Ectoparasitism 72(19.20%), Ticks 52(64.20%) and Myiasis, 43(23.90%) respectively. The year 2015 had the lowest occurrence of 2(0.05%) which was recorded in Helminthosis. The difference between the yearly distribution of parasitic disease was statistically significant ( $p < 0.05$ ). Based on the sex of the animals, females recorded 2032(50.51%) which is the highest in Helminthosis, followed by Piroplasmosis, Ectoparasitism, Mange, Ticks, Ehrlichiosis and Fleas with, 454(46.47%), 224(53.72%), 165(44.00%), 80(48.19%), 7(43.75%) and 1(20.00%) respectively. For males, Helminthosis showed a highest prevalence of 1760(43.75%), followed by Piroplasmosis 523(53.53%), Ectoparasitism 210(56.00%), Mange 193(46.28%), Ticks 86(51.81%), 9(56.25%) and Fleas 4 (80.00%) number of cases respectively. The difference in distribution based on season Helminthosis, Piroplasmosis, Mange, Ectoparasitism, Myiasis, Ticks, Ehrlichiosis and Fleas with 2263(50.51%), 575(58.85%), 241(57.66%), 218(58.13%) occurred during the dry season and Helminthosis, Piroplasmosis, Mange, Ectoparasitism Myiasis, Ticks, Ehrlichiosis and Fleas with 1760(43.75%), 402(41.15%), 177(42.75%), 157(41.87%), 69(41.57%), 43(53.09%) and 7(43.75%) occurred during the wet season. The difference in the distribution of cases in relation to season were statistically not significant ( $p > 0.05$ ). The present study has revealed a high prevalence of Gastro helminth parasites, whose burden was high in all the parameters measured, hence, interventions through sensitization and education of dog owners are necessary to reduce the risk of transmission of parasites from dogs to humans in the study area.

**Keywords:** Parasitic disease, Season, Dog prevalence

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## INTRODUCTION

Dogs are most likely the oldest domestic animals and have for many millennia been a human companion [1]. Dogs in Nigeria are increasingly kept as companion animals for security, hunting, breeding and as well as a source of protein among some ethnic groups [2,3].

While some of the dogs are kept on short leash, others are allowed to roam freely in public places; children play grounds, scavenging waste dumps, decaying food materials and fecal matters [4]. Dogs contaminate the environment with helminth eggs which are passed out with their feces, in most rural and urban resource limited communities making them susceptible to arthropod (endo and ectoparasite infections). Children play outdoors and adults walk the streets bare feet picking up infections from contaminated soil [4]. Diseases in dogs are therefore of great concern since they are directly or indirectly associated with the risk of transmission of pathological agent from dogs to humans [1].

Parasitism is one of the most common disease conditions seen in dogs especially in developing countries like Nigeria [5]. Parasites causes harmful effects and poses serious health challenges in domestic dogs (*Canis Lupus Familiaris*) such as reduced growth rate, generalized ill-health, lowered resistant to other infectious diseases and reduced working efficiency [5].

While studies have been conducted, parasite diseases particularly, gastrointestinal helminthes and protozoans have been had been identified as the major impediment to dog health worldwide owing to the direct and indirect loses, they cause [6].

Studies on the epidemiology of disease from various regions of Nigeria, suggest that parasitic disease are the most prevalent diseases reported [7] the prevalence of gastrointestinal parasites in local and exotic dogs in Jos South Local Government Area of Plateau State [4]. Conducted a faecal examination survey and reported gastrointestinal helminth parasites of dogs in Ilesa Osun State, Nigeria [8]. Parasitic disease of dogs in Osun State, South-West Nigeria and its zoonotic implications [9]. Prevalence of zoonotic gastrointestinal parasite burden of local dogs in Zaria and its Implication on human health, Northern Nigeria.

In areas of high population density such as Urban and Peri-urban dog keeping practices may also be risk to the transmission of zoonosis [10].

The major risk factors affecting epidemiology of Helminthosis and other gastro intestinal tract parasites can be classified broadly as parasitic factors, host factors and environmental factors [11].

Although, analysis of dog parasitic diseases has been conducted earlier on in the state by [7] the authors wish to determine the recent distribution of dog parasite diagnosed over three years period (2015-2018) in Jos teaching hospital

and suggest possible control measures. A good knowledge of epidemiology, seasonal variation of parasitic disease of dogs is important for their prevention or control as well as their zoonotic implication and public awareness to the community which necessitated this study.

## MATERIAL & METHODS

Clinical records of cases diagnosed and confirmed cases of parasitic diseases of dogs presented to the small animal clinic of the university of Jos veterinary teaching hospital, Plateau State, Nigeria, were obtained from January 2015 to December 2018. Diagnosis of each disease was carried out in the clinic in the conventional way by the use of case history and clinical signs [12] while, cases were confirmed in the laboratory by collecting blood and faecal samples and examining them with the help of a light microscope [12] for the presence of different parasites. Data generated were analyzed using descriptive statistics (frequency and percentage) and chi square test to determine the effect between categorized variables of parasite, year, sex and season in association with the occurrence of parasites.

## RESULTS

Out of the 6113 cases examined, within the collation period, Helminthosis had the highest occurrence of 2846(70.83%) followed by Piroplasmosis 657(67.32%), Mange, Ectoparasitism, Ticks, Myiasis, Ehrlichiosis, fleas with 135(97.83%), 117(92.13%), 49(96.08%), 30(85.71), 9(56.25%) and 3(100.00) number of cases respectively (**Table 1**). Based on years, 2016 recorded Helminthosis with the highest occurrence of 1976(49.12%) followed by Piroplasmosis 245(25.08%), Ectoparasitism, Mange, Ticks, Myiasis, Ehrlichiosis and Fleas with 215(57.33%), 95(22.73%), 19(23.46%) 19(11.45%), 11(68.75%), 4(80.00%) followed by 2017 with Helminthosis 1308(32.51%), Piroplasmosis 598(61.21), Mange 225(53.83%), Ectoparasitism 88(23.47%), Ticks 10(12.35%), Ehrlichiosis 5(31.25%) and Fleas 1(20.00). The year 2018 recorded Helminthosis to have the highest occurrence with 737(18.32%), Piroplasmosis 134(13.72%), Mange 98(23.44%), Ectoparasitism 72(19.20%), Ticks 52(64.20%) and Myiasis, 43(23.90%) respectively. The year 2015 had the lowest occurrence of 2(0.05%) which was recorded in Helminthosis (**Table 2**). Based on the sex of the animals, Females recorded 2032(50.51%) which is the highest in Helminthosis, followed by Piroplasmosis, Ectoparasitism, Mange, Ticks, Ehrlichiosis and Fleas with, 454(46.47%), 224(53.72%), 165(44.00%), 80(48.19%), 7(43.75%) and 1(20.00%) respectively. For males, Helminthosis showed a highest prevalence of 1760(43.75%), followed by Piroplasmosis 523(53.53%), Ectoparasitism 210(56.00%), Mange 193(46.28%), Ticks 86(51.81%), 9(56.25%) and Fleas 4 (80.00%) number of cases respectively (**Table 3**). The difference in distribution based on season Helminthosis, Piroplasmosis, Mange, Ectoparasitism, Myiasis, Ticks, Ehrlichiosis and Fleas with 2263(50.51%), 575(58.85%),

241(57.66%), 218(58.13%) occurred during the dry season and Helminthosis, Piroplasmosis, Mange, Ectoparasitism, Myiasis, Ticks, Ehrlichiosis and Fleas with 1760(43.75%), 402(41.15%), 177(42.75%), 157(41.87%),

69(41.57%), 43(53.09%) and 7(43.75%) occurred during the wet season (Table 4).

**Table 1.** Distribution of parasitic diseases in dogs as presented to the University of Jos, Veterinary teaching Hospital Jos from January 2015 to December 2018.

Disease	Blood	Feces	Sample	Total	Prevalence Rate (%)
Ectoparasitism			117(92.13%)	127(2.35%)	2.37
Fleas			3(100.00%)	3(0.06%)	0.06
Helminthosis		2846(70.83%)		4018(74.42%)	74.91
Mange			135(97.83%)	138(2.56%)	2.57
Myiasis			30(85.71%)	35(0.65%)	0.65
Piroplasmosis	657(67.32%)			976(18.08%)	18.20
Ticks			6(0.61%)	51(0.94%)	0.95
Ehrlichiosis	4(25.00%)			3(18.75%)	0.03

*P value* = <.0001; *DF* = 20;  $\chi^2$  = 3546.129

**Table 2.** Distribution of parasitic diseases in dogs by year as presented to the University of Jos, Veterinary teaching Hospital Jos from January 2015 to December 2018.

Diseases	2015	2016	2017	2018	Total	Prevalence rate (%)
Ectoparasitism	0(0.00%)	215(57.33%)	88(23.47%)	72(19.20%)	375(6.13%)	6.19
Fleas	0(0.00%)	4(80.00)	1(20.00%)	0(0.00%)	5(0.08%)	0.08
Helminthosis	2(0.05%)	1976(49.12%)	1308(32.51%)	737(18.32%)	40.23(65.81%)	66.39
Mange	0(0.00%)	95(22.73%)	225(53.83%)	98(23.44%)	418(6.84%)	6.10
Myiasis	0(0.00%)	19(11.45%)	104(62.65%)	43(23.90%)	166(2.75%)	2.74
Piroplasmosis	0(0.00%)	245(25.08%)	598(61.21%)	134(13.72%)	977(15.98%)	16.12
Ticks	0(0.00%)	19(23.46%)	10(12.35%)	52(64.20%)	81(1.33%)	1.34
Ehrlichiosis	0(0.00%)	11(68.75%)	5(31.25%)	0(0.00%)	16(0.26%)	0.26

*P value* = <.00001\*; *DF* = 33;  $\chi^2$  = 613.46

## DISCUSSION

Results obtained in this study have demonstrated that dogs in Jos, Plateau State are commonly infected with Helminthosis and several other parasitic infections. According to the three-year retrospective studies, the aggregate prevalence of Helminthosis is 74.9% which is less than an earlier report [7] on the disease in dogs in Jos South LGA of Plateau State which reported a prevalence of 100%. Conversely, scientists [13] reported a lower prevalence rate of 60.53% in selected dog abattoirs in Jos, Plateau State. The prevalence observed in this study may differ from that of other authors in Jos, Plateau state, because the data obtained was not population-based, but restricted to dogs presented to the University

Teaching Hospital, where pet holders are believed to be reasonably aware of the advantages of deworming practices. Earlier reports from other parts of Nigeria [8] reported a prevalence of 71.8% in Osun State, and another study [14] in Ibionu LGA of Akwa Ibom State, with 74% prevalence rate. However, relatively lower prevalence was recorded in Zaria 33.9% by [9], 56.9% in Calabar, Cross River State, Nigeria. The high prevalence of Helminthosis may be attributed to poor environment and kennel hygiene, poor housing, access to veterinary services, difference in socio-economic status of dog keepers, favorable climatic conditions for the survival of the infective stages outside the host may have contributed to the differences in prevalences of intestinal helminths among dogs in different parts of Nigeria and in the study areas in

**Table 3.** Distribution of parasitic diseases in dogs by season as presented to the University of Jos, Veterinary teaching Hospital Jos from January 2015 to December 2018.

Disease	Dry	Rainy	Total
Ectoparasitism	218(58.13)	157(41.87)	375(6.13)
Fleas	5(100.00)	0(0.00)	5(0.01)
Helminthosis	2263(56.25)	1760(43.75)	4023(66.39)
Mange	241(57.66)	177(42.34)	138(2.56)
Myiasis	97(53.43)	69(41.57)	166(2.72)
Piropasmosis	575(58.85)	402(41.15)	977(15.98)
Ticks	38(46.91)	43(53.09)	81(1.33)
Ehrlichiosis	9(56.25)	7(43.75)	16(6.13)

*P value = 0.1846; DF = 11; X<sup>2</sup> = 14.953*

**Table 4.** Distribution of parasitic diseases in dogs by sex as presented to the University of Jos, Veterinary teaching Hospital Jos from January 2015 to December 2018.

Disease	Female	Male	Total	Prevalence rate (%)
Ectoparasitism	165(44.00%)	210(56.00%)	375(6.14%)	6.19
Fleas	1(20.00%)	4(80.00%)	5(0.01%)	0.08
Helminthosis	2032(50.51%)	1991(49.49%)	4023(65.82%)	66.39
Mange	224(53.72%)	193(46.28%)	417(6.82%)	6.88
Myiasis	80(48.19%)	86(51.81%)	166(2.72%)	2.74
Piroplasmosis	454(46.47%)	523(53.58%)	977(15.98%)	16.12
Ticks	43(53.09%)	38(46.91%)	81(1.33%)	1.34
Ehrlichiosis	7(43.75%)	9(56.25%)	16(0.26%)	0.26

*P value = 0.0228; DF = 11; X<sup>2</sup> = 22.21*

particular. A total of 976 (18.20%) cases of piroplasmosis were encountered during this study, the high density of infected vectors in Jos [15] may be responsible for this, however, the increased helminth infection and reduced protozoan infection is most likely to be due to decreased routine use antihelminthics in contrast to what have been observed in the other studies [16,17]. Environmental conditions is suitable for survival. Myiasis, Mange, flea infestation and tick infestation, have been known to affect dogs in different parts of Nigeria [18,16]. Tick-borne haemopathogens such as Babesia, Ehrlichia, Anaplasma, Borrelia and Hepatozoon are of major health concern to dogs and cause severe economic damage to dog owners, some of which are of zoonotic significance [19].

It was observed in this study that, the prevalence of parasitic diseases was higher during the dry season, as compared to the rainy season, this variability was also observed in earlier reports [20] of 18.48% between 1998 and 2008 in Jalingo. The study attributed that this is the period some of the climatic factors which are optimal for the proliferation of the etiology agent; hence favoring helminth nematodes multiplication and spread. However, the environmental stress experienced during the dry season might exert a negative influence on the immune system of the host, thereby increasing the likelihood for infection to occur. Ticks, regarded as the largest non-microscopic ectoparasites, are the most important vectors that infest animals, transmit a wide range of pathogens from infected to non-infected hosts [21].

During dry seasons, some parasites and their eggs are possibly dehydrated and desiccated owing to harsh weather conditions which make rainy season favorable for their multiplication and infestation. In conclusion, the result of the present study has shown that the prevalence of parasitic diseases especially helminthosis, piroplasmosis and other tick-borne diseases is relatively high in the environs of the hospitals during the study period. It is recommended that there should be proper sensitization and public awareness on the need for proper health care for dogs, considering the public health implications and dangers associated with their indiscriminate roaming. Dog owners should also imbibe the culture of proper control and prevention measures to ticks and tick-borne diseases through regular tick bath.

This study therefore recommends periodic, continuous sensitization and surveillance to detect parasites of zoonotic significance, environmental sanitation should be enforced by the Government of Plateau State, Nigeria. Further study could be carried out on humans associated with dog keeping or handling to determine the level of dog associated human infections in Plateau State, Nigeria [22].

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