Direct Research Journal of Veterinary Medicine and Animal Science
Vol. 8(1), Pp. 1-6, July 2023
ISSN: 2734-2166
DOI: https://doi.org/10.26765/DRJVMAS17833122
Article Number DRJVMAS17833122

https://directresearchpublisher.org/drjvmas

Original Research

Prevalence of Haemoparasites in the Nigerian Breed of Dogs in Lafia Area of Nasarawa State, Nigeria

Anzaku, E. A.[2], Faith, E. A.[2]*, Bala, A.[1], Abdullahi, A.N.[2]

[1]National Veterinary Research Institute (NVRI) Vom, Plateau State, Nigeria.
[2]Department of Animal Science, College of Agriculture, Science and Technology Lafia, P.M.B. 33, Nasarawa State, Nigeria.
Corresponding Author E-mail: faithelijah2013@gmail.com

Received 7 June 2023; Accepted 25 June 2023; Published 3 July 2023

ABSTRACT: The objective of this study was to investigate the common haemoparasites of the Nigerian mixed breed dog in Lafia, Nasarawa State. One hundred and sixty (160) mongrel dogs of different ages and sexes in Nasarawa state, north central Nigeria were sampled. 5 ml of blood was collected aseptically from the cephalic vein of 74 male and 86 female dogs in the government veterinary clinic, project quarters, millionaire quarters and Lafia metropolis. Blood samples from 160 Nigerian breed dogs aged 4 to 21 months were analyzed for the prevalence of haemoparasites. All means are given as standard deviations, which were compared using a one-way analysis of variance (ANOVA) at 95% significant level ($P<0.05$). The prevalence of haemoparasites was found to be five 10 (12.80%). Male dogs were found to have a prevalence rate of 6 (16.2%) compared to 4 (8.14%) in female dogs. Babesia canis was the only haemoparasite isolated in this study. There was a significant (p0.05) difference in the packed cell volume of the infected males compared to the females. It is therefore concluded that there is paucity of control/ treatment measures of haemoparasites infection in mongrel dogs and thus the need to re-strategize the management of this disease.

Keywords: Prevalence, haemoparasites, Nigerian, breeds, dogs
Citation: Anzaku, E. A., Faith, E. A., Bala, A., Abdullahi, A.N. (2023). Prevalence of Haemoparasites in the Nigerian Breed of Dogs in Lafia Area of Nasarawa State, Nigeria. Direct Res. J. Vet. Med. Anim. Sci. 8(1), Pp. 1-6. https://doi.org/10.26765/DRJVMAS17833122

INTRODUCTION

Several haemoparasites of dogs causes diseases of public health importance. The domestic dog (*Canis lupus familiaris* or *Canis familiaris*), is a member of genus Canis (canines) that forms part of the wolf-like canids (Wang and Tedford, 2010). Dog is the most widely abundant carnivore (Vilà *et al*., 1999; Thalmann *et al*., 2013), selectively bred over other animal due to its various capabilities such as behavioural, sensory and physical attributes (Dewey and Bhagat, 2002; Perri, 2016). Apart from Trypanosomosis, dogs are constantly challenged by other haemoparasites such as Babesiosis and Anaplasmosis which causes anaemia. Babesiosis is one of the most important haemoparasites of animals (Lako *et al.,* 2007*),* including dogs. The disease is found throughout Africa, Asia, Europe, the Middle East, North America and America where it affects dogs (Taboada *et al.,* 1998). In tropical and subtropical regions of the world, vector-borne diseases commonly occur in various species of animals (Irwin and Jefferies, 2004; Elelu *et al*., 2016). Globally, dogs have been documented to be infected by different haemoparasites such as bacteria, viruses and eukaryotic parasites, which are transmitted through different arthropod vectors such as ticks and mosquitoes causing huge morbidity and mortality (Otranto *et al*., 2009). Furthermore, the geographical expansion of tick vectors influenced by the climatic changes and movement of humans together with their pets increase the vulnerability of dogs to infections

(Otranto *et al*., 2009; Gray *et al*., 2009). These groups of diseases cause huge economic losses to both livestock and pet animal owners due from mortality, hospital bills and loss in productivity.

Despite the zoonotic significant of some if the haemoparasites of the dog and its closeness to man, there is dearth of information on the prevalence of haemoparasitic diseases of dogs in Nasarawa State. Therefore, this study was aimed to evaluate the common haemoparasites of the Nigerian mongrel breed of dog.

MATERIALS AND METHODS

Experimental animals

One hundred and sixty (160) mongrel dogs of different ages and sexes in Nasarawa State, in the North Central part of Nigeria were sampled.

Sample collection

5mls of blood samples were collected aseptically from the cephalic vein of 74 male and 86 female dogs in the State veterinary clinic, project quarters, millionaires' quarters and Lafia metropolis (Figure 1). Dogs were restrained properly with the help of assistant. The cephalic vein was disinfected on the left limb and right limb using methylated spirit and appropriate pressure was applied using tourniquet around the radius and ulna to allow a sufficient distension of the external cephalic vein. A 23 gauge, 1.2 inches sterile needle and 5ml syringe were used to withdraw blood samples from the cephalic vein. A separate syringe and needles were used on each dog. The collected blood samples were quickly transferred into a sterile bottle containing anticoagulant (Ethylene diamine). The needle was always detached from the syringe before empting the blood into the sterile bottles after every withdrawal. This was done to prevent rapture of the red blood cells during forceful passage through the narrow hollow. All collected samples were labeled at the time of collection and transported to the laboratory on ice-park.

Laboratory techniques

All collected labeled blood samples were subjected to laboratory analysis within six hours of collection. Two methods were used in the examination of the blood samples. These include, thin smear and haematocrit centrifuge techniques.

Thin smear preparation

A drop of blood was placed at about 1/23 of the length of clean dry grease free glass slide of 450 and drawn backwards to make contact with the blood and allowed to spread along the edge of the spread. It was then drawn forward to make a thin smear. This smear was allowed to air dry and then fixed in methyl alcohol for 5 minutes. A Giemsa stain was diluted with suffered distilled water of pH 7.2 at the ratio of 1:9 was used for staining the dried smear for 30 to 45 minutes. The dried smear for 30 to 45 minutes. The slide was then drained washed and blot dry. A thin larger of immersion oil was placed on the slide and scanned under the light microscope at x 100 objective lens.

Haematocrit centrifuged technique and packed cell volume (PCV)

After blood samples were collected, they were stored in EDTA bottles. The blood was mixed thoroughly and microhaematocrit capillary tubes were filled to about three quarters with 0.05ml of blood. One end with plastiscal by holding the tube vertically above the plastiscal and then pushing down firmly into it, while twisting at the same time. The tubes were loaded in the microhaematocrit centrifuge with the sealed end out ward and centrifuge at 12,000 revolutions per minutes for 5 minutes. The readings were taken using a haematocrit reader in percentage (%).

Examination of haemoparasites

All Giemsa stained, thin blood smears and smear of white blood cell were examined under light microscope at x 100 objective (using oil immersion objective) for the identification of both intracellular and extracellular parasite.

Statistical analysis

The standard deviation for each mean is shown in (Table 3), and all means were compared using one-way analysis of variance (ANOVA). When $P<0.05$ differences were deemed significant.

RESULTS

A total of one hundred and sixty (160) mongrel dogs of different ages and sexes were sampled for the presence of haemoparasites. Out of these, 86 (53.75%) were female and 74 (46.25%) were male. Among the female 8 (95.3%) were found to be infested with ticks and 4 (4.7%) were not infested. Out of the 80 infested females 4 (4.9%) were infected with the haemoparasite *Babesia canis* (Figure 2). Out of 74 males sampled 68 (91.9%) were found to be infested with ticks and 36 (8.1%) were infected with the haemoparasite *Babesia canis* (Table 1). Table 2 shows the prevalence of *Babesia canis* in

Figure 1: Blood collection from dogs

Table 1: Prevalence of Haemoparasites in Dogs in Lafia.

Age group (months)	No of dogs examined	Type of haemoparasite (%)	No infected (%)
4 – 6	14	*Babesia canis*	2(14.3)
7 – 9	42	*Babesia canis*	4(9.5)
10 – 12	30	Nil	0
12 – 15	28	*Babesia canis*	2(7.1)
16 – 18	32	Nil	0
19 – 21	14	*Babesia canis*	2 (14.3)
Total	160		10(6.25)

Table 2: Prevalence of babesia canis infection in relation to the prevalence of ticks among the various age.

Age group (month)	No of dogs examined	No (%) infected with Babesia	No (%) of dogs infected with tick
4 – 6	14	2(14.3)	14(100.00)
7 – 9	42	4(9.5)	48(95.7)
10 – 12	30	0	30(100.00)
12 – 15	28	2(7.1)	14(78.60)
16 – 18	32	0	30(93.8)
19 – 21	14	2(14.3)	14 (100.0)
Total	160	10(6.35)	150(93.75)

mongrel dogs in relation to the presence of ticks in the area covered during the sampling and the result obtain showed that Babesia species and ticks seem to be common at the age of seven to nine months. The only haemoparasite obtained was *Babesia canis* while others were not isolated because features seen on the microscope with blood smear appeared large piroplasm, pyriform in shape 4 – 5um in length, pointed at one end and round at the other and there is a vacuole in the cytoplasm. Tables 3 and 4 show the comparison of the prevalence of the haemoparasite between the male and the female mongrel dogs, a statistical mean and standard deviation (Mean $\pm$ 9.1) of 33.7$\pm$0.57 and 32.5$\pm$0.07 for infected dogs and (45.6$\pm$5.78 and 45.4$\pm$5.23) for non-

Table 3: Mean ±SD packed cell volume of babesia infected and babesia free dogs examined on age group mean ± SD Packed Cell Volume.

Age Group	Babesia (infected)	Babesia-Free
4 – 6	32.0±0.00e	44.2±7.22
7 – 9	33.5±0.71q	44.3±5.98l
10 – 12	0.00±0.00i	47.4±4.45j
13 – 15	34.0±0.00k	43.8±4.87l
16 – 18	0.00±0.00m	4.65±5.42n
19 – 21	33.0±0.00^{o}	46.3±5.28p

Row with different superscripts are statistically significant (P<0.05)

Table 4: Mean ± SD Packed cell Volume of Babesia infected and babesia free Dogs examined Mean + SD Packed Cell Volume.

Sex	Number Examined	Babesia infected	Number Examined	Babesia Free
Male	3	33.7±0.57a	34	45.6±5.78b
Female	2	32.5±0.70e	41	45.4±5.23d

Rows with different superscripts are statistically significant (P<0.05).

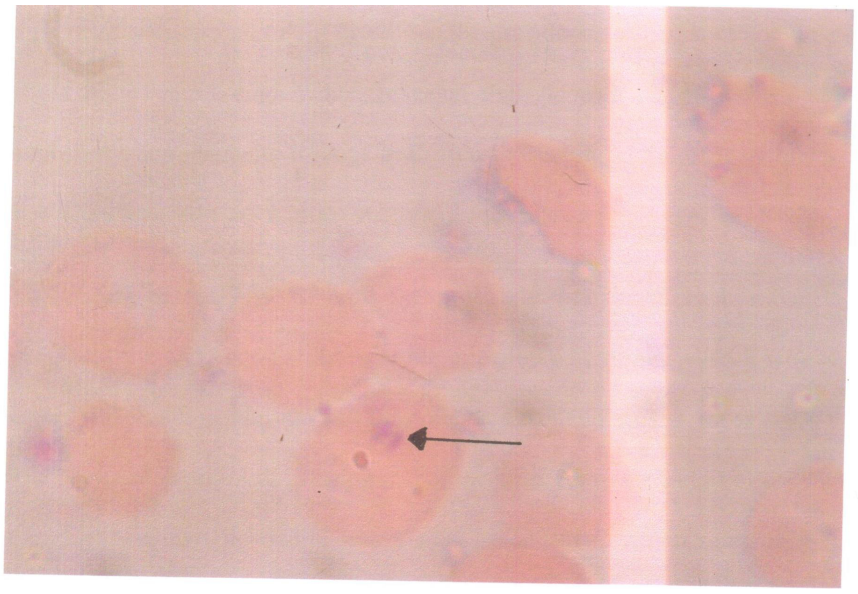

Figure 2: Babesia canis within a red blood cell (arrow) × 100

infected dogs respectively. P<0.05 shows a significance difference between sexes.

DISCUSSION

This study was carried out to determine the prevalence of haemoparasites and their effect on mongrel dogs which revealed that *Babesia canis* is the most important haemoparasite in dogs in this North-central region of the country and similar survey have been made in other country (Mwosu and Ikeme, 1992). The ability of the host to limit the peak and number of each wave of parasiteamia and even to eliminate the infection determines when it will be acute, sub-acute or chronic and thus outcome of the disease (Anosa, 1980).

The Nigerian breed of dogs being one of the most common breeds of dogs in Lafia the North-central part of Nigeria was used. The rate of infection sampled was higher in males' mongrel dogs 6 (8.1%) than in female

4(4.7%). The possibility could be due to the dominancy and scavenging habits of the male dogs. Infection was also higher in dogs less than one year old. This could be due to the movement habits of young dogs and as such are more exposed to infection as well as being immunological naïve (Fallah *et al.,* 1995).

According to Davidson *et al.* (1978) the prevalence of *Babesia canis* infections within a population of dogs is not necessarily indicated by the number of dogs with clinical signs or haematological abnormalities which is similar to this study. This fact is important in areas in which haemoparasite is not endemic especially in region (Ahmed *et al.,* 1992). Grove and Vap (1975), reported that apparent infection can be maintained for more than 5 years after the acute stage of the disease, though since the collection of blood sample were done, once from each dog there is possibility that very low infestation may occasionally not be detected in blood. Kennel setting with poor tick surveillance and control are at a higher risk for housed animals to develop Babesiosis (Birkenhener *et al.,* 1999). Mongrel dogs always move about and due to good tick surveillance and control lower risk for stray animals to develop haemoparasite in North-central part of Nigeria (Nwosu and Ikeme, 1992).

In non-temperate areas, temperature higher than 43^{o}C occur and such temperature reduce the tick population considerably compare to temperature lower than 3^{o}C occur hence increase tick population within higher prevalence and intensity of infection (Fried, 1986). From this point of view, the general perception is that most haemoparasite are asymptomatic (Birkenhener *et al.,* 1999). Nevertheless, even light infestation (1 to 2 ticks) are capable of producing severe disease with potential life threaten consequences (Macquart, 2004).

Conclusion

The results of this study show that ticks and tick-borne haemoparasitic diseases are prevalent in dogs in Lafia, Nasarawa State. With the veterinary importance of ticks and their pathogen, as well as the recent emergence of tick-borne diseases as zoonoses, there is the need for a continuous and concerted effort towards combating this menace especially in dogs that have close contact with human due to their domestic nature.

Recommendations

More awareness should be created so as to educate dog breeders and pet owners as regards the need for efficient control of ticks in the environment and on the body of their animals by treatments with ecto-parasiticides that repel and kill ticks thereby reducing the risk of disease transmission. These campaigns should also include periods of the year that strategic tick control should be instituted. Vaccines against babesiosis have been developed to induce partial protection against the disease by reducing severity duration of clinical disease. However, as with vaccination, most current prophylactic measures are considered insufficient for complete protection. A recent study showed that an attenuated E. canis strain may serve as an effective future vaccine for canine ehrlichiosis, but currently, no commercial vaccines are available to protect against infections with E. canis although potential agents have been tested.

REFERENCES

Ahmed, A., M. Iqbal, M. Javaid and Z. Ahmad, (1992). Studies on comparative yield potential of some newly evolved small and bold-seeded mungbean genotypes. J. Anim. Plant Sci., 2: 139-140.

Anosa, V.O. (1980). Studies on the parasitaemia plasma volumes, and leucocytes and some marrow cell counts and moribund state in Trypanosoma brucei infection of splenectomized and intact nice. Zentbl Vet. 29 Pg 169 – 180.

Birkenhener, A.J., Levy, G.M., Savary, K.C. (1999). Babesia gibsoni infection in dogs from north Carolina J. Am. Anim. Hospital Assoc. 35 Pp125 – 128.

Davidson, J. and Gaagar, S.M. (1978). Protozoan infections. In: Catcat, I:J. (ed): Canine medicine American Veterinary Publications. Inc. Santa Barbawa, (5) Pp 110 – 112.

Dewey, T. and Bhagat, S. (2002). Canis lupus familiaris Archived 23 October 2014 at the Wayback Machine. Animal Diversity Web. Retrieved 6 January 2009.

Elelu, N., Ferrolho, J., Couto, J., Domingos, A. and Eisler, M.C. (2016). Molecular diagnosis of the tick-borne pathogen Anaplasma marginale in cattle blood samples from Nigeria using qPCR. Experimental and Applied Acarology, 70 (4): 501510.

Fallah, M. Taberkhami, H. and Sadijadi, M. (1995). Contineous in vitro cultivation of Babesia bovis J. Am. Anim Hosp. Assoc. 41Pp 170 – 172.

Gray, J.S., Dautel, H., Estrada-Peña, A., Kahl O. and Lindgren, E. (2009). Effects of climate change on ticks and tick-borne diseases in Europe. Interdisciplinary Perspectives on Infectious Diseases, Article ID 593232: 1-12.

Grove, M.G. and Vap, I.F. (1975). Babesia in a dog J.A.V.M.A. 153 – 689.

Irwin, P.J. and Jefferies, R. (2004). Arthropod-transmitted diseases of companion animals in Southeast Asia. Trends in Parasitology, 20(1): 27-34.

Lako NJ, Tchoumboue J, Payne VK, Njiokou F, Abdoulmoumini M, et al. (2007) Prevalence of Trypanosomosis and babesiosis among domestic ruminants in the western Highlands of Cameroon. Proceedings of the 12th International conference of the Association of Institutions of Tropical Veterinary Medicine

Macquart, G. (2004). Introduction, Distribution, Life History and Habitat, Host parasites http://creatureseducation./Livestock, April (2004).

Nwosu, C.O. and Ikeme, M.M. (1992). Parasitaemia and clinical manifestation inTrypanosoma brucei infected dog. Reveu Eleu Med. Pays trop. 45:3-4.

Otranto, D., Dantas-Torres, F. and Breitschwerdt, E.B. (2009). Managing canine vector-borne diseases of zoonotic concern: part one. Trends Parasitology, 25: 157–163.

Taboada J (1998) Babesiosis. In: Greene CE (Ed), Infectious Diseases of the Dog and Cat. WB Saunders, Philadelphia.

Thalmann, O., Shapiro, B., Cui, P., Schuenemann, V.J., Sawyer, S.K., Greenfield, D.L. and Napierala, H. (2013). Complete mitochondrial genomes of ancient canids suggest a European origin of domestic dogs. Science, 342(6160): 871-874.

Vilà, C., Amorim, I.R., Leonard, J.A., Posada, D., Castroviejo, J., Petrucci-Fonseca, F. and Wayne, R.K. (1999). Mitochondrial DNA phylogeography and population history of the grey wolf Canis lupus. Molecular Ecology, 8(12): 20892103.

Wang, X. and Tedford, R. H. (2010). Dogs: their fossil relatives and evolutionary history. Columbia University Press, 232 pp.