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Research Article

A Retrospective Study of Canine Hemoplasmosis in Nairobi, Kenya

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ABSTRACT

Hemoplasmosis is a blood-borne pathogen that has a worldwide distribution. It is caused by an obligate erthrocytic pathogen that affects a wide range of mammalian species including dogs. Recently increased prevalence has been noted in canine patients presented at the Small Animal Clinic, University of Nairobi. However, scanty or no information exists on the prevalence, clinical presentation and management of canine hemoplasmosis in Kenya. This retrospective study was conducted to determine its clinical presentation and management. The most prevailing clinical signs in included, anorexia 42.3% which was the highest followed by lymphadenopathy at 36.6%, with pounding heart and dehydration being the least occurring at 7.0%. Tick infestation was seen in 66.7% of the cases while flea infestation was seen in 33.3% of the cases. Concurrent infections were found in 60% cases recorded whereas hemoplasmosis occurred singly in 40% of the dogs. In 100% of the cases, a blood smear was used as a confirmatory test. For management of the condition Imidocarb dipropionate was used (53.8%) while a combination of Imidocarb dipropionate and long acting oxytetracycline was used in 25% of the cases. This study has described the clinical presentation of Hemoplasmosis and shown that there is increased occurrence of this disease in dogs presented at the Small Animal Clinic, University of Nairobi, Kenya.

Key words: Hemoplasmosis, Dogs, Clinical signs, Management, Kenya

INTRODUCTION

Hemoplasmosis formally hemobartonellosis is an infectious anaemia caused by hemotrophic mycoplasmas and affects numerous mammalian species. Based on potential vector borne and interspecies transmission, they carry a zoonotic potential (Willi *et al.*, 2007). It has been considered to be an emerging and reemerging zoonotic infection that affects livestock, wildlife, companion animals and humans (Mascareli *et al.*, 2014).

Canine hemoplasmosis was first described in Germany in 1928 in a splenectomized dog (Nascimento *et al*., 2012) and the first documentation of feline hemoplasmosis was in an anemic cat in South Africa in 1942 (Sykes, 2003). The causative organism was then known as *Eperythrozoon felis* which later changed to *Haemobartonella felis* in 1955 (Sykes, 2003). The genus *Haemobartonella* was created by Tyzzer and Weinman in 1939 as opposed to previous genus *Bartonella* (Nascimento *et al*., 2012). The species name has been re-classified as a mycoplasma based on the 16SrRNA (Valle *et al*., 2014) and hence proposed name is *Mycoplasma hemocanis* (Nascimento *et al.*, 2012). Canine hemoplasmosis has been documented among the top five global vector borne diseases and has a worldwide distribution (Birkenheur, 2014). There is however, worldwide geographical variation in the prevalence of different species (Roura *et al*., 2010). Though specific vectors associated with the transmission are not clearly defined, Sharifiyazdi *et al.* (2014) have noted that that mites and ticks are important sources of hemoplasma infections.

Mycoplasma haemocanis has a worldwide distribution with prevalence of infection varying from 0.5% to 40% (Nascimento *et al.*, 2012). A study on prevalence rate in Europe using Polymerase Chain Reaction (PCR) has revealed a prevalence rate of 15.4% in France and 1.2% in Switzerland (Valle *et al*., 2014). A prevalence study done in northeastern region of Brazil has shown that 1 in every 205 (0.48%), dogs are positive for *Mycoplasma haemocanis* (Valle *et al.*, 2014). The other species documented to affect dogs is *Candidatus Mycoplasma haematoparvum* (Roura *et al.*, 2010).

A literature search on this infection in Kenya revealed scanty information concerning canine hemoplasmosis. Hence this study was conducted to determine the clinical presentation and management of canine hemoplasmosis in the Small Animal Clinic of The University of Nairobi from the year 2010 to 2015.

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MATERIALS AND METHODS

Study area

The small animal clinic, University of Nairobi is located in Upper Kabete Campus, Loresho ridge off Kapenguria road approximately 14kms Northwest of Nairobi. Most animals presented at the clinic are from Nairobi and the outskirts.

Data ccollection

All cases that were positive for Hemoplasmosis were retrieved from daily cases record book. The clinical case numbers positive for Hemoplasmosis were noted down. The files were then retrieved from the shelves. The clinical records were retrospectively viewed from 2010 to 2015. The data collected included month, year, case number, breed, age, and sex, clinical findings, and diagnosis, treatment regime used for both canine and hematological parameters where available. This information was recorded manually and transferred into Microsoft Excel (2007) spread sheet and reviewed for any errors. The total number of cases was 154.

Data analysis

Data was entered in Excel spread sheet (Microsoft, 2007). It was then coded, sorted and individual aspects of the data analyzed. Summary tables, graphs and pie charts were then used to depict the results.

RESULTS

Sex distribution

For the cases of hemoplasmosis in dogs 49.3% (35/69) were males and 47.9% (34/69) were females.

Age distribution

The highest age category was 0-1 year at 50% (18/36) while the lowest were those above 10 years at 5.6% (2/36) for those with their ages recorded 49.3% (35/71) of the cases had ages unrecorded. (Table 1).

Breed distribution

The German Shepherd Dog was represented at 49.2% (26/59) of the dogs that were positive for hemoplasmosis. Least affected were the Boxer, Great Dane and Chihuahua. Breeds not recorded were 16.9% of the total cases (12/71) (Table 2).

Annual case distribution for dogs

In 2010, 3/71 cases were seen in the whole year. In 2012, 1 case, 2013 5 cases and 2014 20 cases out of the total 71 cases. This showed an increasing trend with 40 of the 71 cases being recorded in the year 2015 (Fig. 1). Distribution over the months varied with the highest number of cases seen in the month of November at 22.5% (16/71) and the least in the month of March at 0% (Fig. 2).

Clinical findings

Common clinical signs noted during the study were: anorexia being the highest at 42.3% (30/71), followed by lymphadenopathy at 36.6 % (26/71) while the least was a pounding heart at 7.0% (5/71). In 8.4% of the cases there was ectoparasites infestation, of which 5.6% (4/71) were ticks and 2.8% (2/71) fleas.

Diagnosis

In 98.6% of the cases (70/71), blood samples were processed by making a blood smear to confirm the diagnosis. One case was tentatively diagnosed based on the clinical presentation. In 4/70 (5.7%) of the cases hematology was carried out. Blood biochemistry was done concurrently with the blood smear in 2/70 of the cases.

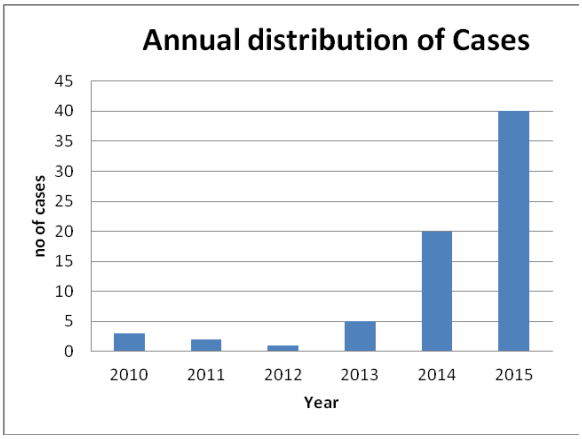

Fig. 1: Annual occurrence of Hemoplasmosis.

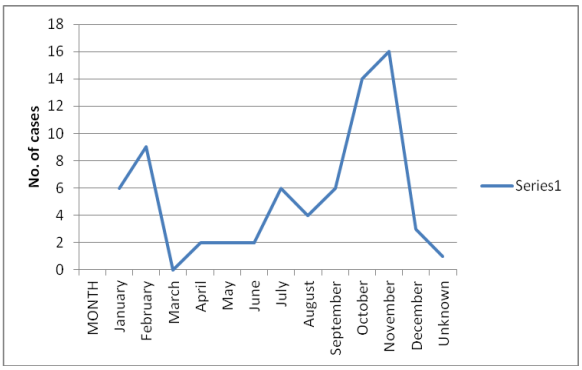

Fig. 2: Summation of monthly case distribution in dogs across the six years.

Table 1: Age distribution for the canine patients

Age (Years)	Number	Percentage (%)	Percentage of recorded cases
Unrecorded	35	49.3	-
0-1	18	25.4	50
1-4	12	16.9	33.3
4-8	4	5.6	11.1
8-10	2	2.8	5.6

Table 2: Dog breeds distribution

Dog breed	Number among known breeds	% No. of cases
German Shepherd dog	29/59	49.2
Japanese Spitz	10/59	16.9
Crosses	7/59	11.9
Boerboel	4/59	6.8
Dachshund	2/59	3.4
Rottweiler	2/59	3.4
Labrador Retriever	2/59	3.4
Boxer	1/59	1.7
Great Dane	1/59	1.7
Chihuahua	1/59	1.7

Single infection occurred in 40% (28/70). Among the 42 confirmed concurrent cases, 21/42 (50%) cases were with Ehrlichiosis, 3/42 (7.1%) Babesiosis (Table 4).

Treatment

Treatment was either combined at 62% 44/71 or 38% 27/71 single treatment. Most preferred single treatment was Imidocarb dipropionate at (14/26) 53.8% followed by Oxytetracycline 15.4% (4/26), Doxycycline and Enrofloxacin were both at 11.5% (3/26) and Norfloxacin 7.7% (2/26). (Figure 3) The most commonly used combina-tion was Imidocarb dipropionate and Oxytetracycline represented by 25% (11/44) followed by Imidocarb dipropionate-Oxytetracycline-Doxycycline 22.7% (10/44), Imidocarb dipropionate and Doxycycline 20.5% (9/71), Imidocarb dipropionate and Enrofloxacin 18.2% (8/71), Oxytetracycline-Doxycycline 6.8% (3/71), Imidocarb dipropionate-Doxycycline-Enrofloxacin 4.5% (2/71) and lastly Imidocarb dipropionate Ciprofloxacin 2.3% (1/44). (Fig. 4).

Recurrence level in dogs

Recurrence was seen in six of the cases. The first line of treatment varied in all cases. Recurrence rate was 15.5% (11/71).

DISCUSSION

According to this study, 49.3% males and 47.9% female dogs were affected by Hemoplasmosis an indication there was no sex predilection for this infection. This finding is in agreement with the observation noted by Valle *et al.* (2014) that there is no significant association for age and gender in hemoplasmosis infection in dogs. They also found out that sex, age and breed were not significantly associated though vector borne diseases had an association. However, in cats, Roura *et al.,* (2010) found that age, breed and vector borne infections had no association with hemoplasmosis.

The study found the German Shepherd Dog breed was most commonly affected (49.3%). However, this high occurrence could be attributed to the fact that this is a common breed kept especially in Nairobi hence the high numbers presented at the clinic for medical intervention.

The highest numbers of cases were reported in the year 2015. Increasing trend was observed with 3 cases reported in 2010 for the dogs and 1 case in 2012. This finding is significant to support this as an emerging disease in companion animals in Nairobi and its environs. The highest numbers of cases were reported in the month of October which is end of dry season and November which is the beginning of wet season. This was a summation across all the six years. This shows uniformity across both dry and rainy season in Nairobi. December also falls under the rainy season yet only three cases were recorded. This could suggest that the occurrence of Canine Hemoplasmosis is not determined by season This shows the condition had cut across different seasons implying that season of the year does not necessarily affect its occurrence. However, cumulatively most cases occurred in the rainy seasons of the year and it is at this time of the year when the vector population in reference to *Rhipicephalus sanguineus* is high.

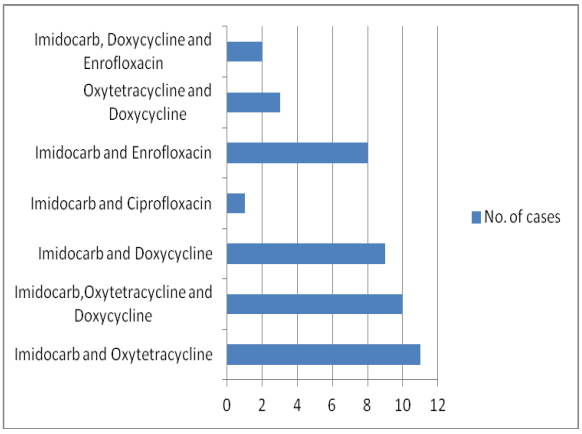

Fig. 3: Combined therapy in dogs.

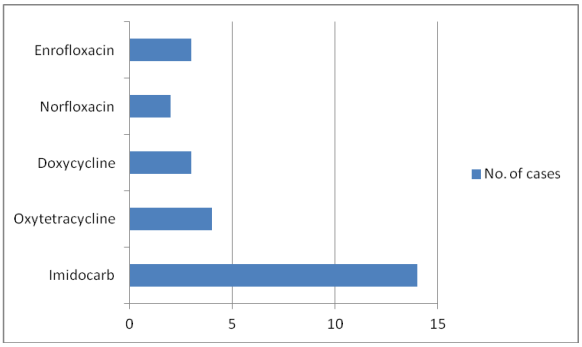

Fig. 4: Single therapy distribution in dogs.

Table 3: Clinical presentation in dogs

Clinical findings	Occurrence	Percentage
Anorexia	30	42.30
Lymphadenopathy	26	36.60
Diarrhea	19	26.80
Pale mucous membranes	15	21.10
Dullness	15	21.10
Congested mucous membranes	13	18.30
Emaciation	12	16.90
Pyrexia	9	12.70
Increased respiratory rate	8	11.30
Vomiting	7	9.90
Increased heart rate	6	8.50
Distended abdomen	6	8.50
Pounding Heart	5	7.0

Table 4: The recurrence level in various canine cases

Number of times recurring	Number of cases
Once	3
Twice	2
Four times	1
Total	6

Concurrent infections were observed between Hemoplasmosis and other vector borne diseases especially Ehrlichiosis suggesting that the brown dog tick, *Rhipicephalus sanguineus* could act as a common vector. This is in agreement with Roura *et al*. (2014) who found a close association between hemoplasmosis and other vector borne diseases. Infection with vector borne diseases is then a risk factor in this case and this agrees with the observation by Valle *et al*., (2014). It has also been reported that chronic hemoplasmosis infections may be aggravated by Ehrlichiosis, Babesiosis and Septicemia

as they cause immunosuppresion (Valle *et al.*, 2014). In this study, Ehrlichiosis was the most infection occurring concurrently with Hemoplasmosis at 50% (21/42) in all cases with a concurrent infection. Co-infection with Babesiosis was lower at 7.1% and septicemia at 2.4%. Though Valle *et al.* (2014) found neoplasia to be a great risk factor, in this study only one dog was diagnosed with Transmissible Venereal Tumor.

In Mediterranean countries, it was reported that young age was a risk factor and this concurs with this study as dogs aged below one year were majorly affected. However, risk factors for dogs in Brazil were old age, bite wounds, neoplastic diseases and vector borne exposure. Age related status of immunity contributes to age being a risk factor because of interference of immune response to antigen. (Valle *et al*., 2014) Both young and old are likely to be affected due to the limitations in the immune system.

The study noted the clinical presentation of anorexia, lymphadenopathy, diarrhea, pallor of mucous membranes, dullness, congested mucous membranes and emaciation. Though Lappin (2006) reported splenomegaly as an occasional finding this study made no observation of the same. This study has established lymphadenopathy as the most commonly noted (31.3%) clinical sign in dogs and is in agreement with a report by Torkan *et al.* (2014) who found lymphadenopathy to be a significant clinical sign. Sharifiyazdi *et al.* (2014) reported of a case of canine hemoplasmosis that was presented with a history of fever and depression though argued that immunosuppresion and splenectomy are vital in pathogenesis. This was consistent with this study as some dogs had such signs.

Presence of fleas and ticks supports presence of vector borne transmission. In this study ticks were observed in 5.6% and 2.8% with fleas. Kenya being a country in the tropics, the brown dog tick *Rhipicephalus sanguineus* is present and it has been reported that increased prevalence of the hemoplasmosis is seen in areas where *Rhipicephalus sanguineus* has a widespread distribution (Pitorri *et al.*, 2012) then high occurrence of the infection is expected. However, in this study, tick and flea infestation was noted in only 5.6% and 2.8% of the cases respectively.

A thin blood smear was the main method of diagnosis according to the records examined in this study. Though this is the standard method it is not very effective due to fluctuating levels of the parasitaemia and low sensitivity (Lappin, 2006). Hence, some positive cases maybe missed out during the test. The most sensitive method is the use of Polymerase Chain Reaction (Lappin 2006, Valle *et al.*, 2014) a test method that had not been used during the period covered by this study.

The most frequent method of treatment in dogs recorded in this study was Imidocarb dipropionate and Oxytetracycline followed closely by combination of the mentioned drugs together with Doxycycline. Pitorri *et al.*, (2012) documented a case where successful treatment was achieved when Doxycycline was given for a protracted period of 87 days. This suggests that Doxycycline has some level of efficacy when it comes to eliminating the parasite. For single therapy, Imidocarb dipropionate was the most used. Sharifiyazdi *et al*., (2014) noted that in cats, flouroquinolones offer a more effective treatment.

This study has shown that there is increased occurrence of hemoplasmosis in dogs presented at the Small Animal Clinic, University of Nairobi. More studies should be done using more sensitive diagnostic methods like the Polymerase Chain Reaction to understand its prevalence and how to mitigate its occurrence.

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