RESEARCH ARTICLE

Epidemiological Studies on Anaemia in Dogs in Anand, Gujarat

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ABSTRACT

The present work was carried out to study the incidence and etiologies of anaemia in dogs. Out of a total of 1516 dogs presented at the Veterinary Clinical Complex of the College in Anand, 127 (7.86%) dogs were found with anaemia. These anaemic dogs were selected to detect etiologies of anaemia. The highest incidence of anaemia was due to haemorrhagic gastroenteritis (22.05 %) followed in descending order by organopathy (20.47 %), ectoparasitic infestations (15.75%), viral infections (14.96%), iron deficiency (7.87%), rickettsia infections (7.09%), endo-parasitic infections (6.30%), haemoprotozoa infections (2.36 %), pyometra (1.57%), drug and vaccine-associated cause and tumour (0.79%, each). The different etiologies studied in relation to age, sex, and different breed also revealed anaemia mainly due to parasites and haemorrhagic gastroenteritis in puppies and organopathy in older dogs, with a higher prevalence of haemorrhagic gastroenteritis followed by organopathy in both the sexes and also higher incidence in Labrador Retriever and nondescript breeds. This trend suggests the ameliorative measures that should be taken up on priority to prevent the occurrence of anaemia in dogs, particularly puppies and older dogs, and in males than the females.

Keywords: Anaemia, Dogs, Etiology, Haematology, Incidence, Parasitic screening.

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INTRODUCTION

The dog holds the distinction of being the first domesticated animal among the many species that have been domesticated. The canid family consists of 38 different species of carnivore mammals. Many infectious and non-infectious diseases affect dogs, with anaemia being one of the most common symptoms. It's very usual in canine practice as a clinical sign that needs further investigation (Jha *et al.*, 2013). Anaemia is described as a decrease in the blood's ability to provide enough oxygen to tissues for proper metabolic activity (Hoffbrand and Pettit, 1993). It is defined as reduced red blood cell counts (RBCs). It is characterized by a packed cell volume (PCV) or haematocrit, haemoglobin concentration, and RBC count below normal reference values for that species (Ettinger *et al.*, 2017). In haematological analysis, a dog with Hb value less than 12 g/dl, total erythrocyte count less than 5.5 x 106/μL or PCV less than 35% is considered anaemic (Tandel *et al.*, 2016). The objective of the present study was to assess the prevalence and etiologies of anaemia in dogs presented to the College Clinics in Anand, Gujarat.

MATERIALS AND METHODS

The study was carried out at Veterinary Clinical Complex (VCC), College of Veterinary Science and AH, Anand (India). A total of 1516 dogs presented during 6 months from December 2020 to May 2021 were screened for various diseases. Of these, 127 dogs were found anaemic. Haematological analysis of dogs showing Hb value less than 12 g/dL, total erythrocyte count

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less than 5.5x10^6/μL, or PCV less than 35% were considered as anaemic as per Tandel *et al.* (2016). Clinical examination and different diagnostic techniques were used to find out different etiologies of anaemia. Fecal samples were collected and examined for endo-parasitic infections as per the method described by Soulsby (2012) in all cases of anaemic dogs. The blood smears of anaemic dogs were screened for both detections of haemoprotozoa and RBC morphology. The examination for haemoprotozoa was done by using the Rapid Antibody test kit and/or standard staining method like Giemsa staining of thin blood smears (Kelly *et al.*, 1980). The stained blood smears were examined for the morphology of red blood

cells (RBCs) and classified according to their size, shape, and haemoglobin concentration. Skin scraping and trichogram techniques (Suartha *et al.*, 2018) were used for the diagnosis of canine skin diseases as an etiological agent in anaemia. Different commercially available rapid test kits were used for the detection of Ehrlichia, anaplasma, Lyme disease, canine parvovirus, canine coronavirus, canine adenovirus, and canine distemper and giardia infection. For immune-mediated anaemia (IMHA) diagnosis, a slide agglutination test was performed as described by Archer and Mackin (2013). The frequency of different etiological factors of anaemia was then worked out overall, age, breed, and sex-wise by simple descriptive statistics.

RESULTS AND DISCUSSION

Of the 1516 dogs presented and screened at the Veterinary Clinical Complex of the College in Anand, 127 (7.86 %) dogs were found anaemic. Different etiologies of anaemia recorded were shown in Table 1. The highest incidence of anaemia was due to haemorrhagic gastroenteritis (22.05 %) followed by hepatic and renal organopathy (20.47 %), ectoparasitic infestations (15.75 %), viral infections (14.96 %), iron deficiency (7.87 %), rickettsia infections (7.09 %), endo-parasitic infections (6.30 %), haemoprotozoa infections (2.36 %), pyometra (1.57 %), drug and vaccine-associated cause and tumour (0.79 %, each), respectively. The cases of haemorrhagic gastroenteritis classified here were negative for parvovirus infection, while the viral infections mostly included parvo virus with signs of haemorrhagic gastroenteritis. The dogs with haemoprotozoa infections

had mild tick infestations, but no ticks were seen in cases of rickettsia infections. Katagiri and Oliveira-Sequeira (2008) and Uppal *et al.* (2009) observed the highest incidence of anaemia (40.00 and 54.30%, respectively) in gastrointestinal infection. In contrast, Tandel *et al.* (2019) observed the highest incidence for liver disorders (23.53%) and endoparasites (23.53%) in dogs in and around Anand, Gujarat.

Age-wise different etiologies are presented in Table 2. The highest incidence of anaemia was seen in dogs of 0 to 6 months age (38.58%) followed by >6 years (28.34%), 3 to 6 years (19.69%), and 6 months to 3 years age (13.39%). Similar results for the highest incidence of anaemia in the 0 to 6 months of age group were reported by Singh *et al.* (2012) and Surendhar *et al.* (2018). However, Tandel *et al.* (2019) observed prevalence of anaemia with a higher rate (58.83%) in an adult group as compared to younger (21.57%) and senile (19.60%) groups of dogs. The present findings might be due to immature immune development of pups that are susceptible to infection through pre-natal, colostral, or lactogenic transmission (Kumar *et al.*, 2014). In the present study, endo-parasitic, haemorrhagic gastroenteritis, iron deficiency, and viral etiologies were more in the younger group, and rickettsia, demodicosis, organopathy, and pyometra were the predominant etiologies of anaemia in adult and older dogs (Table 2).

Haemorrhagic gastroenteritis, even without parvovirus infection, was the highest age-wise etiological incidence for 0 to 6 months (34.69%) and 6 months to 3 years (23.53%). Organopathy was found to be the highest etiological

Table 1: Different etiologies for incidence of anaemia in dogs

Sr. No.	Etiologies		No. of cases	%
1	Endo-parasitic infections	*Ancylostoma* spp. (n = 7)	8	6.30
		Toxocara spp. (n = 1)		
2	Haemoprotozoa infections	*Babesia* spp. (n = 3)	3	2.36
3	Rickettsia infections	*Anaplasma* spp. and *Ehrlichia* spp. mixed infections (n = 4)	9	7.09
		Anaplasma spp. (n = 2)		
		Ehrlichia spp. (n = 3)		
4	Ecto-parasitic infestations	Tick infestation (n = 12)	20	15.75
		Demodex spp. (n = 8)		
5	Viral infections	Canine parvovirus (n = 10)	19	14.96
		Canine distemper (n = 9)		
6	Drug and vaccine (n = 1)		1	0.79
7	Organopathy	Hepatic disorders (n = 18)	26	20.47
		Renal disorders (n = 8)		
8	Iron deficiency (n = 10)		10	7.87
9	Haemorrhagic gastroenteritis (n = 28)		28	22.05
10	Pyometra (n = 2)		2	1.57
11	Tumour (n = 1)		1	0.79
Total			127	100

Table 2: Age-wise etiology of anaemia in dogs

Sr. No.	Etiologies		No. of cases	Age			
				0 to 6 months	6 months to 3 years	3 to 6 years	>6 years
				No. of cases and percent (%)			
1	Endo-parasite infections	Ancylostoma spp. (n = 7)	8	5 (10.20)	2 (11.76)	0	0
		Toxocara spp. (n = 1)		1 (2.05)	0	0	0
2	Haemoprotozoa infections	Babesia spp. (n = 3)	3	1 (2.05)	2 (11.76)	0	0
3	Rickettsia infections	Anaplasma spp. and Ehrlichia spp. mixed (n = 4)	9	0	2 (11.76)	2 (8.00)	0
		Anaplasma spp. (n = 2)		0	1 (5.88)	0	1 (2.78)
		Ehrlichia spp. (n = 3)		0	0	2 (8.00)	1 (2.78)
4	Ecto-parasite infestations	Tick infestation (n = 12)	20	9 (18.37)	0	1 (4.00)	2 (5.56)
		Demodex spp. (n = 8)		2 (4.08)	0	4 (16.00)	2 (5.56)
5	Viral infections	Canine parvovirus (n = 10)	19	5 (10.20)	2 (11.76)	2 (8.00)	1 (2.78)
		Canine distemper (n = 9)		5 (10.20)	0	1 (4.00)	3 (8.33)
6	Drug and vaccine (n = 1)		1	0	1 (5.88)	0	0
7	Organopathy	Hepatic disorders (n = 18)	26	0	0	4 (16.00)	14 (38.89)
		Renal disorders (n = 8)		0	0	2 (8.00)	6 (16.67)
8	Iron deficiency (n = 10)		10	4 (8.16)	3 (17.65)	1 (4.00)	2 (5.56)
9	Haemorrhagic gastroenteritis, negative for parvovirus (n = 28)		28	17 (34.69)	4 (23.53)	4 (16.00)	3 (8.33)
10	Pyometra (n = 2)		2	0	0	1 (4.00)	1 (2.78)
11	Tumor (n = 1)		1	0	0	1 (4.00)	0
Total Nos.			127	49	17	25	36
Percent			100.0	38.58	13.39	19.69	28.34

Table 3: Breed-wise etiological incidence of anaemia

Sr. No.	Breed	No. of Cases	Percent
1.	Labrador retriever	37	29.13
2.	German shepherd	21	16.54
3.	Pomeranian	18	14.17
4.	Rottweiler	10	7.88
5.	Non-descript	26	20.47
6.	Others	15	11.81
Total		127	100

The incidences of anaemia in different breeds of dogs are presented in Table 3. The highest incidence was observed in Labrador Retriever (29.13%) followed by non-descript (20.47%), German Shepherd (16.54%), and Pomeranian (14.17%). Similar findings for the highest incidence of anaemia in the Labrador Retriever breed were reported by Kottadamane *et al.* (2017) and Dhavalagi *et al.* (2020). It might be due to different proportions of various breeds and over the presentation of Labrador Retriever breed around the study area.

Sex-wise (Table 4), anaemia was found more in males (68.50 %) than females (31.50 %). A similar finding was reported by Adhikari *et al.* (2013), Bhat *et al.* (2016), Tandel *et al.* (2019), and Kumar and Kumar (2020). It might be due

incidence for 3 to 6 years (24 %) and >6 years (55.56 %) age dogs with anaemia. These findings for organopathy agreed with Tandel *et al.* (2019).

Table 4: Sex-wise etiological incidence of anaemia

Sr. No.	Etiologies		No. of Cases	Sex	
				Male	Female
				No. of cases and percent	
1	Endo-parasite infections	*Ancylostoma* spp. (n = 7)	8	6 (6.89)	1 (2.50)
		Toxocara spp. (n = 1)		1 (1.15)	0
2	Haemoprotozoa infections	*Babesia* spp. (n = 3)	3	2 (2.30)	1 (2.50)
3	Rickettsia infections	*Anaplasma* spp. and *Ehrlichia* spp. mixed infections (n = 4)	9	3 (3.45)	1 (2.50)
		Anaplasma spp. (n = 2)		2 (2.30)	0
		Ehrlichia spp. (n = 3)		2 (2.30)	1 (2.50)
4	Ecto-parasite infestations	Tick infestation (n = 12)	20	8 (9.20)	4 (10.00)
		Demodex spp. (n = 8)		6 (6.89)	2 (5.00)
5	Viral infections	Canine parvovirus (n = 10)	19	6 (6.89)	4 (10.00)
		Canine distemper (n = 9)		6 (6.89)	3 (7.50)
6	Drug and vaccine (n = 1)		1	0	1 (2.50)
7	Organopathy	Hepatic disorders (n = 18)	26	12 (13.79)	6 (15.00)
		Renal disorders (n = 8)		5 (5.75)	3 (7.50)
8	Iron deficiency (n = 10)		10	8 (9.20)	2 (5.00)
9	Haemorrhagic gastro-enteritis, negative for parvovirus (n = 28)		28	19 (21.85)	9 (22.50)
10	Pyometra (n = 2)		2	0	2 (5.00)
11	Tumor (n = 1)		1	1 (1.15)	0
Total			127	87	40

to over presentation of male dogs in the study area. The highest etiological incidence was found for haemorrhagic gastroenteritis in both males (21.85 %) and females (22.50 %) negative for parvovirus, followed by hepatic disorders (13.79 and 15.00%). Tandel *et al.* (2019), however, observed major etiological factors of the liver (33.30%) and renal (29.16%) disorders amongst male and female dogs.

Conclusion

Canine anaemia is the common presenting clinical finding with various types of diseases and disorders of a specific organ system. Recognition of specific etiology has paramount importance in resolving anaemia. There is an association between various etiologies and age. Haemorrhagic gastroenteritis, even without parvo virus infection, was found to be the highest age-wise etiological incidence for 0 to 6 months (34.69%) and 6 months to 3 years (23.53%) old dogs, while organopathy was the highest etiological incidence for 3 to 6 years (24 %) and >6 years (55.56%) old dogs with anaemia. Sex-wise, anaemia was found more in males (68.50%) than females (31.50 %).

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