

Research Article

Analysis of Haematological Data for Canine Samples with Special Reference to Anaemia

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Abstract

A total of 108 canine blood samples from different age, breed and sex were studied for haematological observations at Department of Pathology, Mumbai Veterinary College, Mumbai for the period of one year between June 2017 to May 2018. The samples were received from BSPCA hospital and TVCC of Mumbai Veterinary college, Mumbai. These dogs were admitted to the clinics with history of anorexia, loss of appetite, diarrhoea, vomition etc. The received samples were processed on Junior Abacus Diatron (US) hemoanalyzer. Out of 108 samples, 43(39.81%) samples were found within physiological limits. However, 65 samples revealed anaemia 65(60.18%). The observed anaemia cases were categorised as Normocytic Hypochromic 17(26.15%), Microcytic Hypochromic 39(59.09%), Microcytic Normochromic 1(1.515%) and Macrocytic Normochromic 8 (12.12%). The haematological observations were correlated with clinical findings, discussed and reported accordingly.

Keywords: Anaemia, Haematology, Normochromic, Microcytic, macrocytic, canine blood.

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Introduction

Despite the benefits of dogs to our society, there are well documented health hazard associated with them with a diverse range of infections, including bacterial, fungal viral and parasitic diseases. Anaemia is one of the major manifestations of many infections & infestations in dogs. Dogs suffer from many infections & infestations in which anaemia is one of the major manifestations. Anaemia is commonly encountered in veterinary practice. It is a clinical sign which needs further study especially in canines [1].

Anaemia is a medical term referring to a reduced number of circulating red blood cells (RBCs), haemoglobin (Hb), or both. It is not a specific disease but rather is the result of some other disease process or condition. These include trauma or injury, parasites, tumours, diseases that prevent proper clotting of blood, chemicals or toxins, very poor nutrition or nutritional imbalances [2]. The most important abnormality in anaemia is the hypoxemia and subsequent tissue hypoxia that results from the reduced haemoglobin concentration and oxygen-carrying capacity of blood [3]

Now a day, Anaemia is a major problem in animals which are caused by the number of factors viz. Bacteria, Virus, Fungi, Parasites and dietary deficiencies are main causes. The anaemia mainly classified on the basis of response of bone marrow as regenerative and non-regenerative, on the basis of aetiology as Bacteria, Virus, Fungi, Parasites and dietary deficiencies. On the basis of size and shape of RBCs anaemia's are classified as Normocytic normochromic, Normocytic hypochromic, Microcytic normochromic, Microcytic hypochromic, Macrocytic normochromic and Macrocytic hypochromic and on the basis haemorrhagic and haemolytic anaemia.

The present study on data analysis was undertaken to ascertain haematological alterations with special reference to anaemia in cases of canines.

Materials and Methods

In present investigation, haematological data was studied for the period of 12 months (from 1st June, 2017 to 31st May 2018) at the Department of Veterinary Pathology and Teaching Veterinary Clinical Complex, Mumbai Veterinary College, Mumbai, where the dogs are routinely brought from Mumbai and suburbs areas for treatment of different ailments.

A total of 108 dogs of different age, sex and breeds were presented in TVCC of Mumbai Veterinary College, Parel, Mumbai with history of anorexia, loss of appetite, diarrhoea, vomition etc. Detailed clinical manifestations and clinical parameters were recorded. About 2 ml blood was taken in sterile syringes containing disodium salt of ethylenediamine-tetra acetic acid (EDTA, 1mg/ml) aseptically from cephalic or femoral vein, before any treatment was instituted. Haemoglobin (Hb), packed cell volume (PCV), total erythrocytic count (TEC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentrations (MCHC), total leucocyte count (TLC) and platelets were determined using standard methods on Junior Vet Abacus Diatron (US) Automatic haemoanalyzer. Differential leucocyte counts (DLC) and RBC morphology of blood smears stained with fields stain were carried out manually by microscopic screening under oil emulsion at Department of Pathology. Morphology study includes assessment of RBC shape, size, color, inclusions, arrangement and other abnormal RBC features. The values of MCV, MCH and MCHC were considered to classify the type of anemia.

The haematology reports were categorised as per age, sex and different breeds of the canine species. For age-wise category, the data was classified in the age groups of 0-3 years, 3 to 6 years and above 6 years. Variety of breeds of dogs were considered and normal and anaemia cases were classified to calculate the % of occurrence. The occurrences of sex wise cases were also studied separately to understand its incidence ratio in the current study.

Result and Discussion

Out of 108 samples, 45 (41.66%) samples were showed the haematological and DLC values within normal physiological limits. However, 63 (58.33%) samples revealed various degrees and types of anaemia. The anaemia cases were observed as Normocytic Hypochromic 18(27.27%), Microcytic Hypochromic 39(59.09%), Microcytic Normochromic 1(1.515%) and Macrocytic Normochromic 8 (12.12%). Additionally, thrombocytopenia was noticed in 36 (33.33 %) dogs and thrombocytopenia accompanied with anaemia was observed in 24 (22.22 %) cases. Moreover, the cases of leukocytopenia were 9 (8.33%), leucocytosis were 20 (18.52%), neutrophilia were 24(22.22%), lymphocytosis were 41(37.96%) and 5(4.63%) cases of pancytopenia were recorded. DLC counts for all other dogs in analysis were found within normal referral range.

The spurious findings of RBC morphology revealed macrocytosis, microcytosis, rouleaux formation, hypochromia, anisochromia, anisocytosis, poikilocytosis, schistocyte, leptocytes, spherocyte, target RBC etc. Some representative observations are presented in **Figure 1**.

Breed, sex and age wise results encountered in analysis for anemia cases are discussed below.

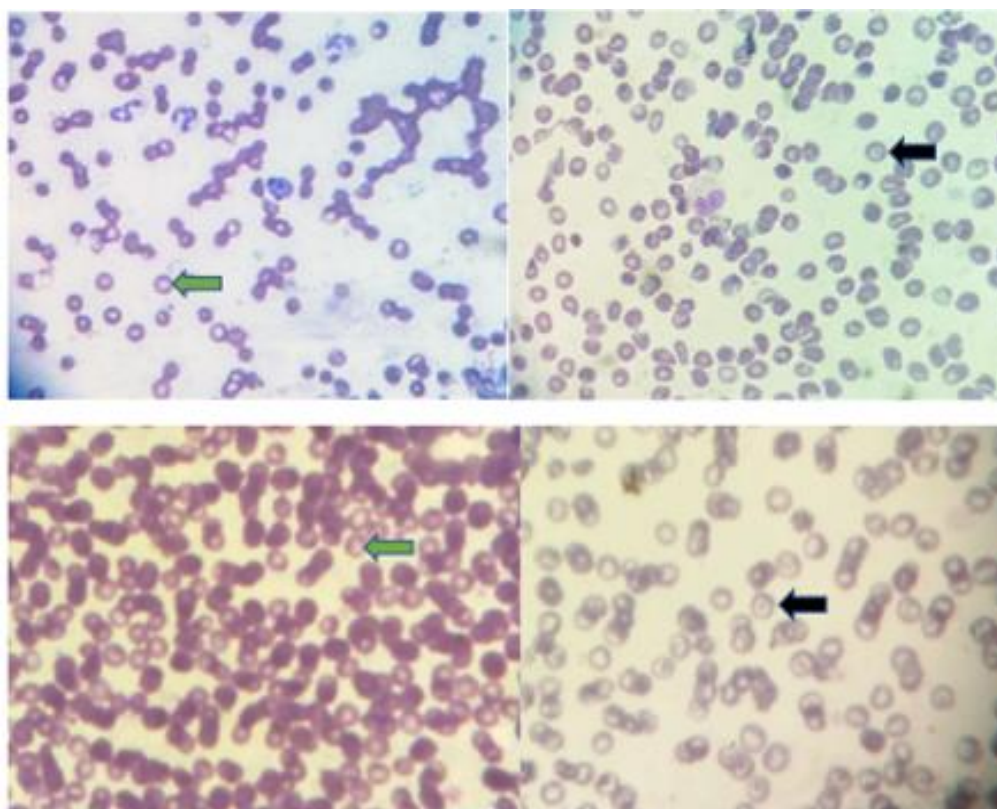


Figure 1 Microphotographs (100x) showing Leptocytes (Green Arrow), Target RBCs (Black arrow) from dogs suffering with anemia

Breed wise observations

In the study of 108 clinical cases, different 20 breeds of dog's blood samples were processed and classified for various types of anaemias (**Table 1**).

Table 1 The breed wise cases of anaemia

S. No.	Breeds of dogs	Total cases studied	Normal cases	Anaemic cases	% cases of anemia	Classification of Anemia cases			
						NH	MN	MH	MAN
1	Labrador	25	8	17	68.00%	8	0	7	2
2	Non-descript	22	11	11	50.00%	4	0	6	1
3	Pomeranian	10	2	8	80.00%	0	0	6	2
4	Pug	6	4	2	33.33%	0	0	2	0
5	Cocker spaniel	6	1	5	83.33%	1	0	3	1
6	Golden retriever	5	2	3	60.00%	0	0	2	1
7	German shepherd	5	1	4	80.00%	2	1	1	0
8	Rottweiler	4	2	2	50.00%	0	0	2	0
9	Dachshund	3	1	2	66.67%	1	0	0	1
10	Lhasa Apso	3	0	3	00.00%	1	0	2	0
11	Bull dog	3	1	2	66.67%	0	0	2	0
12	Boxer	3	2	1	33.33%	0	0	1	0
13	Shih Tzu	2	2	0	00.00%	0	0	0	0
14	Doberman	2	1	1	50.00%	0	0	1	0
15	Beagle	2	1	1	50.00%	0	0	1	0
16	Siberian husky	2	1	1	50.00%	0	0	1	0
17	Great Dane	2	1	1	50.00%	0	0	1	0
18	N.Mastiff	1	0	1	100.00%	0	0	1	0
19	Chihuahua	1	1	0	00.00%	0	0	0	0
20	Saint Bernard	1	1	0	00.00%	0	0	0	0
Total Cases		108	43	65					
NH=Normocytic Hypochromic, MN=Microcytic Normochromic, MH=Microcytic Hypochromic, MAN= Macrocytic Normochromic									

Amongst all, 25 samples were of Labrador, 22 from Non-descript, 10 Pomeranian, 6 from Pug and Cocker spaniel, 5 each from Golden retriever and German shepherd, 4 of Rottweiler, 3 cases each of Dachshund, Lhasa Apso, Bull dog and Boxer whereas, Shih Tzu, Doberman, Beagle, Siberian husky and Great Dane had 2 cases each. One sample of Neapolian Mastiff, Chihuahua and Saint Bernard was processed.

In the study, 43 cases were observed as normal whereas 65 cases were found positive for anaemic condition. Out of 65 anaemic cases, the highest incidence of anaemia was observed in Mastiff and Chihuahua breed (100%) followed by Cocker spaniel (83.33%), German shepherd and Pomeranian (80.00 %), Labrador (17 cases, 68.00 %), Bull and Dachshund (66.67%), Golden retriever (60.00%) Doberman Pinscher, Beagle, Siberian husky, Great Dane, Rottweiler and Non-descript (50.00 %), Boxer and Pug (33.33%) while it was absent in Saint Bernard, Lhasa Apso and Shih Tzu breed.

Singh *et al.* (2012) [4] conducted the study on incidence of anaemia in dogs from Jammu Region and reported maximum breed wise incidence in mixed/desi/mongrels i.e. 52.33 per cent, followed by Pomeranian i.e. 10.76 per cent, Labrador and Spitz i.e. 9.23 per cent, German shepherd i.e. 7.69 per cent and followed by other breeds (Saint Bernard, Bull dog, Boxer and Pointer) i.e. 10.76 per cent is well support the observations made in the current study.

Sex wise observations

During investigation, 55 males and 53 females' samples were analysed. Amongst them, 33 (60%) males and 31(58.49%) females found anaemic (**Table 2**). Microcytic hypochromic anaemia was prominent finding in the males. The percentage of anaemia cases in male was more than the females.

Tandel *et al.*, (2016) [5] studied that Out of 352 cases, 181 (51.42 %) cases of anaemia were recorded in males whereas 171 (48.58 %) were in females. These observations are aligned with the observations made in the present investigation.

Table 2 The sex wise cases of anaemia

S. No.	Breeds	Male Cases							Female Cases					
		Total	Male	AN	NH	MN	MH	MAN	Female	AN	NH	MN	MH	MAN
1	Non-descript	22	12	6	2	0	4	0	10	5	2	0	2	1
2	Labrador	25	10	6	3	0	3	0	15	11	5	0	4	2
3	Dachshund	3	2	2	1	0	0	1	1	0	0	0	0	0
4	Lhasa Apso	3	2	2	0	1	0	1	1	1	0	1	0	0
5	Shih Tzu	2	2	0	0	0	0	0	0	0	0	0	0	0
6	Rottweiler	4	1	0	0	0	0	0	3	2	0	0	2	0
7	Golden retriever	5	3	2	0	0	2	0	2	1	0	0	0	1
8	Pomeranian	10	4	4	0	0	2	2	6	4	0	0	4	0
9	Bull dog	3	2	2	0	0	2	0	1	0	0	0	0	0
10	Boxer	3	0	0	0	0	0	0	3	1	0	0	1	0
11	German shepherd	5	3	2	2	0	0	0	2	1	1	0	0	0
12	Doberman	2	1	1	0	0	1	0	1	1	0	0	1	0
13	Pug	6	3	0	0	0	0	0	3	2	0	0	2	0
14	Cocker spaniel	6	4	3	0	0	2	1	2	2	1	0	1	0
15	N.Mastiff	1	1	0	0	0	0	0	0	0	0	0	0	0
16	Beagle	2	2	1	0	0	1	0	0	0	0	0	0	0
17	Siberian husky	2	1	1	0	0	1	0	1	0	0	0	0	0
18	Great Dane	2	2	1	0	0	1	0	0	0	0	0	0	0
19	Chihuahua	1	0	0	0	0	0	0	1	0	0	0	0	0
20	Saint Bernard	1	0	0	0	0	0	0	1	0	0	0	0	0
Total		108	55	33	8	1	19	5	53	31	9	1	17	4

AN= Anaemic, NH=Normocytic Hypochromic, MN=Microcytic Normochromic, MH=Microcytic Hypochromic, MAN= Macrocytic Normochromic

Age wise observations

In age wise observations, age group of 0-3 years showed total 43 cases whereas, 27 cases were from age group 3—6 years and 38 cases were reported from the 6 years and above. Out of total 65 dogs with anaemia, the highest incidence was observed in young group (25 cases, 38.46 %) followed by senile group (25 cases, 37.87 %) and adult group (15 cases, 22.72 %) (**Table 3**).

Table 3 The age wise cases of anaemia

Sr. No.	Age Group	Total Cases	Normal	Anaemic	% of anaemia	Classification of anaemia			
						NH	MH	MN	MAN
1	0-3 Years	43	18	25	38.46	8	12	1	4
2	3-6 Years	27	12	15	22.72	3	12	0	0
3	6 & Above	38	13	25	37.87	6	15	0	4
Total cases		108	43	65		17	39	1	8

NH=Normocytic Hypochromic, MN=Microcytic Normochromic, MH=Microcytic Hypochromic, MAN= Macrocytic Normochromic

Highest incidence of anaemia observed in young group of animals could be due to immature immunity and age of developing stage. Singh *et al.*, (2012) [4] in their study reported anaemia in 65 (47.44%) dogs out of 137 dogs, among that prevalence of anaemia was found to be highest in dogs below 6 months (44.61%) followed by 15.38% in 6 months to 1 year, 20.00 % between 1 to 3 year and 12.32 % between 6 to 10 year age groups. Lowest prevalence was

found in dogs in the age group 3 to 6 years (7.69 %). The same scenarios of results were seen in the current study as well.

Conclusions

The following conclusions can be drawn from the data analysis in current investigation.

- The ratio of dogs suffering with anaemic condition is found more than that of normal cases. Out of 108 samples, 43 (39.81%) samples were found within physiological limits whereas, 65 samples revealed anaemia 65(60.18%).
- On classification of anaemia cases, the highest incidence of Microcytic Hypochromic (39 cases, 59.09%) anemia is observed followed by Normocytic Hypochromic (17 cases, 26.15%), Macrocytic Normochromic (8cases 12.12%) and Microcytic Normochromic (1 case, 1.515%) anaemia.
- The highest incidence of anaemia was observed in Mastiff and Chihuahua breed.
- The percentage of anaemia cases in male was more than the females.
- Highest incidence of anaemia observed in young group of animals than 3 and above year's age.
- Further detailed study with a more number of samples is required for confirmation.

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Publication History

Received 08th Apr 2019
Revised 30th Apr 2019
Accepted 12th May 2019
Online 30th May 2019

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