CLINICOPATHOLOGICAL ALTERATIONS IN ANAEMIC DOGS

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[Received: 20.02.2023; Accepted: 23.05.2023]
{DOI 10.29005/IJCP.2023.15.1.90-93}

A total of 300 dogs were examined for a period of 6 months from June 2021 to November 2021 in the present study to evaluate the anaemia. Among them 64 (21.33%) dogs had anaemia based on laboratory examination. Various causes of anaemia in dogs were haemoprotozoans, pyometra, hepatic disorders, renal disorders, tick infestation, and tumors. Haematologically significant (P< 0.05) increase in TLC, lymphocyte count, eosinophil count, reticulocytes and MCV and significant (P< 0.05) decrease in Hb, PCV, TEC, neutrophil count, diameter of RBC and MCHC in anaemic dogs was noticed. Reticulocytosis was observed in dogs indicating regenerative and responsive anaemia and active bone marrow. Erythrocyte indices were very useful to assess type of anaemia.
Keywords: Anemia, Dogs, Hepatic disorder, Reticulocytosis, Tumors.

Anaemia is commonly encountered in Veterinary practice. The most important abnormality in anaemia is the hypoxemia and subsequent tissue hypoxia that resulted from the reduced haemoglobin concentration and oxygen carrying capacity of blood (Meshram *et al.,* 2019). Anaemia is not a disease but an important clinical sign of animals observed in many disease conditions. Blood examination is generally performed to assess general health, adjunct to patient evaluation or for diagnosis of a disease, to assess the body's ability to fight against infection, to evaluate the prognosis of certain diseases and to know the efficacy of treatment (Jain, 1986).

Materials and Methods

The dogs were examined for the presence of anaemia by laboratory examination. The dogs were separated into two groups control healthy and anaemic dogs.Blood samples from dogs manifesting anaemia and healthy dogs were collected to carry out different haematological examination by standard tests. All haematological examinations were carried out on the same day of collection.For haematological study approximately 2 ml of blood was collected from cephalic vein or saphenous vein in dogs as per standard procedure and transferred into a dry vial containing 10 percent EDTA for complete blood picture. The results were analyzedby two sample t- test using the SPSS 20.0 student version software

Results and Discussion

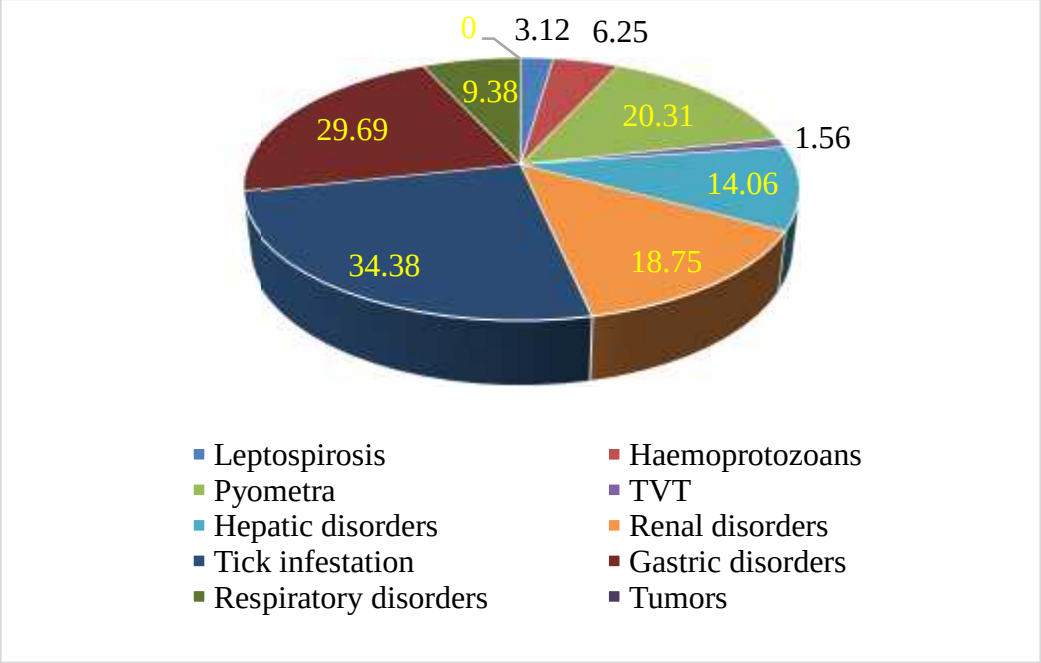
Laboratory investigation revealed different etiological agents in anaemic dogs like leptospirosis in 2 dogs (3.12%), haemoprotozoans in 4 dogs (6.25%), pyometra in 13 dogs (20.31%), hepatic disorders in 6 dogs (9.38%), renal disorders in 12 dogs (18.75%), tick infestation in 22 dogs (34.38%), gastric disorders in 19 dogs (29.69%), respiratory disorders in 7 dogs (10.93%), tumors in 2 dogs (3.12%) and ascites in 3 dogs (4.69%). Different causes of anaemia in dogs were showed in Table. 1. and Fig. 1.

TABLE. 1. DIFFERENT CAUSES OF ANAEMIA IN DOGS

Causes of anaemia	Total	Percentage (%)
Leptospirosis	2	3.12
Haemoprotozoans	4	6.25
Pyometra	13	20.31
Hepatic disorders	9	14.06

Renal disorders	12	18.75
Tick infestation	22	34.38
Gastric disorders	19	29.69
Respiratory disorders	7	10.93
Tumors	2	3.12

FIG. 1. DIFFERENT CAUSES OF ANAEMIA IN DOGS



Inleptospirosis andhaemoprotozoan infestation haemolytic anaemia, in pyometra normocytic normochromic anaemia andin hepatic failuremicrocytic hypochromic anaemia was noticed.

Alterations in various haematological parameters of dogs were showed in **Table. 2** and Erythrocyte indices were showed in **Table. 3.**

TABLE. 2. HAEMATOLOGICAL PARAMETERS OF THE ANAEMIC DOGS

S.No.	Parameter	Healthy dogs (Mean±SE)	Anaemic dogs (Mean±SE)
1	Haemoglobin (g%)	13.33±0.27	8.71± 0.31*
2	PCV (%)	42.33±1.72	27.26±1.08*
3	TEC ($x10^6$/ mm^3)	6.32±0.30	3.99±0.20*
4	TLC ($x10^3$/ mm^3)	12.51±3.45	12.97±7.84
5	Neutrophils (%)	73.00±1.50	67.2±1.26*
6	Lymphocytes (%)	25.33±1.08	31.69±2.03 *
7	Eosinophils (%)	1.33±0.49	3.47±0.59 *
8	Basophils (%)	0.17±0.17	0.06±0.06
9	Monocytes (%)	0.17±0.17	0.75±0.22
10	Platelets ($x10^6$/µl)	2.18±3.98	2.16±1.33
11	ESR (mm/hour)	2.83±0.30	2.86±0.27
12	Diameter of RBC (µm)	6.81±0.23	5.84±0.14*

13	Reticulocytes ($x10^3$/ µl)	0.00±0.00	61.1±9.87

***Significant (P <0.05) analysed by two sample t- test**

Table. 3. Erythrocyte indices of the anaemic dogs

S.No.	Parameter	Healthy dogs (Mean±SE)	Anaemic dogs (Mean±SE)
1	MCV (fl)	64.04±1.25	71.75±3.02*
2	MCH (pg)	24.70±0.40	23.21±0.79
3	MCHC (%)	48.12±1.32	34.05±1.63*

***Significant (P <0.05) analysed by two sample t- test**

Haematologically, significant (P<0.05) decrease in Hb, PCV, TEC values were observed in anaemic dogs. These types of findings were in conformity with Das and Konar (2013) and Bai *et al*. (2017) in dogs. In the present study the neutrophils were decreased significantly (P<0.05) in dogs. Similar type of observations was reported by Purzycka *et al*. (2020) in dogs.TLC, lymphocytes and eosinophils were increased significantly (P<0.05). Leukocytosis might be due to bacteremia as a result of the reduction in hepatic phagocytic activity. Eosinophils were increased in parasitic infestation.Significant difference was not observed in basophils and monocytes in anaemic dogs. These observations were in conformity with Willi *et al*. (2015). Diameter of RBC was decreased significantly (P<0.05) in anaemic dogs. Significant difference was not observed in platelet count, ESR and reticulocyte count in anaemic dogs. These types of observations were in agreement with those of Guadarrama- Olhovich *et al*. (2013) and Singh *et al*. (2017). Thrombocytopenia might be due to platelet sequestration in the spleen or development of disseminated intravascular coagulation. Reticulocytosis was observed in many cases of anaemia with functional bone marrow, reticulocytopenia occurs in dogswith reduced or defective erythropoiesis. In the present investigation MCV was increased significantly (P<0.05) and MCHC was decreased significantly (P<0.05). In MCH significant difference was not observed. These findings were in accordance with Battison (2007) observed decreased MCHC level.

Conclusions

From the above studies, it was concluded thathaematologically, reticulocytosis was observed in dogs indicatingregenerative and responsive anemia and active bone marrow.Erythrocyte indices were very useful to assess type of anaemia. Eosinophils were increased in parasitic infestation.

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