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HAEMATOLOGY OF ANAEMIC DOGS UNDER THE INFLUENCE OF ANTIANAEMIC DRUGS*

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Anaemia in dogs may be due to several causes. Usually animals infested with ecto and endo parasites become anaemic due to loss of blood or it may be due to malnutrition or any systemic disease. However, certain cases of anaemia remain refractory to treatment as reported by Tasker *et al.* (1969) who found that in Basenji dogs aged between 3 to 7 months, showed progressive anaemia even after treating with haematinics and tonics for more than one month.

Enzymes like Glucose-6--Phosphate dehydrogenase (G6PD), Pyruvate kinuse (PK) and Glutathione (GSH) play important role in maintaining supply of energy and cell membrance integrity and protect haemoglobin from irreversible damage. Screening of enzyme deficient animal is therefore of paramount importance in maintaining proper health of pet dogs. Hence this work was undertaken to identify dogs with Persistant anaemia and to estimate haemogram and enzyme level of blood in city dogs reared as pets.

Materials and Methods

Twenty six dogs (14 male and 12 female aged between 3 months to 3 years belonging to Alsatian, Dobermann and Pomerenian breeds) were identified with the condition of persistant anaemia having a haemoglobin value less than 6 g/dl and free from ecto, endo parasites and all systemic diseases. From these dogs blood samples were collected (5 ml from each animal) in sterilised vials containing heparin (5000 IU/ml) by venupuncturing the saphenous vein. Then the dogs were subjected to antianaemic treatment with Belamyl 0.5 ml and Vibelan 3 ml daily for one month. During this period four blood collections were made at weekly intervals. Based on the after treatment values of haemogram and enzymes, 15 anaemic dogs were grouped into responding to treatment or group A-I and remaining 11 anaemic dogs in the not responding to treatment or group A-II. All the samples were subjected to estimation of packed cell volume (PCV) by Wintrobe's micro haematocrit method, Haemoglobin (Hb) by Sahli's acid haematin method, Red blood cells (RBC) using Hayem's dilution fluid and Reticulocyte count (RC) as per the standard methods described by Schalm *et al.* (1975). The enzymes Glucose-6-Phosphate dehydrogenase (G6PD) and Pyruvate Kinase (PK) were estimated as described by Motulsky and Yoshida (1966) and Tanaka (1962) respectively, using red blood cells. The Glutathione (GSH) was estimated by using whole blood as described by Beutler *et al.* (1963). The values were statistically analysed as per the methods described by Snedecor and Cochran (1968) and presented in Table 1.

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Table 1 Haematological parameters of normal and anaemic dogs before and after treatment

Blood parameters	Normal dogs (10 Nos.)	Anaemic dogs before treatment (26 nos.)	Anaemic dogs after treatment (26 nos.)	Anaemic dogs respond to treatment – AI (15 nos.)	Anaemic dogs not respond to treatment – AII (11 nos.)
PCV (per cent)	43.82 ± 3.72	16.12 + 2.08	31.22+1.64	26.88 + 2.56	15.84 ± 1.62
Hb (g/dl)	12.68 ± 1.71	4.08 ± 1.27	8.48 ± 1.12	9.92 ± 1.84	3.26 ± 0.74
RBC (10^6/cu mm)	5.82 ± 0.92	1.61±0.87	3.24 ± 0.92	3.66 + 0.76	1.58 +0.72
RC (per cent)	"	8.12±2.52	3.72 ± 0.78	14.42 ± 0.68	"
G6PD (IU/gHb)	13.04±3.62	12.42± 3.14	16.12 + 2.10	18.94 + 1.72**	5.46 + 1.08
PK (IU/gHb)	4.46 ± 1.32	6.78 + 1.88	5.96 ± 1.04	4.76± 1.12	8.72 ± 2.48
GSH (mg/100 ml of RBC)	67.42 + 12.42	180.94 ±17.28	92.78 ± 8.32	110.52 + 5.84**	247.56 ± 28.56**

** Highly significant

Results and Discussion

The haemogram value for dogs of group Al were PCV 26.88±2.56 per cent, Hb 9.92±1.84 g/dl and RBC 3.66±0.76 x 10^5/Cu mm and for A-II the values were PCV 15.84±1.62 per cent, Hb 3.26±0.74 g/dl and RBC count 1.58±0.72 x 10^5/Cu/mm. Similar observation of low haemogram values were reported by Tasker *et al.* (1969), Prasse *et al.* (1975) and Burman *et al.* (1982) in anaemic Basenji dogs.

The G6PD activity recorded in group A-I and A-II anaemic dogs were 18.94±1.72 IU/gHb and 5.46±1.08 lU/gHb respectively and the difference was highly significant ($P<0.01$). When compared between these two values, the group A-I showed increased G6PD activity, which could be on account of release of reticulocytes into circulation which are the cells possessing increased G6PD activity as reported by Tasker *et al.* (1969). Similar opinion was offered by Searcy *et al.* (1979) that the erythrocytic glycolytic enzymes displayed increased activity in anaemic Basenji dogs when compared to normal Basenji dogs. But the G6PD activity recorded for Group A-II was low and the haemogram values were also low. Similar low G6PD value of 6.53 lU/gHb was estimated in three Basenji dogs having progressive unresponsive anaemia reported by Tasker *et al.* (1969). In the present study the anaemia group A-II may be considered as G6PD deficient category.

The PK value estimated for A-I and A-II anaemic dogs were 4.76±1.12 and 8.72+2.48 lU/gHb respectively and the difference were highly significant ($P<0.01$). The increased PK activity in group A-II may be for the maintenance of integrity of the red cell which prevent the Hb becoming methaemoglobin because the functional integrity of the red cells was affected by the reduced G6PD activity already recorded.

The mean glutathione (GSH) value estimated in anaemic dogs of group A-I and

group A-II were 110.52±5.84 and 247.56±28.56 mg/100 ml of RBC respectively. The difference was highly significant (P<0.01). These values are higher than the normal value of 67.42±12.42 mg/100 ml of RBC recorded in normal healthy dogs. Similar increase in GSH activity ranging from 85 to 340 mg/100 ml of RBC was recorded by Maede (1977) in dogs with acute haemolytic anaemia. This increased GSH concentration was in response to reduced haemoglobin content in anaemic animals, in which each haemoglobin molecule gets more frequently oxygenated and deoxygenated as described by Gohil *et al.* (1988).

Summary

It was found that the anaemic dogs group AI which responded to treatment showed response with the release of reticulocytes into the circulation, but anaemias of longer duration showed increase in enythrocyte enzyme activity especially G6pD and GSH followed by PK. This showed that the enzymes are interrelated in keeping the haemoglobin in the functional state. Whereas in the nonresponding anaemic group AII G6PD enzyme deficiency was identified and the PK and GSH activities increased twice as that of responding group which may be a compensatory mechanism.

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