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Alteration In Haemoglobin Concentration In Blood of *Felis Domesticus* and *Funambulus Palmarum* With Reference To Natural and Artificial Diet

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Abstract: The paper deals with an experiment which shows that when the animals (*Felis domesticus*, a carnivore and *Funambulus palmarum*, a herbivore) were fed with artificial diet that contains food preservatives and additives, their Haemoglobin concentration (Hb%) decreased significantly (P<0.05). The trend was observed in all three seasons under study.

Key words: *Felis domesticu* • *Funambulus palmarum* • Artificial diet • Natural diet • Red Led • Copper Arsenite

Introduction

Food additives like sulphur dioxide, Tetrazine and common preservative like Benzoate are excessively used these days in fast food culture. several experiments have indicated above its bad effect on health. These common preservative and additives are observed to create hypersensitivity, cancer, neurological conditions, rapid heartbeat, digestive problems and obesity in children. Some people feel organic additives are preferable to artificial ones, but point out that "Natural" additives may be harmful in large quantities (such as salt) or may contain natural toxins, such as chemicals made by plants. Two type of mammals were selected *Felis domesticus and Funambulus palmarum* because they denote the variations in the blood composition on three scheduled levels viz; kind of food habits, specific dietary provisions and the seasonal fluctuations in the blood. It was found that Haemoglobin concentration (Hb%) decreased significantly (P<0.05) in the blood of *Felis domesticus and Funambulus palmarum* under artificial diet during summer, rainy and winter seasons. Haemoglobin in the blood falls when iron loss exceeds that of iron absorption and anaemia develop.

Some important indices about Red Blood Corpuscles and Haemoglobin

Colour Index (C.I.) It is calculated as follows:

$$\frac{Precentage\ of\ Haemoglobin}{Precentage\ of\ red\ cells}$$

The haemoglobin percentage is determined as well as the red cell count. A count of 5 million red cells per cubic mm is taken as 100%. If a subject is found only 4 million red cells (i.e, 80% of the normal 5 million), then the colour index will be 60/80 = 0.75. The normal colour index is 1, but slightly lower index, i.e. 0.85, is more commonly

found and is also not abnormal.

Colour index indicates the proportion of haemoglobin present in each red cell with respect to normal. In Hypochromic anaemia the index is low, in Hyperchromic or Macrocytic anaemia, the index is above 1.

1. Mean corpuscular haemoglobin (M.C.H.) – It is calculated as follows :

$$\frac{\text{Haemoglobin in grams per litre of blood}}{\text{Red cells in million per cubic mm}}$$

The average figure is 29.5 γγ ± 2.5. (1 micro - microgram or γγ is one million – millionth of 1 gram) This indicates the absolute amount of Haemoglobin cell, e.g., each red cell contains on the average 29.5 γγ of Haemoglobin.

Material and Methods

In the present investigation two different food habit mammals namely, *Felis domesticus* (a carnivore)and *Funambulus palmarum* (a herbivore) were selected as experimental animals. Both selected mammals may prove to be good experimental objects to denote the variations in the blood composition. As twenty *Felis domesticus* (cat) with an average starting weight of 2.8 kg and *Funambulus palmarum* (Squirrel) with an average starting weight 95 g were selected for the laboratory stock. Both the mammals were allowed to acclimatized to the laboratory condition for 10 days. During acclimatization the *Felis domesticus* and *Funambulus palmarum* fed with natural diet. Both group of mammals were housed in two group of 10 separately.

Second group of *Felis domesticus* was transported to laboratory. *Felis domesticus* was fed with a diet of cat food (Premium cat food of PETCO) mixed with 3% BHA (food preservative) and 2% artificial dyes (food colourant – Red Led, Copper Arsenite). The second group of *Funambulus palmarum* were also transported to laboratory and fed with a mixed diet of ground nut water adlibitum, 3% BHA (food preservative) and 2% artificial dyes (food colourant- Red Led, Copper Arsenite). The mammals were given 2-3 days acclimation period before taking blood for haematological and biological studies, each animal of both mammals was weighted to nearest gram. To estimate the amount of Haemoglobin in the blood in mammals Gower's Haldane haemoglobinometer (or haemometer), N/10 HCl (1.0 ml of concentrated HCl dissolved in 99 ml distilled water), distilled water.

The apparatus also includes a 20 cm micropipette, a small glass rod stirrer, a bottle brush, a dropper and a small bottle to hold the HCl solution and 22 gauge needle. Clean the graduated tube first with distilled water and then with 90% alcohol let the tube dry. Using a dropper, fill the tube upto 2g mark with N/10 HCl (20^{th} mark on percentage side). Sterilized the finger with a cotton swap dipped in alcohol. Gently prick the finger with a fresh sterilized needle. Suck up the drop of blood that appears into the micropipette upto 20 cmm mark. Press a fresh cotton swab dipped in alcohol on the pricked finger till bleeding stops. Wipe off excess blood on the outside of the micropipette tip. Expel blood from the micropipette into the graduated tube containing HCl in such a way that the tip of the micropipette is dipped in HCl. This forms the acid pipette 2-3 times with distilled water and expel the contents into the graduated tube. Stir the acid haematin solution with a glass rod and let it stand undisturbed for 10 minutes. Add distilled water drop by drop to the graduated tube till the colour of the acid haematin solution in it, matches perfectly with the solution in the sealed tube. At this stage, note the level of solution in the graduated tube. Take 3 sets of reading and calculate the average value.

Observations

These mammals considered for present study are common in nature. *Felis domesticus* is a domestic cat which prefers salty, sour or bitter tasting substances. They do not develop a sweet taste

because of lack of perception of simple sugars. Most of the cats like milk but some adults cannot digest cow's milk due to lactose intolerance and suffer by diarrhoea. *Funambulus palmarum* (squirrel) prefer food that are rich in protein, fat carbohydrate. Generally squirrels are categorized as omnivore in feeding habit. They feed on nuts, seed, fruits, insects, frogs, eggs and small birds. It was observed that under natural diet in case of *Felis domesticus,* haemoglobin concentration (Hb%) in blood was 11.60g/dl in summer, 11.90g/dl in rainy season and 12.00 g/dl in winter season. In *Funambulus palmarum*, haemoglobin concentration in blood was 14.50 g/dl in summer, 15.00 g/dl in rainy season and 15.30 g/dl in winter season under natural diet.

Table 1 Alteration in the Haemoglobin Concentration (HbC) in the blood of *Felis domesticus* and *Funambulus palmarum* under natural and artificial diet during summer, rainy and winter seasons.

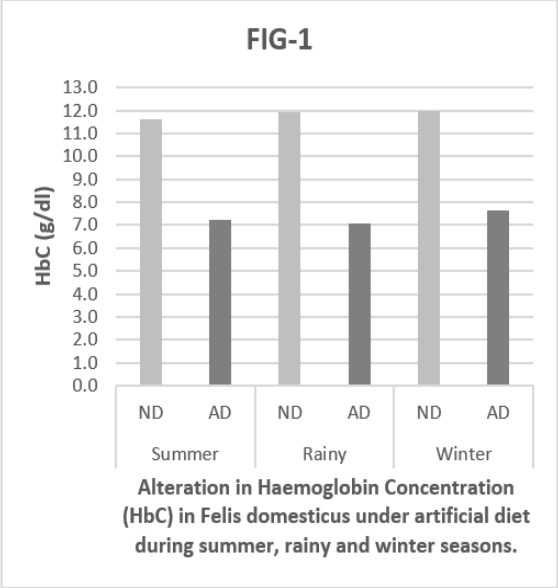
S. No	Mammals	Summer		Rainy		Winter	
		ND	AD	ND	AD	ND	AD
1	*Felis domesticus*	11.6 ± 0.950	7.25 ± 1.10	11.9 ± 0.95	7.085 ± 1.08	12 ± 0.84	7.65 ± 1.00
2	*Funambulus palmarum*	15.5 ± 0.60	12.06 ± 0.910	15 ± 0.85	12.28 ± 1.06	15.3 ± 0.94	13 ± 1.16

Values given in the table are the mean of 9 observation each.

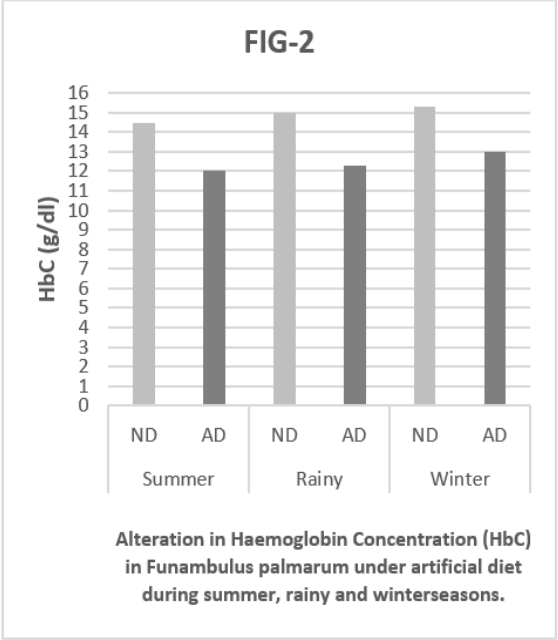
Values are significant at $P < 0.05$

ND= Natural Diet , AD = Artificial Diet

After artificial feeding in case of *Felis domesticus* the haemoglobin concentration in blood was 7.250 g/dl in summer,7.085 g/dl in rainy season and 7.65 g/dl in winter season. In *Funambulus palmarum* the haemoglobin concentration in the blood was 12.06 g/dl in summer, 12.28 g/dl in rainy season and 13.00g/dl in winter season under artificial diet (Table- 1).



ND- Natural Diet, AD- Artificial Diet



ND- Natural Diet, AD- Artificial Diet

After artificial feeding there was a drastic decrease in haemoglobin concentration in the blood of both mammals. (Fig. 1 and Fig. 2)

Table 2 Percentage alteration in the Haemoglobin Concentration (HbC) in the blood of *Felis domesticus* and *Funambulus palmarum* under artificial diet during summer, rainy and winter seasons.

S.No	Mammals	Summer	Rainy	Winter
1	*Felis domesticus*	-37.50%	- 40.50%	- 36.25%
2	*Funambulus palmarum*	-16.82%	- 18.13%	- .15.03%

(+) = Increase, (-) = Decrease

Present study reveals a significant ($P<0.05$) decreasing in haemoglobin concentration in the blood of *Felis domesticus* were -37.50% in summer, -40.50% in rainy season and -36.25% in winter season under artificial diet. Similarly decreasing in haemoglobin concentration in the blood of *Funambulus palmarum*, were – 16.82% in summer, -18.13% in rainy season and -15.03% in winter season under artificial diet (Table 2)

Discussion

In the present investigation the haemoglobin concentration (Hb%) decreased in the blood of *Felis domesticus and Funambulus palmarum under* artificial diet during summer, rainy and winter seasons. Haemoglobin concentration of blood has been observed to be positively correlated with Total Erythrocyte Count (Prasad 1980 and Ahmad 1981). Rautela and Joshi (1987) observed higher haemoglobin concentration in male birds.

Baronia and Sahai (1992) observed reduction in haemoglobin concentration in *Rattus* rattus under the stress of benzene hexa chloride. Ali and Abdul (1983) reported decrease in haemoglobin percentage in *rabbit* during Malathion poisoning. Bilgrami et al. (1987) described significant fall in haemoglobin content in create in treated mice. Joshi and Tondon (1977) have recorded a higher haemoglobin content during summer season in lower vertebrates. Cernikova (1967) have recorded lower haemoglobin content during summer seasons in pacific salmon and freshwater fishes.

In the present study, however, it has been observed that in *Felis domesticus and Funambulus palmarum* under study a decreasing trend in the haemoglobin content under artificial diet during summer, rainy and winter but when grand average value of haemoglobin content of both mammals were compared, it was found that the *Funambulus palmarum* exhibit a higher haemoglobin content than *Felis domesticus.* Maximum decrease in haemoglobin concentration were observed during rainy season in both mammals. The variation in haemoglobin content under three all test seasons in both mammals may be concluded that although the haemoglobin content is correlated with the Total Erythrocyte Count (TEC), as well as regulated by Mean Corpuscular Volume (MCV) and Mean Corpuscular Haemoglobin (MCH).

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