

ALTERATION IN PACKED CELL VOLUME (PCV) IN BLOOD OF *FELIS DOMESTICUS* AND *FUNAMBULUS PALMARUM* WITH REFERENCE TO NATURAL AND ARTIFICIAL DIET

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ABSTRACT: The present study deals with an experiment on the alteration in Packed Cell Volume (PCV) of the blood which shows that when the animals (*Felisdomesticus*, a carnivore and *Funambuluspalmareum*, a herbivore) were fed with artificial diet that contains food preservatives ButylatedHydroxyanisole (BHA) which is Petroleum- derived antioxidants that used to preserve fats and oils, food additive Sodium Benzoate and food colorants Red Led, Copper Arsenite, their Packed Cell Volume (PCV) decreased significantly ($P<0.05$) was recorded in summer, rainy and winter seasons.

Key Words: *Felisdomesticus*, *Funambuluspalmareum*, natural diet, artificial diet, ButylatedHydroxyanisole, Sodium Benzoate, Copper Arsenite.

INTRODUCTION

The Packed Cell Volume (PCV) is a measurement of the proportion of the blood that is made up of cells. The value is expressed as a percentage or fraction of red blood cells in the blood. For example a Packed Cell Volume (PCV) of 40% means that there are 40 millilitres of red blood cells in 100 millilitres of blood. It is used to diagnose anaemia, Polycythaemia or dehydration in patients.

Generally, the test is a part of a full blood count and is commonly carried out to monitor response to treatment, estimate need for blood transfusions.

If the number of red blood cells increases, the Packed Cell Volume (PCV) also rises. It also increases as a result of dehydration. A low Packed Cell Volume (PCV) implies that the patient has low number of red blood cells and is suffering from anaemia.

Now a days extremely use of food preservatives, additives and artificial dyes(dangerous chemicals) are excessively used to prevent the food spoilage in fast food culture. Several experiments have indicated its bad effect on health, observed to create cancer because these different chemicals present in preservatives, additives have ability to damage DNA, increase intolerance power, irritating behaviour, hypersensitivity(increasing cases of suiside and depression), asthma attacks, migraine headaches, hypersexuality and change in personality of humanbeing (loneliness) and lack of concentration. Actually 0.75% ButylatedHydroxyanisole (BHA) are harmful to the blood of living being because of haemoglobin (Hb) present in the erythrocytes has the binding affinity with the chemicals. Food preservative ButylatedHydroxyanisole (BHA) are known to be metabolized in liver and eliminating by urine, they might be very detrimental to the circulatory system. Preservatives and artificial dyes e.g. copper Arsenite (harmful chemicals)can bind with haemoglobin (Hb) to form a complex. The binding process was a spontaneous molecular interaction, in which Vander Waal's forces and hydrogen bonds played major roles. Result showed that this chemical led to conformational changes in haemoglobin (Hb) including loosening of the skeleton structure and decreasing a helix in the secondary structure of the haemoglobin (Hb) result thyroid cancer, weight lose, hyperactivity in children. So now a days biotechnology of food processing is used. Food processing technology include fermentation in which functional additives, ingredients and enzymes produced using fermentation process. The process where by microorganisms and their enzymes bring about these desirable changes in food materials is fermentation.

In food processing method we use genetically modified (GM) microorganism. Recombinant micro-organisms can be generated be used to modify foods and to obtained desired processed food products, such as bread, sausage rolls, pies, meat products (bacon, ham, sausage, salami and pate) "convenience foods" such as microwave meals or ready meals. It is free of toxins. The phospholipase A1(PLA1) gene from *Fusariumvenenatum* is expressed in genetically modified *Aspergillusoryzae* to produce the phospholipase A1(PLA1) enzyme used in the dairy industry for cheese manufacture. Phospholipase A1(PLA1) has been reported to play an important role as a virulence factor in some bacteria and fungi.

For coloring of some food products used cochineal extract which is a pigment extracted from the dried eggs and bodies of female *Dactylopiuscoccus*, a beetle like insect that preys on cactus plants. Which is known as Cochineal extract or carmine. It is added to food for its dark-crimson color found in fruit juices, frozen fruit snacks, candy and yogurt. It is non-toxic food colorant.

Recent studies have shown processed foods to be a factor in increasing numbers of domestic animals suffering from cancer, arthritis, obesity, dental disease and heart disease according to many veterinarians and breeders.

Experiments conduct on that extract of color pigments(chlorophyll) present in leaf cells of plants. This pigment of Neem and Aloe vera plants that can use as natural food colorant and act as preservative because it has ability to stop replication of some bacteria and viruses and kill them and Aloe vera gel contains 200 active components including vitamins, minerals, 19 of the 20 known amino acids, 12 anthraquinone, enzymes, hormones and saponins. Anthraquinone improves digestion.

MATERIAL AND METHODS

In the present investigation two different food habit mammals namely, *Felisdomesticus* (a carnivore) and *Funambuluspalmareum* (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 *Felisdomesticus* (cat) with an average starting weight of 2.8 kg and *Funambuluspalmareum* (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 *Felisdomesticus* and *Funambuluspalmareum* fed with natural diet. Both group of mammals were housed in two group of 10 separately.

Second group of *Felisdomesticus* was transported to laboratory. *Felisdomesticus* was fed with a diet of cat food (Premium cat food of PETCO) mixed with 3% ButylatedHydroxyanisole (BHA) (food preservative) and 2% artificial dyes (food colourant – Red Led, Copper Arsenite). The second group of *Funambuluspalmareum* was 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 were weighted to nearest gram.

For the determination of Packed Cell Volume (PCV) the winstrobe method (1933) will be followed. The haematocrit tube is filled with blood mixed with an appropriate quantity of anti-coagulant – ammonium oxalate + potassium oxalate (3:2), 0.2 mg/ 5 ml. blood, tube upto 100 ml mark with the help of a fine glass dropper, so that, no air bubble enters. Now the tube will be centrifuged at 2500 rpm (revolutions per minute) for about half an hour (rpm is a unit of rotational speed around a fixed axis). The height of the column of red blood cells (RBC) will be noted and the Mean Packed cell value (PCV) will be derived.

OBSERVATIONS

It was observed that under natural diet in case of *Felisdomesticus*, the value of Packed Cell Volume in the blood was 35.60 per 100ml in summer, 37.40 per 100ml in rainy season and 32.90 / 100ml in winter season.

In *Funambuluspalmareum*, the value of Packed Cell Volume in the blood was 42.25 /100ml in summer, 42.50 /100ml in rainy season and 38.10 /100ml in winter season under natural diet.

Present investigation reveals a significant decrease in Packed Cell Volume in the blood in *Felisdomesticus* was 30.60/100 ml in summer, 31.00 /100 ml in rainy season and 29.65/100 ml in winter season under artificial diet. In *Funambuluspalmareum*, the Packed Cell Volume (PCV) in the blood was 34.90/100 ml in summer, 35.65/100 ml in rainy season and 33.00/100 ml in winter season under artificial diet (Table 1).

Table 1 Alteration in the Packed Cell Volume (PCV) in the blood of *Felisdomesticus* and *Funambuluspalmareum* under natural and Artificial diet during summer, rainy and winter seasons.

S.No.	Mammals	Summer		Rainy		Winter	
		ND	AD	ND	AD	ND	AD
1.	<i>Felis domesticus</i>	35.60 ±0.65	30.60 ±0.81	37.40 ±0.72	31.00 ±0.90	32.90 ±0.68	29.65 ±0.95
2.	<i>Funambulus palmarum</i>	40.25 ±0.50	34.90 ±0.65	42.50 ±0.70	35.65 ±0.88	38.10 ±0.55	33.00 ±0.64

Values given in the table are the mean of 9 observations each, Values are significant at P<0.05.

ND =Natural diet, AD = Artificial diet

After artificial feeding there was a significant (P< 0.05) decrease in Packed Cell Volume (PCV) in the blood in *Felisdomesticus* and *Funambuluspalmarum* in three seasons (summer, rainy and winter seasons) (Fig 1, Fig 2).

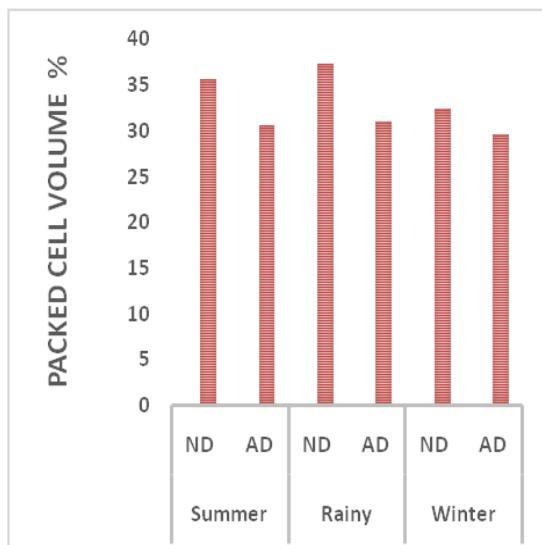


Fig 1

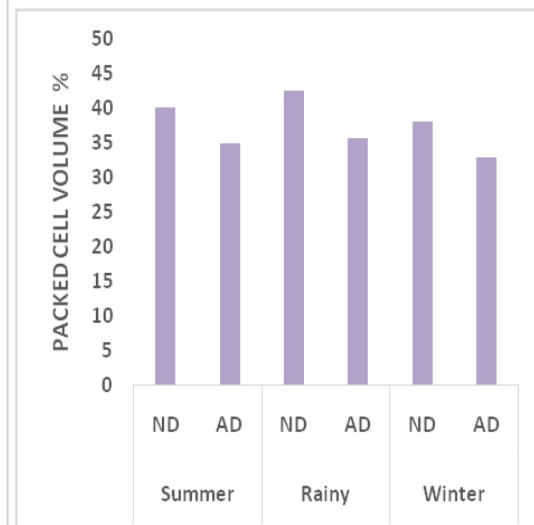


Fig 2

FIG-1. Alteration in Packed Cell Volume(PCV) in *Felisdomesticus* under artificial diet during summer, rainy and winter seasons. (ND= Natural diet , AD= Artificial diet)

FIG-2. Alteration in Packed Cell Volume (PCV) in *FunambulusPalmarum* under artificial diet during summer, rainy and winter seasons. (ND= Natural diet , AD= Artificial diet)

After artificial feeding there was a significant decrease in Packed Cell Volume(PCV) in the blood in *Felisdomesticus* were -14.04%, -17.11% and -9.88% during summer, rainy, and winter seasons respectively. Similarly the decrease in the blood of *Funambuluspalmarum* were -13.29%, -16.12% and -13.38% under artificial diet during summer, rainy and winter seasons respectively (Table 2).

Table 2 Percentage alteration in Packed Cell Volume (PCV) in the blood of *Felisdomesticus* and *Funambuluspalmarum* under artificial diet during summer, rainy and winter seasons.

S.No.	Mammals	Summer	Rainy	Winter
1.	<i>Felisdomesticus</i>	-14.04%	-17.11%	-9.88%
2.	<i>Funambuluspalmarum</i>	-13.29%	-16.12%	-13.38%

(+) = Increase (-) = Decrease

DISCUSSION

The present study revealed a significant decrease in Packed Cell Value (PCV) in the blood of *Felisdomesticus* and *Funambuluspalmarum* under artificial diet during summer, rainy and winter seasons.

Prasad and Banerjee (1981) have observed the total erythrocyte count and cell size are controlling factor of Packed Cell Volume (PCV) percentage in an animals. Prasad (1991) observed the total erythrocute count is not the only factor to regulate Packed Cell Volume (PCV) percentage, the other factor like Mean Corpuscular Volume (MCV) percentage also plays an important role. The seasonal variation in Packed Cell Volume (PCV) percentage in both mammals (*Felisdomesticus* and *Funambuluspalmarum*) in present study may be correlated with erythrocytes under artificial diet. Beside this, these two factors Mean Corpuscular Volume (MCV) has also been found significantly influencing the Packed Cell Volume (PCV) percentage. Yadav (1980) have also reported a similar result in different species of *Channapunctatus*. Chaturvedi and Agrawal (1993) observed a significant decrease in Packed Cell Volume (PCV) in the blood of *Heteropneustesfossilis* under the stress of alachlor and rogor. Zahra and Shreshth (2007) observed Packed Cell Volume (PCV) percentage decrease in *Channapunctatus* following acute and sublethal exposure of glyphosate. R. Kumar and T.K. Banerjee(2012) have observed the Arsenic bioaccumulation in the nutritionally important catfish

Clariasbatrachus exposed to the trivalent arsenic salt, Sodium Arsenite. Engle and Davis (1964) have reported that haematocrit values (Hct) of sluggish animals or less than active animals. Haematocrit value (Hct) is the ratio of the volume of red blood cells to the total volume of blood. Our findings are according with those of Engle and Davis (1964), Chaturvedi and Agrawal (1993) and Zahra and Shreshth (2007) who have reported decrease in Packed Cell Volume (PCV) percentage under stress or artificial conditions.

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