

HEMATOLOGY OF TIGERS (*PANTHERA TIGRIS TIGRIS*), LEOPARDS (*PANTHERA PARDUS*) AND CLOUDED LEOPARDS (*NEOFELIS NEBULOSA*) IN CAPTIVITY.

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Introduction

The determination of hematological values are useful for understanding the state of animal health. The normal blood values in different classes of domestic and pet animals are adequately available (Schalm, *et al.*, 1975; Swenson & Reece, 1996). However, the information on these values is very limited in few feline species maintained in tropical region (Christi, *et al.*, 1998) and not sufficient to establish the relation of age nutrition, management and environment with general health of these animals. The main objective of this study is to have a base line data to provide a basic information on normal hematological values in tropical climate for identifying abnormalities in blood of sick Tigers (*Panthera tigris*), Leopards (*Panthera pardus*) and Clouded Leopards (*Neofelis nebulosa*) kept under captivity in tropical region

Methodology

Three male Tigers, six female Tigers, six female Leopards, one male Clouded Leopard and one female Clouded Leopard of 3.5 to 9 Year, 4.5 to 14 Years, 4 to 11 years, one year and 11 years of age respectively, maintained in Sanjay Gandhi Biological Park, India, were included for this study. There was no previous reports for ailment in these animals. Stool examination of all animals done on three consecutive days were found negative for parasitic infestation.

Blood samples from each animal were collected between 09.00 and 10.00 am. during fully conscious state in squeeze cage. To minimise the excitement and to get rid of physiological stress to the animals during blood collection all animals were made accustomed to stand in the squeeze cage prior to the initiation of experiment. On the day of blood collection animals were brought into squeeze cage and were left in the cage for one hour. Thereafter the animals were further squeezed mildly and again left for 30 minutes. Finally the animals were squeezed properly and blood samples were collected using disposable syringe (20 ml) and sterile needle (20 gauge) by venipuncture either from dorsal branch of medial saphenous vein in the hind leg at about knee level or from recurrent tarsal vein in the hind leg at the upper portion of the paw from the tigers. Blood samples from leopardess and clouded leopards were collected from medial saphenous vein. Blood clotting time (BCT), Total erythrocyte count (TEC) (Schalm, *et al.*, 1975) and hemoglobin (Hb) was estimated by Sahli's Hemometer (Kolmer *et al.* 1969) in freshly collected blood. Packed cell volume (PCV) was measured (Schalm, *et al.*, 1975) from heparinized blood within two hours of blood collection. Mean corpuscular volume (MCV), Mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) were calculated using Swenson and Reece (1996) equation.

Results and Discussion

The data was analysed for averages and standard error and analysis of variance for comparison of various traits between groups was done by the method as described by Snedecor and Cochran (1967).

The values of BCT, Hb, PCV, TEC, MCV, MCH, and MCHC in Tigers, Tigeress, Leopardess and Clouded Leopards have been presented in Table.1.

The significantly ($P < 0.01$) lower BCT in Leopardess than the BCT of Tigers and Tigeress was recorded in our experiment. Maintenance of optimum concentration of Hb and TEC in Tigers, and Leopardess of different age groups recorded during present study might be due to the fact that all animals had achieved age of puberty (Fowler, 1978) as the concentration of Hb achieves its maximum level when the animals reach puberty and sexual maturity (Swenson & Reece, 1996; Safi *et al.* 1987). Slight lower Hb in Lion, Tigers, Leopards, Jaguar and Cheetah (Soifer & Bernstein, 1974) and higher Hb values in Mountain Lion (Currier & Russel, 1982) has been reported. This might be due to the variation in physiological status, ambient temperature, agroclimatic condition, feeding and management of the experimental animals as variation in any of the above factors causes fluctuation in hemoglobin concentration (Safi, *et al.*, 1987). However, the Hb concentration estimated in Tigers, Tigeress, Leopardess, Clouded Leopard and Clouded Leopardess were comparable to the value recorded earlier in Puma, Lion, Tiger, Leopard, Jaguar and Cheetah (Hawkey & Hart, 1986) in Cheetah, Lynx, Puma, Jaguar, and lion (Pospisil, *et al.*, 1987) and in captive born as well as in captured Asiatic Lioness (Christi, *et al.*, 1998).

The TEC values recorded in these species during present study are identical to the values reported in Tigers, Leopards, Jaguar, Cheetah, Cougar, Ocelot and Margay (Howkey & Hart, 1986; Soifer & Bernstein, 1974; Fowler, 1978), Asiatic Lioness (Christi, *et al.*, 1998). However, a higher value of TEC in Lynx, Puma, Lion and Jaguar (Pospisil, *et al.*, 1987) and in Mountain Lion (Currier & Russel, 1982) than the TEC values recorded in present experiment has been reported. The value of PCV in animals of our experiment was higher than domestic cat (Schalm, *et al.*, 1975). However, the PCV value reported in Lion Cheetah, Ocelot, Margay (Soifer & Bernstein, 1974), captive and wild Mountain Lion (Currier & Russel, 1982), captive Lioness (Christi, *et al.*, 1998), Lynx, Puma, Jaguar, Lion, Cheetah (Hawkey & Hart, 1986; Pospisil, *et al.*, 1987) were comparable to the values recorded in present experiment. The value of MCV, MCH and MCHC recorded in our experimental animals was comparable to the respective values reported in cats of different ages (Schalm, *et al.*, 1975; Coffin, 1953), captive born and captured Lioness (Christi, *et al.*, 1998), Puma, Lion,

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Table 1. Hemograms of Tigers, Leopardess and Clouded Leopards

Animals	Male Tigers	Female Tigers	Female Leopards	Male Clouded Leopard	Female Clouded Leopard
BCT(min)	8.25+- 0.20 (7.45- 8.50)	8.50+- 0.38 (7.00- 10.00)	5.29+- 0.20 (4.25-5.75)	-	-
Hb(g/dl)	15.75+- 1.40 (15.40-16.00)	15.03+- 0.47 (13.60-17.00)	14.83+- 0.46 (13.00-16.00)	15.80	15.00
PCV(%)	45.67+- 2.42 (40.00-50.00)	43.33+-0.93 (41.00-48.00)	42.83+-1.06 (39.00-47.00)	48.00	46.00
TEC(X10 ⁶ /ul)	7.17+-0.33 (6.36-7.69)	7.05+-0.12 (6.60 - 7.43)	6.95+-0.16 (6.48-7.67)	7.96	7.17
MCV(u ³)	63.70+- 1.45 (61.11-67.11)	61.46+- 0.91 (59.21- 63.63)	61.62+- 1.34 (58.69-67.13)	60.30	64.15
MCH (pg)	22.07 +- 0.90 (20.54-24.21)	21.15+- 0.82 (18.32-23.02)	21.39+- 0.80 (18.25-24.24)	19.84	20.92
MCHC(%)	34.70+-1.60 (32.00-38.50) (3)	34.72+-0.71 (32.81-38.09) (6)	34.66+- 0.87 (31.11-37.20) (6)	32.91 (1)	32.60 (1)

BCT- Blood clotting time, Hb- Hemoglobin, PCV- Packed cell volume, TEC- Total erythrocyte count, MCV- Mean corpuscular volume, MCH- Mean corpuscular hemoglobin, MCHC- Mean corpuscular hemoglobin concentration.

Tigers, Jaguar and Cheetah (Hawkey & Hart, 1986).

The values of above parameters reveal that the mean values of Hb, PCV, TEC, MCV, MCH and MCHC were quite similar in Tigers, Tigeress, Leopardess and Clouded Leopards. Though the Hb concentration of three Tigeress and three Leopardess were lower than the Hb values of PCV, TEC and MCV of Tigers, Tigeress and Leopardess were similar. These values indicated that in the wild felides in which the Hb concentration was lower the cells size and the number of erythrocytes were not affected. However, the MCH and MCHC values of three Tigeress and three Leopardess having lower hemoglobin concentration were lower than the MCH and MCHC values recorded in other animals having higher Hb concentration. This indicates that the process of erythropoiesis and Hb synthesis is similar to the domestic animals (Swenson & Reece, 1996).

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