



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(10): 390-392
© 2018 TPI
www.thepharmajournal.com
Received: 05-08-2018
Accepted: 06-09-2018

Koundinya U
MVSc Scholar, Department of
Veterinary Surgery and
Radiology, Pookode, KVASU,
Kerala, India

George Chandy
Assistant Professor, Department
of Veterinary Surgery and
Radiology, Pookode, KVASU &
Officer-in-Charge, KVASU
Centre for Wildlife Studies,
Pookode, Kerala, India

Jacob Alexander
Senior Veterinary Surgeon,
Zoological Gardens,
Thiruvananthapuram, Kerala,
India

Sumanth BM
MVSc Scholar, Department of
Veterinary Pathology, Pookode,
KVASU, Kerala, India

John Martin KD
Professor, Department of
Veterinary Surgery and
Radiology, Mannuthy, KVASU,
Kerala, India

Sooryadas S
Assistant Professor, Department
of Veterinary Surgery and
Radiology, Pookode, KVASU,
Kerala, India

Harshad Patki Sudhir
Assistant Professor, Department
of Veterinary Anatomy and
Histology, Pookode, KVASU,
Kerala, India

Correspondence

Koundinya U
MVSc Scholar, Department of
Veterinary Surgery and
Radiology, Pookode, KVASU,
Kerala, India

A study on haematological parameters of Indian spectacled cobra (*Naja naja*)

**Koundinya U, George Chandy, Jacob Alexander, Sumanth BM, John
Martin KD, Sooryadas S and Harshad Patki Sudhir**

Abstract

A study was conducted on 12 captive Indian Spectacled Cobras (*Naja naja*) which underwent routine health screening procedures. The snakes were physically restrained and 2 ml of blood was collected aseptically from ventral coccygeal vein. Haematological examination was performed by manual counting method using Natt and Herrick's dilution fluid and using a blood gas analyser. The values of total erythrocyte count, volume of packed red cells, haemoglobin and differential leukocyte count values were similar to those obtained in other species of cobras. The data obtained may be useful as reference values for haematological parameters of Indian Spectacled Cobras.

Keywords: Haematology, Indian spectacled cobra, snake

Introduction

Reptiles are one of the most diverse classes among all living creatures in the animal kingdom. They are poikilothermic animals with body temperature highly dependent on their surrounding environment. Though the interest in reptiles as a phylogenetically ancient group of vertebrates is an old one, there is no exhaustive information on their haematology. Reptiles, especially snakes, are rarely studied due to various reasons. Reptilian RBC's have nuclei unlike that of mammals. It has also been found that the blood composition in reptiles shows fluctuations depending on season and motor activity (Binyon and Twig, 1965; Lillywhite and Smits, 1984) [3, 8] phase of reproductive cycle (Acuna, 1974) [1] and the level of serum corticosterone (Saad, 1984) [12]. The haematological profile depends also on geophysical conditions of the habitat (Hutchison and Szarski, 1965) [6] and photoperiod (McLean, 1975; Ashby, 1985) [9, 2]. The number of cells in circulating blood is also determined by age, sex and health of the snake. The leukogram of reptiles continuously changes especially during stress and pathological states associated with parasitism (Saint Girons, 1960; Duguay, 1970) [13, 5]. The present study was conducted to assess the haematological parameters of Indian Spectacled Cobras which underwent routine health screening procedures.

Materials and Methods

Twelve apparently healthy Indian Spectacled Cobras maintained at the Zoological Gardens, Thiruvananthapuram, which underwent routine health screening were included in the study. Individual snakes were segregated and housed in a separate enclosure for close observation of behaviour and also to assess health status. A thermo-hygrometer (HTC instruments™, Maharashtra, India) was placed in the enclosure to monitor atmospheric temperature and humidity. All snakes were sexed using "cloacal probing" method.

Blood collection and analysis

The snakes were physically restrained and 2 ml of blood was collected from the ventral coccygeal vein after aseptic preparation of the site using 2% chlorhexidine solution. A 24 G needle attached to a 2 ml syringe was inserted along the ventral midline at a 45° angle between two subcaudal scales approximately half the distance from the vent. The needle was inserted until it touched the vertebral column and moved slowly along it with simultaneous aspiration until blood was withdrawn into the syringe. Immediately after collection, a drop of blood was used for preparing blood smear by "push" smear technique for Differential Leukocyte Count (DLC). The rest of the blood sample was then transferred to K2 EDTA vials and was used for estimating total erythrocyte count and total leukocyte count by manual counting method using

Natt and Herrick's dilution fluid (Karthik, 2013) [7]. Volume of packed red cells and haemoglobin were estimated using a blood gas analyser (Epoc™ Blood Analysis System and Epoc BGEM Test Card, Epocal, INC. Ottawa, ON Canada). The blood collection procedure was carried out quickly to minimize stress associated with handling.

Statistical analysis

The data obtained during the study was subjected to statistical analysis as described by Snedecor and Cochran (1994) [15] using the statistical software SPSS version 21.0. The value of $P < 0.05$ was considered significant (Snedecor and Cochran, 1985). The results were expressed as Mean±Standard Error (Mean±SE).

Results

Mean±SE value of temperature and relative humidity of the enclosure were 89.83±0.56 °F and 84.07±0.50 per cent, respectively. Out of the 12 snakes, eight were males and four were females. The mean±SE value of haemoglobin concentration was found to be 7.60±0.29 g/dL. The mean±SE value of TEC was 5.88±0.27×10⁶. Total Leucocyte Count was found to be 9.78±0.39×10³/μL. VPRC was 19.85±1.07 per cent. The mean±SE values of lymphocyte count was 51.10±1.14 per cent. The mean±SE value of heterophil count was 45.30±1.22 per cent. The mean±SE value of monocyte count was 1.90±0.076 per cent. The mean±SE value of basophil count was 1.50±0.084 per cent. The mean±SE value of eosinophil count was 0.20±0.041 per cent. All the

haematological parameters estimated are presented in the Table 1.

Table 1: Haematological values of Indian Spectacled Cobras

Parameter	Mean±SE
Haemoglobin Conc. (g/dL)	7.60±0.29
VPRC (%)	19.85±1.07
TEC (10 ⁶ /μL)	0.588±0.27
TLC (10 ³ /μL)	9.78±0.39
DLC (%)	
Lymphocytes	51.10±1.14
Heterophils	45.30±1.22
Monocytes	1.90±0.076
Basophils	1.50±0.084
Eosonophils	0.20±0.041

Discussion

The values obtained were compared with the previous studies (Table 2) and the results are discussed below. The value of haemoglobin concentration obtained in this study was in accordance with those obtained by Muliya and Bhat (2016) and Dissanayake *et al.* (2017) [4], but slightly higher than the values obtained by Parida *et al.* (2014) [11]. The values were significantly higher than that of Monocellate Cobra, Siamese Spitting Cobra and Golden Spitting Cobra as noted by Salakij *et al.* (2012). The volume of packed red cells was similar to that reported by Salakij *et al.* (2012) but lower than that reported by Parida *et al.* (2014) [11], and Muliya and Bhat (2016) [10].

Table 2: Comparative haematological values among cobras (Range)

Parameters	Monocellate Cobra, Siamese Spitting Cobra, Golden Spitting Cobra (Salakij <i>et al.</i> , 2012)	Indian Spectacled Cobra (Parida <i>et al.</i> , 2014) [11]	Wild Indian Spectacled Cobra (Muliya and Bhat, 2016) [10]	Wild population of Spectacled Cobra (Dissanayake <i>et al.</i> , 2017) [4]
Haemoglobin Conc. (g/dL)	4.8-6.5	6.5-6.9	7.9-8.5	6.6-7.6
VPRC (%)	18-21	25-29	32-33	20-23
TEC (10 ⁶ /μL)	0.57-0.65	0.34-0.39	1.1-1.3	0.49-0.58
TLC (10 ³ /μL)	9.8-14.3	11.7-12.1	9.8-10.8	11.9-12.4
DLC (%)				
Lymphocytes	66-71	47-49	48-56	64-66
Heterophils	27-31 ^a	23-25	41-49	36-41 ^a
Monocytes	0-1.2	2.5-4	0.4-1.0	4.6-5.6
Basophils	0-0.2	4.6-5.2	0.5-1.9	0-1.2
Eosonophils	0-1.4	2.6-3.6	0.1-0.5	2.1-2.9

a-Heterophils and Azurophils

Total erythrocyte count noted was in accordance with values obtained in Monocellate Cobra, Siamese Spitting Cobra and Golden Spitting Cobra (Salakij *et al.*, 2012) and in wild population of *Naja naja* (Dissanayake *et al.*, 2017) [4]. The value was more than that obtained by Parida *et al.* (2014) [11] and less than the count obtained by Muliya and Bhat (2016) [10]. Total leukocyte count was in accordance with study done by Salakij *et al.* (2012) and Muliya and Bhat (2016) [10]. The value was less when compared to the finding of Parida *et al.* (2014) [11] and Dissanayake *et al.* (2017) [4]. Lower lymphocyte count was seen in this study compared to Salakij *et al.* (2012) and Parida *et al.* (2014) [11], but lymphocyte count was in agreement with the findings of Muliya and Bhat (2016) [10] and Dissanayake *et al.* (2017) [4]. Heterophil count in the present study was in accordance with the findings of Muliya and Bhat (2016) [10] and higher than the value obtained by Salakij *et al.* (2012), Parida *et al.* (2014) [11] and Dissanayake *et al.* (2017) [4]. Monocyte count obtained in this

study was higher than that observed by Salakij *et al.* (2012) and Muliya and Bhat (2016) [10] but lower than the value obtained by Parida *et al.* (2014) [11] and Dissanayake *et al.* (2017) [4]. Basophil count was similar to the count obtained by Muliya and Bhat (2016) [10] and less than the count obtained by Dissanayake *et al.* (2017) [4]. Eosinophils were similar to count obtained in study by Salakij *et al.* (2012) and Muliya and Bhat (2016) [10] and lower count was seen when compared to Parida *et al.* (2014) [11] and Dissanayake *et al.* (2017) [4]. The variation seen in the various haematological parameters might be due to motor activity (Binyon and Twigg, 1965; Lillywhite and Smits, 1984) [3, 8], living conditions of the snake (Hutchison and Szarski, 1965) [6] or the level of serum corticosterone (Saad, 1984) [12]. The aforementioned values provide the information about haematological values of Indian Spectacled Cobra which aid in assessing the physiological health of the species discussed.

References

1. Acuna ML. The hematology of the tropical lizard Iguana iguana Linnaeus: II. Seasonal variations. *Herpetologica*, 1974, 299-303.
2. Ashby MD. Factors affecting blood physiology and haemoglobin function in the New Zealand skinks, *Leiopisma smithi* (Gray) and *Leiopisma zelandica* (Gray). *Conn. Biochem. Physiol.* 1985; 80(A):3140.
3. Binyon E, Twigg C. Seasonal changes in the blood and thyroid of the grass snake, *Natrix natrix*. *Nature (Lond.)* 1965; 207:779-780.
4. Dissanayake DS, Thewarage LD, Rathnayake RMM, Kularatne SA, Ranasinghe JGS, Rajapakse RPJ. Hematological and plasma biochemical parameters in a wild population of *Naja naja* (Linnaeus, 1758) in Sri Lanka. *Journal of Venomous Animals and Toxins including Tropical Diseases*. 2017; 23(1):8.
5. Duguy R. Numbers of blood cells and their variation. *Biology of the Reptilia*. 1970; 3:93-109.
6. Hutchison VH, Szarski H. Number of erythrocytes in some amphibians and reptiles. *Copeia*, 1965, 371-375.
7. Karthik M. Comparative Studies of Sevoflurane and Isoflurane Anaesthesia in Russell's Viper (*Daboia russelii*) Snakes. Masters Dissertation, KVAFSU, Bidar, 2013, 98p.
8. Lillywhite HB, Smits AW. Lability of blood volume in snakes and its relation to activity and hypertension. *Journal of Experimental Biology*. 1984; 110(1):267-274.
9. McLean GS, Lee AK, Withers PC. Haematological adjustments with diurnal changes in body temperature in a lizard and a mouse. *Comp. Biochem. Physiol*, 1975, 241-249.
10. Muliya SK, Bhat MN. Hematology and serum biochemistry of Indian spectacled cobra (*Naja naja*) and Indian rat snake (*Ptyas mucosa*). *Veterinary World*. 2016; 9(8):909.
11. Parida SP, Dutta SK, Pal A. Hematology and plasma biochemistry of wild-caught Indian cobra *Naja naja* (Linnaeus, 1758). *Journal of Venomous Animals and Toxins including Tropical Diseases*. 2014; 20(1):14.
12. Saad AH, El Ridi R, Zada S, Badir N. Effect of hydrocortisone on immune system of the lizard, *Chalcides ocellatus* I. Response of lymphoid tissues and cells to *in vivo* and *in vitro* hydrocortisone. *Developmental & Comparative Immunology*. 1984; 8(1):121-30.
13. Saint Girons MC. Dimorphisme sexuel du leucogramme chez Viperaberusadulte. *Secinc Sot. Biol.* 1960; 154:342-344.
14. Salakij C, Salakij J, Chanhom L. Comparative hematology, morphology and ultrastructure of blood cells in Monocellate cobra (*Naja kaouthia*), Siamese spitting cobra (*Naja siamensis*) and Golden spitting cobra (*Naja sumatrana*). *Kasetsart J (Nat Sci)*. 2006; 36:291-300.
15. Snedcor GW, Cochran WG. *Statistical Methods*. (8th Ed.). The Iowa State University Press, Iowa, USA, 1994, 657p.