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DIFFERENTIAL COUNT VALUES OF CAPTIVE OSTRICHES (*Struthio camelus*) IN INDIAN CLIMATIC CONDITIONS AT VARIOUS AGE GROUPS

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Abstract: This study was designed to assess the Differential count values of ostrich (*Struthio camelus*) at various age groups. Ostriches of age 2, 4, 6, 8, 10, 12 and 24 – 36 months were selected for this study. 3 ml of blood were collected from each bird and were used to estimate the Differential Count (DC) values. The results obtained were very much similar to the findings of other researchers from various parts of the world and different rattite species.
Keywords: Ostrich, Modified Leishman-Giemsa stain, Differential count, Captivity, Age.

Introduction

Ostrich is the largest, flightless and heaviest living bird in the world, belonging to the ratite family. The ostrich has one of the most advanced immune systems known to mankind. It has remarkable tolerance to heat, withstanding temperature of 56^0C without undue stress. It has been undergoing ups and downs worldwide. Management of these birds in general, particularly the young chicks, is still relatively difficult. The management systems are yet to be standardized in many parts of the world. The hematological values are known to be influenced by various factors such as age, sex, diet, body condition, diseases, management systems and nutritional status. The values are useful for diagnosis of disease and illness in birds. The parameters also provide highly valuable information on physiological status and allow the detection of possible diseases. There is very little understanding on the blood serum profile of ostriches. It is necessary to have standard values and knowledge of their variation in relation to age, sex, season, physiological status, blood collection methods and other factors for proper evaluation of metabolic profiles. However, very little research work had been done on haematology of ostriches.

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Materials and methods

Geographical location

Ostriches reared under standard managemental conditions at Post Graduate Research Institute in Animal Sciences, Kattupakkam were used for our study.

Collection of Blood

Morning time (7.30 9.00-A.M) was utilized for blood collection. Birds were restrained with their wings and face was covered with a black colored hood. Blood was collected by venipuncture from the brachial vein (wing) because of its larger size. Pressure was applied to raise the vein. Three milliliters of blood was collected from all 42 birds using a 5ml syringe. A drop of blood placed on a clean grease free glass slide was gently slid over using another glass slide to prepare the smears and were allowed to air shade dry and fixed in methanol for two minutes to be used late for staining.

Lab Analysis

Blood analysis was carried out within four hours of collection Differential count (DC) by using modified Leishman-Giemsa stain as per the method described by Bancroft and Marilyn (2008).

Preparation of 100ml Modified Leishman-Giemsa stain and staining technique

Leishman's powder of 150 mg and 30 mg of Giemsa powder were dissolved in 100 ml of acetone free methanol and solution was stirred and mixed thoroughly for about one hour using a mortar and pestle. The solution was later filtered thrice in Whatman filter paper No.1.

A thin blood smear was made from whole blood. The smear was dried and later stained with Modified Leishman-Giemsa and held for two minutes. Distilled water was later added slowly over the stain until the water did not overflow and allowed to stand for 50 minutes. As per the method the time mentioned was only 30 minutes, but it was observed that the ostrich blood smear showed good staining result when it was stained and distilled water was allowed to stand for 60 minutes. The smear on the glass slide was washed, air dried and examined under oil immersion lens of the microscope. Moving the slide vertically and horizontally, a total of 100 leucocytes were counted using blood cell counter.

Results and Discussion

The data recorded during the conduct of the experiment were grouped, analyzed systematically and presented in their respective Table. The discussion of the result obtained from the study of is presented below.

Effect of age on the Differential Count

Effect of age on Heterophil count

Age of the birds had no significant effect on heterophil but different range of values ranging between (61.50 ± 0.76 to 64.83 ± 0.60 per cent) were observed.. The overall average value of Heterophils observed in our study was 63.09 per cent and this value is close to the value observed by Levi *et al*. 1989 (62.60 per cent), Mushi *et al*. 1999 (60 per cent), Selvan *et al*. 2012 (62.17 percent) and Durgun *et al*. 2005 (66 per cent). Higher values were recorded by Bonadiman *et al*. 2009 (73.5 per cent) and Hassim *et al*. 2006 (79.33 per cent). No significant differences were observed between different age group which is similar to the findings of Levi *et al*. 1989 and Mushi *et al*.1999.

Researchers who had studied the effect age on Heterophils Count on other species such as Emu (Patodkar *et al*.2008, Menon *et al*.013) were in accordance to our findings.

Effect of age on Lymphocyte count

Age of the birds had no significant effect on lymphocyte but different range of values ranging between (32.33 ± 0.42 to 34.33 ± 0.88 per cent) were observed. The overall average value of Lymphocytes observed in our study was 33.07 per cent, almost similar to the findings of Levi *et al*.1989 (34 per cent), Mushi *et al*.1999 (32 per cent) and Selvan *et al*. 2012 (31 per cent). The values observed by Hassim *et al*. 2006 (11.42 per cent) were lower than the values observed by us. Bonadiman *et al*. 2009 and Durgun *et al*. 2005 recorded 24.5 percent, 22.20 percent and 28.0 percent respectively which is much lower than the values observed in this study. No significant differences were observed between different age groups which is similar to finding of Levi *et al*. 1989 and Mushi *et al*. 1999.

Researchers who had studied the effect of age on Heterophils Count in species other than ostrich such as Emu (Patodkar *et al*. 2008 and Menon *et al*. 2013) were similar in findings.

Effect of age on Eosinophil.

Age of the birds had no significant effect on eosinophil but different range of values ranging between (0.66 ± 0.21 to 1.16 ± 0.40 per cent) were observed. The overall average value of Eosinophils observed in our study was 1.06 percent and this value is close to the value observed by Mushi *et al*. 1999 (1.0 percent), Selvan *et al*. 2012 (1.33 percent), Bonadiman *et al*. 2009 (1.80 percent) and Durgun *et al*. 2005 (1.40 percent). Levi *et al*. 1989 observed a lower value of 0.3 percent. Higher values of 2.67 percent were observed by Hassim *et al*. 2006. No significant differences were observed between different age groups, which is similar to finding of Levi *et al*. 1989 and Mushi *et al*.1999.

Researcher who had studied the effect of age on Eosinophil Count in Emu (Menon *et al*.2013) showed similar findings and Patodkar *et al*. 2008 in Emu recorded contrary findings.

Effect of age on Monocyte

Age of the birds had no significant effect on monocytes but different range of values ranging between (2.50 ± 0.22 to 3.16± 0.30 per cent) were observed. The overall average value of Monocytes observed in our study was 2.78 per cent, almost similar to the findings of Levi *et al*.1989 (2.8 percent), Bonadiman *et al*. 2009 (2.3 percent), Durgun *et al*. 2005 (2.15 percent). More authors recorded lower values, Selvan *et al*. (1.0 percent) and Mushi *et al*. 1999 (1.0 percent). Higher values were observed by Hassim *et al*.2006 (5.33 percent). No significant differences were observed between different age groups which are similar to findings of Levi *et al*. 1989 and Mushi *et al*. 1999.

Researchers who had studied the effect of age on monocyte Count in other species such as Emu (Patodkar *et al*.2008, Menon *et al*. 2013) recorded contrary findings.

Summary

The value observed in our study was almost similar to the findings of different researchers and other species of the ratite family. This might serve as standard value of differential count for ostrich at indian climatic condition.

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Table 1: Haematological parameters at different age groups

Parameters	Mean for age (month)						
	2 (n=12)	**4 (n=12)**	**6 (n=12)**	**8 (n=12)**	**10 (n=12)**	**12 (n=12)**	**24-36 (n=12)**
Heterophil^{NS} (%)	61.50±0.76	62.83±1.13	62.33±0.91	63.66±0.71	64.83±0.60	63.83±0.70	62.66±0.91
Lymphocyte^{NS} (%)	34.33±0.88	33.00±1.00	33.33±0.76	32.50±0.50	32.33±0.42	32.50±0.50	33.50±0.99
Eosinophil^{NS} (%)	1.00±0.36	1.16±0.30	1.16±0.30	1.16±0.30	1.16±0.40	1.16±0.30	0.66±0.21
Monocyte^{NS} (%)	2.83±0.47	2.83±0.16	3.16±0.30	2.50±0.22	2.83±0.30	2.50±0.22	2.83±0.16

** Highly significant (P<0.01), *- Significant (P<0.05) and NS- Not significant

Mean values sharing any one common superscript in a row for age and sex do not differ significantly