

Haematological Profile of Cyclic and Non Cyclic Local Buffaloes

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ABSTRACT

The present study has undertaken in the animals carrying various reproductive stages were selected from local area of Parbhani district of Maharashtra State and animals belonging to local or non descript breeds of buffaloes were grouped as cyclic and non cyclic category with each group consisting of twenty buffaloes. To determine various haematological parameters in local buffaloes viz, Haemoglobin, Packed Cell Volume, Total erythrocyte count, Total leucocyte count and Differential leucocyte count. Standard laboratory methods were used to analyse hemogram. On estimation of blood haematological values, the average values of Haemoglobin, Packed Cell Volume, Total erythrocyte count, Total leucocyte count and Differential leucocytes viz: lymphocytes, monocytes, neutrophils, eosinophils and basophils were 11.805 gm per cent, 34.564 per cent, $5.747 \times 10^6/\text{cumm}$, $11.336 \times 10^3/\text{cumm}$ and 61.100 percent, 2.350 per cent, 34 percent, 1.250 per cent and 0.6 per cent in cyclic buffaloes and the same were 11.008 gm per cent, 32.903 per cent, $5.155 \times 10^6/\text{cumm}$, $8.660 \times 10^3/\text{cumm}$ and 62.050 per cent, 2.450 per cent, 33.100 per cent, 1.200 per cent and 0.550 per cent in non cyclic buffaloes, respectively. Amongst haematological parameters, haemoglobin, Total erythrocyte count and Differential leucocytes: lymphocytes, monocytes, neutrophils, eosinophils and basophils did not differ significantly in cyclic and non cyclic buffaloes, whereas Packed cell volume ($P < 0.05$), Total leucocyte count ($P < 0.01$) differed significantly in cyclic and non cyclic buffaloes. The higher mean value of Packed cell volume among cyclic local buffaloes is concomitant with the higher values of Total erythrocyte count in cyclic local buffaloes. The higher Total leucocyte count among the cyclic local buffaloes might be due to the estrous phase because it was higher on the day of estrous. However, in non cyclic local buffaloes, low values of Total leucocyte count might be due to infectious conditions. Thus it was concluded that reproductive health could be interpreted by hemogram in buffaloes.

Key words: Haematology, Cyclic and Non cyclic, Local buffalo.

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INTRODUCTION

India is predominantly an agrarian society where lactating animals are the backbone of national economy. Approximately 70 per cent of Indian population is engaged in agriculture and animal husbandry practices. Indian agriculture contributes 14.5 per cent and livestock contributes 3.6 per cent to the GDP. According to India's most recent Livestock Census¹², buffalo make up approximately one third of India's total bovine population. The world buffalo population is estimated at 185.29 million out of that India has 105.1 million and comprised of approximately 56.7 per cent of the total world population⁶. Buffalo is a triple purpose animal, being suitable for milk, meat and draught. Buffalo population in India registered a steady increase of 1.93 per cent in the last two decades and is more than 100 million at present (Annual Report of Animal Husbandry 2010-11). Postpartum anoestrus is major problem in buffaloes, a period of anoestrus following parturition is a normal physiological event and ovarian cyclicity resumes as the uterus involutes. The anoestrus period becomes abnormal when its duration extends past the accepted average. The duration of the average anoestrus interval is influenced by age, breed, environmental factors and genetic background. It is necessary to understand the mechanism of the hypothalamus-pituitary-gonadal axis to appreciate the cause of anoestrus and to be able to initiate therapy to promote estrus. The buffaloes are generally in a negative energy state when the first ovulation occurs. While the exact mechanism of the effect of energy balance remains obscure. Haemato-biochemical studies are important in diagnosis of healthy and diseased conditions of the animals. The blood picture may vary in normal cycling and anoestrous animals. The knowledge of hematological values is useful in diagnosing various pathological and metabolic disorders, which can adversely affect the productive and reproductive performance, resulting in great economic losses to dairy farmers¹³. By keeping this in view the present study was planned to investigate the

haematological profile in cyclic and non cyclic local buffaloes.

MATERIAL AND METHODS

Selection of animals

The 40 adult she buffaloes in the present experiment reared in and around Parbhani. The screened animals in the present study were categorized into two groups as follows:

Group I: On the basis of gyaneco-clinical examination by per rectal examination 20 cyclic buffaloes having corpus luteum on one of the ovaries were used in the experiment.

Group II: After gyaneco-clinical examination by per rectal examination 20 non cyclic buffaloes having inactive ovaries and those failed to come in heat within the 21 days were used in the experiment.

Collection of blood sample for analysis

Blood samples from selected animals were collected by jugular venipuncture on the day of gyaneco-clinical examination under necessary aseptic precautions in the morning before let loose for grazing. Each animal of both the groups (Group I and Group II) was observed for signs of heat up to 21 days. Whole blood samples were collected in vials containing an anticoagulant EDTA by means of a sterilized 16 gauge hypodermic needle. The samples were used for haematological investigation. Haematological parameters were analysed as per the standard methods described by Schalm *et al.*¹⁶.

Statistical analysis

Mean values of Haematological parameters of Group I and Group II were compared by using standard statistical procedure and interpreted by applying student "t" test¹⁸.

RESULTS AND DISCUSSIONS

Haemoglobin

The mean values of haemoglobin in cyclic and non cyclic local buffalo are presented in table 1 and depicted in Fig.1. Comparison of the mean values of haemoglobin between two groups indicated non-significant difference. But, the mean value of Group I was higher than the mean value of Group II. The mean values were found to be higher non

significantly in cyclic buffaloes when compared to non cyclic buffaloes. However, the non cyclic buffaloes showed non-significant numerical reduction in mean values than the mean values of cyclic buffaloes (Table 1). Similar findings of higher values of haemoglobin in cyclic buffaloes had been reported by Dhoble and Gupta⁵, Ali *et al.*¹, Ramakrishna¹⁴, Hedao *et al.*⁷, Kumar *et al.*¹⁰, Ali and Shukla² and Kumbhar *et al.*¹¹. The mean values of haemoglobin in both groups were higher than the values reported by Shrivastava and Kharche¹⁷, Ali *et al.*¹, Ramakrishna¹⁴ and Kumar *et al.*⁹ and lower than Kumar *et al.*¹⁰. The mean concentration of haemoglobin obtained in cyclic buffaloes was non significantly higher ($P < 0.05$) than non cyclic buffaloes. The low values of haemoglobin in non cyclic buffaloes in the present study may be due to poor nutrition and anaemic condition of the buffaloes. While high values in cyclic buffaloes reflected their body condition and nutritional states as the animals included in study were reared under different field conditions². Thus, the importance of haemoglobin level has not directly implicated in reproductive disorder. Yet decreased in haemoglobin value is indicative of certain systemic disorder which could indirectly affect the functional activity of the reproductive organ.

Packed cell volume

The mean values of packed cell volume in cyclic and non cyclic local buffalo are presented in table 1 and depicted in Fig. 2. Comparison of the mean values of packed cell volume between two groups indicated significant ($P < 0.05$) hike in Group I than Group II. The mean values were found to be significantly higher in cyclic buffaloes when compared to non cyclic buffaloes. However, the non cyclic buffaloes showed significant reduction in mean values than the mean values of cyclic buffaloes (Table 1). Similar findings of higher values of packed cell volume in cyclic buffaloes as compared to non cyclic buffaloes had been reported by Hedao *et al.*⁷, and Kumbhar *et al.*¹¹. The mean values of packed cell volume in both groups were

lower than the values reported by Kumbhar *et al.*¹¹. It is to be noted that, similar to total erythrocyte count the PCV varied within a wide range in cyclic buffaloes (26.27 per cent - 45.00 per cent) as compared to the range observed in non cyclic buffaloes (21.00 per cent - 48.00 per cent). Further higher mean value of packed cell volume in cyclic buffaloes than non cyclic ones is concomitant with the higher value of TLC in cyclic buffaloes. It is indicator of animal's erythrocyte states.

Total erythrocyte count

The mean values of Total erythrocyte count in cyclic and non cyclic local buffalo are presented in table 1 and depicted in Fig. 3. Comparison of the mean values of Total erythrocyte count between two groups indicated non-significant difference. But, the mean value of Group I was higher than the mean value of Group II. The mean values were found to be higher non significantly in cyclic buffaloes as compared to non cyclic buffaloes. However, the non cyclic buffaloes showed non-significant numerical reduction in mean values than the mean values of cyclic buffaloes (Table 1). Similar findings of higher values of Total erythrocyte count in cyclic buffaloes as compared to non cyclic buffaloes had been reported by Kumbhar *et al.*¹¹. The mean values of Total erythrocyte count in both groups were lower than the values reported by Kumar *et al.*⁹ and Hedao *et al.*⁷. The higher value of erythrocytes / RBC attributed to excitement and hyper activity under influence of estrogens⁴.

Total Leucocyte Count (TLC)

The mean values of Total Leucocyte count in cyclic and non cyclic buffaloes are presented in table 1 and depicted in Fig. 4. Comparison of the mean values of Total Leucocyte count between two groups indicated highly significant ($P < 0.01$) hike in Group I than Group II. The mean values were found to be higher significantly in cyclic buffaloes when compared to non cyclic buffaloes. However, the non cyclic buffaloes showed significant reduction in mean values than the mean values of cyclic buffaloes (Table 1). Similar findings

of higher values of Total leucocyte count in cyclic buffaloes as compared to non cyclic buffaloes had been reported by Kumar *et al.*⁹, Hedaoo *et al.*⁷ and Kumbhar *et al.*¹¹. The mean values of Total leucocyte count in both groups were higher than the values reported by Hedaoo *et al.*⁷, Kumar *et al.*¹⁰ and Kumbhar *et al.*¹¹ and lower than Kumar *et al.*⁹. The mean value of TLC in cyclic buffaloes is higher than non cyclic ones may be due to the oestrous phase because it is higher on the day of oestrous. However, in non cyclic buffalo low value of TLC might be due to infection.

Differential leucocyte count (DLC)

Lymphocyte

The mean values of Lymphocyte in cyclic and non cyclic buffaloes are presented in table 1 and depicted in Fig.5. Comparison of the mean values of lymphocytes between two groups indicated non-significant difference. But, the mean value of Group I was lower than the mean value of Group II. The mean values were found to be higher non significantly in non cyclic buffaloes when compared to cyclic buffaloes (Table 1). However, the cyclic buffaloes showed non-significant numerical reduction in mean values than the mean values of non cyclic buffaloes. Similar findings of higher values of lymphocyte in non cyclic buffaloes as compared to cyclic buffaloes had been reported by Kumar *et al.*⁹ and Ali and Shukla². The mean values of lymphocyte in both groups were higher than the values reported by Hedaoo *et al.*⁷ and lower than Kumar *et al.*⁹ and Ali and Shukla². The mean value of lymphocytes in non cyclic buffaloes is higher might be due to infection in animals. The lymphocytes (T-cells and B-cells) respond to antigenic stimuli to produce species-specific immunoglobulin Kaneko *et al.*⁸. The non-significantly higher values of lymphocytes observed in non cyclic buffaloes could be viewed from this angle.

Monocyte

The mean values of Monocyte in cyclic and non cyclic buffaloes are presented in table 1 and depicted in Fig.6. Comparison of the mean values of Monocytes between two groups indicated non-significant difference. But, the

mean value of Group I was lower than the mean value of Group II. The mean values were found to be higher non significantly in non cyclic buffaloes when compared to cyclic buffaloes. However, the cyclic buffaloes showed non-significant numerical reduction in mean values than the mean values of non cyclic buffaloes. Similar findings of higher values of monocyte in non cyclic buffaloes as compared to cyclic buffaloes had been reported by Kumar *et al.*⁹ and Hedaoo *et al.*⁷. The mean values of Monocyte in both groups were higher than the values reported by Kumar *et al.*⁹ and lower than Hedaoo *et al.*⁷ and Ali and Shukla². The non significantly higher value of monocytes observed in non cyclic buffaloes might be due to stress, recovery of acute diseases and granulomatous inflammatory response (Brucellosis).

Neutrophils

The mean values of Total Leucocyte count in cyclic and non cyclic buffaloes are presented in table 1 and depicted in Fig.7. Comparison of the mean values of Neutrophils between two groups indicated non-significant difference. But, the mean value of Group I was higher than the mean value of Group II. The mean values were found to be higher non-significantly in cyclic buffaloes when compared to non cyclic buffaloes. However, the non cyclic buffaloes showed non-significant numerical reduction in mean values than the mean values of cyclic buffaloes (Table 1). Similar findings of higher values of Neutrophils in cyclic buffaloes as compared to non cyclic buffaloes had been reported by Kumar *et al.*⁹ and Ali and Shukla². The mean values of Neutrophils in both groups were higher than the values reported by Hedaoo *et al.*⁷ and Ali and Shukla². The present result revealed that the higher values of neutrophils in cyclic buffaloes might be due to higher values of leucocyte observed in cyclic buffaloes. In states of excitement i.e. oestrous, exercise and strange surrounding there is also leucocytosis (Neutrophilia), since adrenaline liberated during this state mobilizes the marginal neutrophils pool cells¹⁵.

Physiologically Neutrophilia was observed in oestrous and met oestrous phases⁹.

Eosinophils

The mean values of Total Leucocyte count in cyclic and non cyclic buffaloes are presented in table 1 and depicted in Fig.8. Comparison of the mean values of Eosinophils between two groups indicated non-significant difference. But, the mean value of Group I (1.250 ± 0.239 per cent) was higher than the mean value of Group II (1.200 ± 0.200 per cent). These mean values were found to be higher non significantly in cyclic buffaloes when compared to non cyclic buffaloes. However, the non cyclic buffaloes showed non-significant numerical reduction in mean values (1.200 ± 0.200 per cent) than the mean values of cyclic buffaloes (1.250 ± 0.239 per cent). Similar findings of higher values of Eosinophils in cyclic buffaloes as compared to non cyclic buffaloes had been reported by Kumar *et al.*⁹ and Hedao *et al.*⁷. The mean values of Eosinophils in both groups were lower than the values reported by Kumar *et al.*⁹, Hedao *et al.*⁷ and Ali and Shukla². The higher number of Eosinophils in cyclic buffaloes might be due to large number mast

cells observed in oestrus or cyclic buffaloes in female genital tract.

Basophils

The mean values of Total Leucocyte count in cyclic and non cyclic buffaloes are presented in table 1 and depicted in Fig.9. Comparison of the mean values of Basophils between two groups indicated non-significant difference. But, the mean value of Group I was higher than the mean value of Group II. These mean values were found to be higher non significantly in cyclic buffaloes when compared to non-cyclic buffaloes. However, the non cyclic buffaloes showed non-significant numerical reduction in mean values than the mean values of cyclic buffaloes (Table 1). Similar findings of higher values of Basophils in cyclic buffaloes as compared to non cyclic buffaloes had been reported by Kumar *et al.*⁹ and Ali and Shukla². The mean values of Basophils in both groups were higher than the values reported by Hedao *et al.*⁷ and lower than Kumar *et al.*⁹ and Ali and Shukla². The mean values of Basophils are higher in circulation of cyclic buffaloes might be associated with increased number of Eosinophils in cyclic buffaloes.

Table 1: Range, mean and standard errors and 't' value of Haematological profile in cyclic and Non cyclic local buffalo

Sr. No.	Parameter	Cyclic buffaloes (Group - I)			Non cyclic buffaloes (Group-II)			't' value
		No.	Range	Mean \pm SE	No.	Range	Mean \pm SE	
1	Haemoglobin (gm per cent)	20	08.44- 14.00	11.805 \pm 0.280	20	08.15 – 14.00	11.008 \pm 0.445	1.584 NS
2	Packed Cell volume(per cent)	20	26.27-45.00	34.565 \pm 1.105	20	21.00-48.00	32.903 \pm 1.791	2.726 *S
3	Total erythrocyte count ($\times 10^6$ /cumm)	20	04.17-07.93	5.747 \pm 0.272	20	03.90-06.71	5.155 \pm 0.193	0.841 NS
4	Total Leucocyte count (10^3 /cumm)	20	07.86-99.00	11.336 \pm 428.273	20	07.05-11.54	8.660 \pm 281.745	5.587 **S
5	Lymphocytes (per cent)	20	41 - 45	61.100 \pm 1.675	20	40 - 71	62.050 \pm 1.935	0.506 NS
6	Monocytes (per cent)	20	1 - 4	2.350 \pm 0.244	20	1 - 6	2.450 \pm 0.294	0.308 NS
7	Neutrophils (per cent)	20	28 - 50	34.000 \pm 1.196	20	25 - 51	33.100 \pm 0.20	0.541 NS
8	Eosinophils (per cent)	20	0 - 4	1.250 \pm 0.239	20	0 - 4	1.200 \pm 0.200	0.175 NS
9	Basophils (per cent)	20	0 - 2	0.600 \pm 0.169	20	0 - 2	0.550 \pm 0.153	0.236 NS

* Significant at 0.05 per cent level.

NS Non-Significant

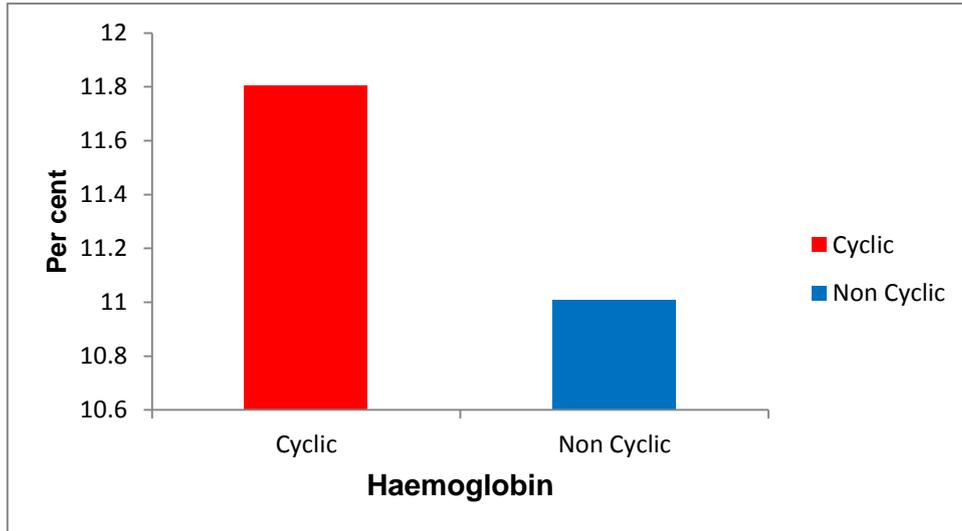


Fig. 1: Hemoglobin of cyclic and non cyclic local buffaloes

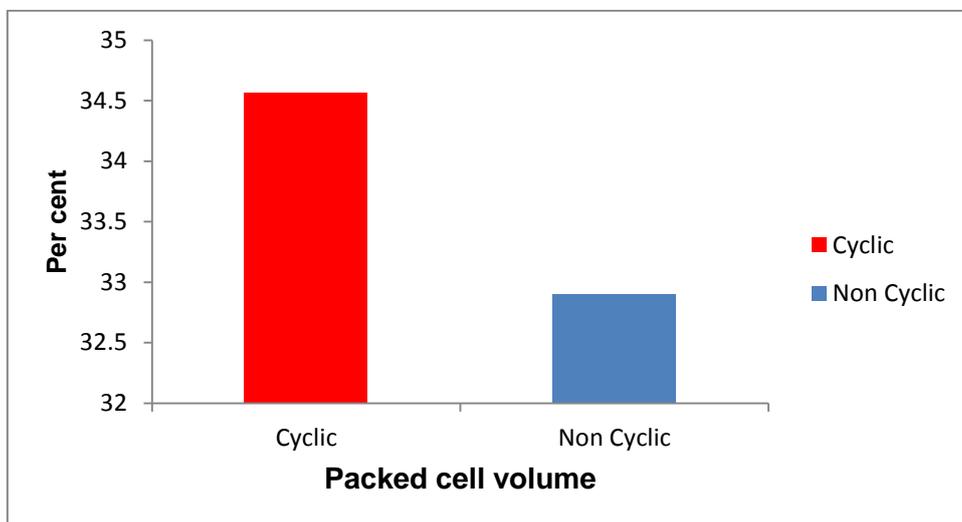


Fig. 2: Packed cell volume of cyclic and non cyclic local buffaloes

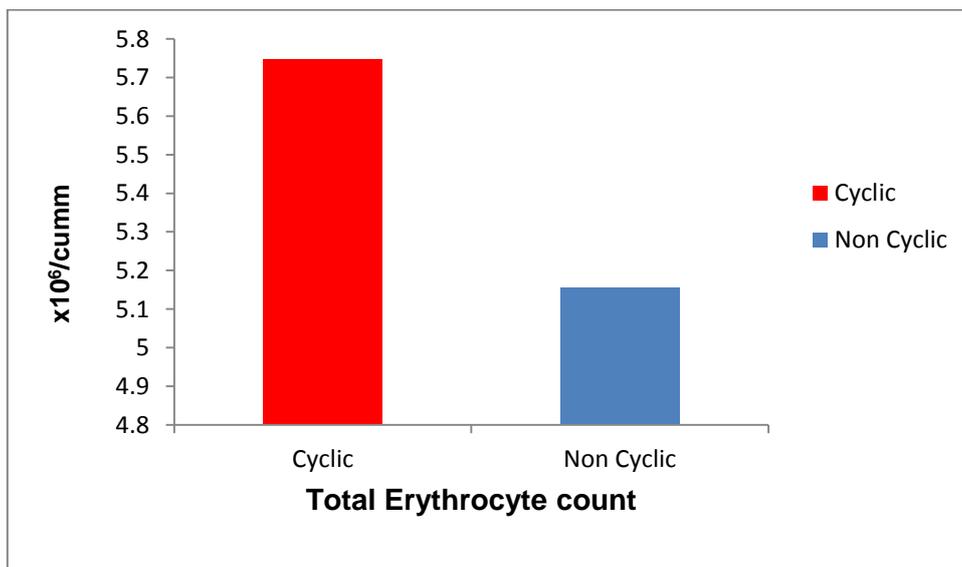


Fig. 3: Total Erythrocyte count of cyclic and non cyclic local buffaloes

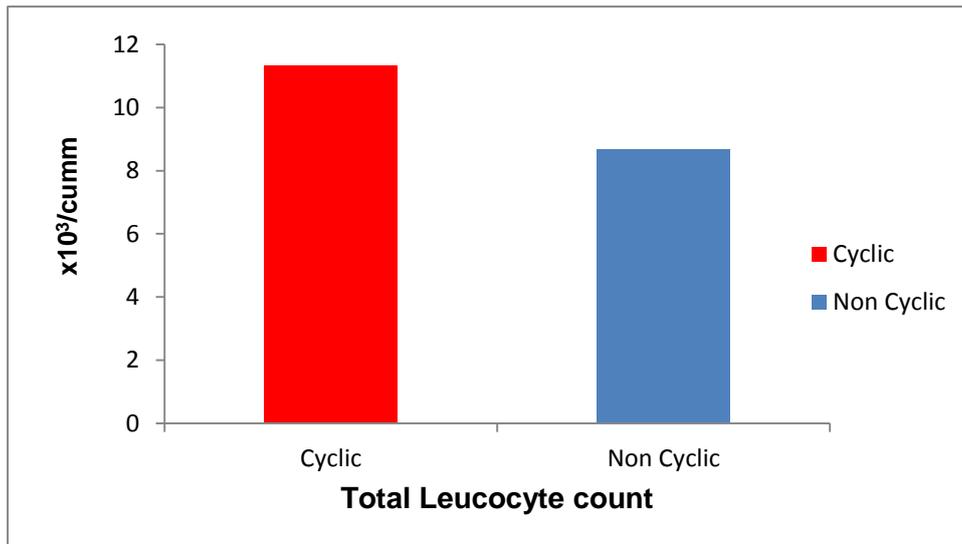


Fig. 4: Total Leucocyte count of cyclic and non cyclic local buffaloes

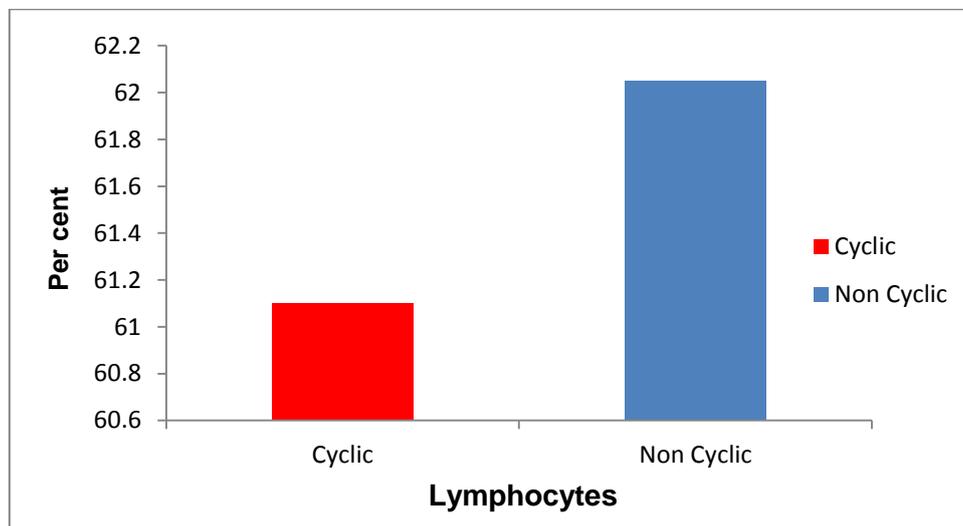


Fig. 5: Total Lymphocytes of cyclic and non cyclic local buffaloes

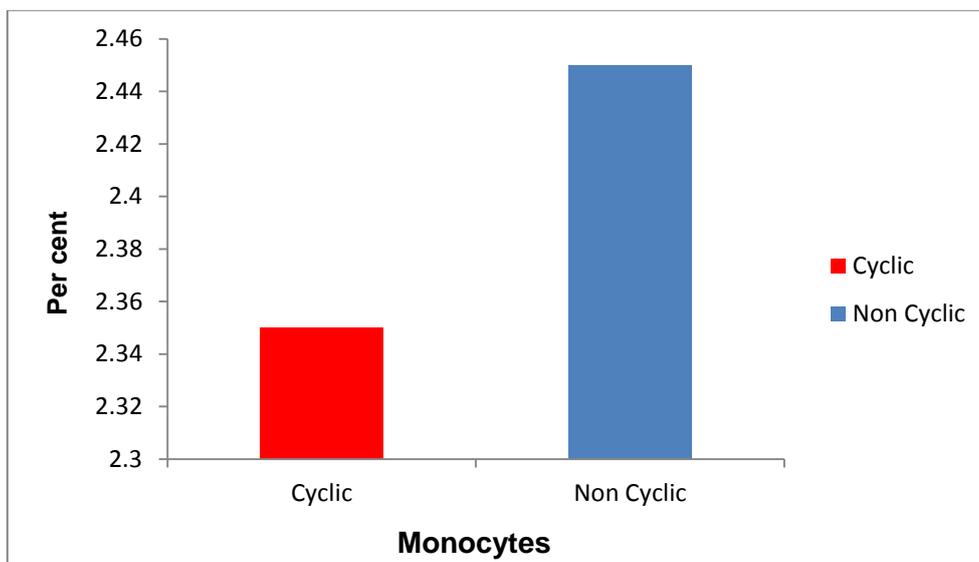


Fig. 6: Monocytes of cyclic and non cyclic local buffaloes

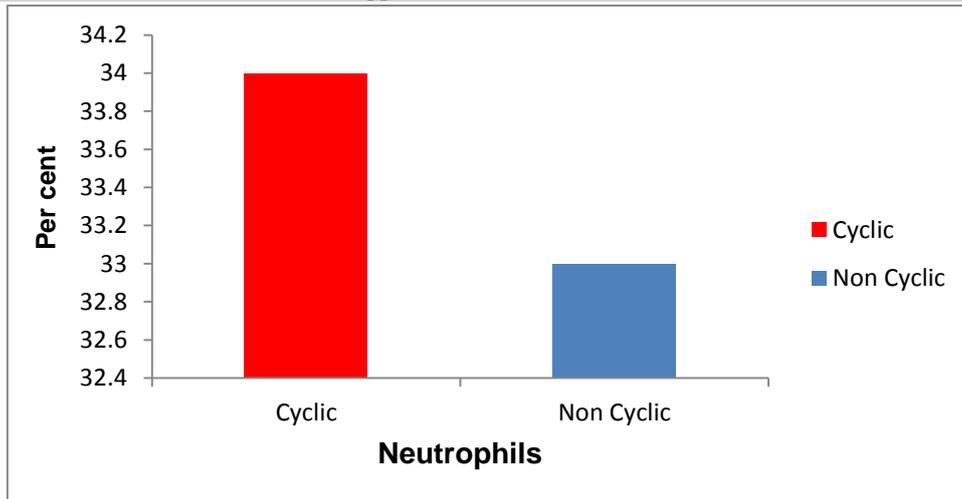


Fig. 7: Neutrophils of cyclic and non cyclic local buffaloes

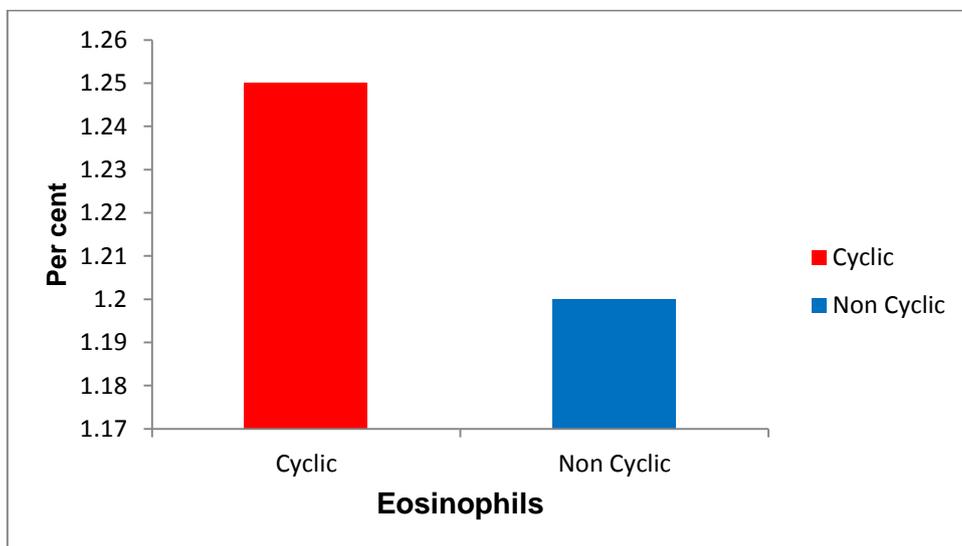


Fig. 8: Eosinophils of cyclic and non cyclic local buffaloes

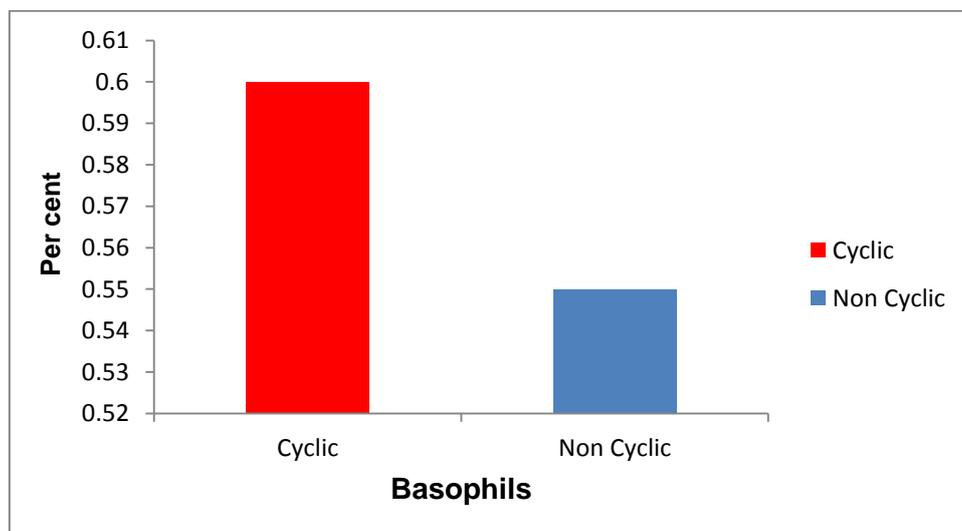


Fig. 9: Basophils of cyclic and non cyclic local buffaloes

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