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HAEMOGRAM OF NIGERIAN MONGREL BITCH AT DIFFERENT STAGES OF THE REPRODUCTIVE CYCLE

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ABSTRACT

The haematologic parameters of the Nigerian Mongrel bitch were investigated at different stages of the reproductive cycle to determine their clinical values. Results showed that red blood cell (RBC) counts were highest during anoestrus, with a mean of 5.09 ± 0.62 x 10^6/µL, while lowest values were recorded during pregnancy, the difference was significant (P<0.05). White blood cell (WBC) counts, packed cell volume (PCV) and haemoglobin concentration (Hb) showed an increasing pattern from anoestrus to proestrus and then decreased with transition from proestrus to oestrus. Total WBC counts were highest during dioestrus and almost twice the value recorded in pregnancy. It appears that WBC count may be used for pregnancy diagnosis in the Nigerian Mongrel bitch.

Key words: Haemogram, reproductive cycle, Nigerian Mongrel bitch.

INTRODUCTION

The number of various circulating blood cells can vary with normal physiological stages, as well as with pathological conditions. Considerable variations exist normally among individuals in given populations and can be attributed to sex, age, nutrition and sexual cycle (Bobade *et al*., 1985; Fraser, 1986).

Blood cell counts may also change in disease states, WBC rise in acute bacterial infections, neoplastic leukaemias, tissue necrosis, trauma and chemical or metabolic intoxication. However, extreme stages of the same pathological conditions are associated with decreased WBC values (Fraser, 1986).

Gandotra *et al*. (1994) showed an increase in WBC count, with a range of 17,000-38,000 cells/µL, and neutrophilia of up to 90% from 24 cases of pyometra with no significant change in Hb concentration. In a review of *Brucella canis* infection, Wright and Parry (1989) reported that a complete blood count might reveal an inflammatory leucogram and hyper-proteinaemia (hyperglobulinaemia), possibly with a mild non-regenerative anaemia. In another case report of canine transmissible venereal tumour, Booth (1994) showed a WBC count of 12.9 x 10^3µL, with other parameters within normal range.

Significant increase in erythrocyte numbers occurred in dehydration and other similar derangements of tissue fluid balance (Kelly, 1979). During pregnancy, PCV gradually reduced from a mean of 53% to 32% at term and then increased to 42% during the next 6 weeks in a normal bitch. RBC and Hb followed the same pattern (Schams *et al*., 1975). In the normal bitch, both the total and differential leucocyte counts are influenced by age.

However, there is a dearth of information on the haematologic parameters of the Nigerian Mongrel bitch. This study, therefore, seeks to generate data on some haematologic parameters during different stages of the reproductive cycle of the Mongrel bitch. It is intended that the findings of this study will contribute to the understanding of the changes in blood parameters during the oestrous cycle of the Mongrel bitch.

MATERIALS AND METHODS

A total of 39 Nigerna Mongrel bitches of varying ages were obtained from within the Maiduguri Metropolis, Nigeria. Blood samples were collected from these bitches during different stages of the reproductive cycle. Stages of the oestrous cycle were determined on the basis of behavioural sings, physical examination and vaginal cytology. With the animals properly restrained, 5 ml of blood was collected through cephalic venepuncture and transferred to properly labelled, commercially available ethylene diamine tetra acetic acid (EDTA) coated blood sample bottles for immediate processing.

Total red blood cells (RBC), white blood cells (WBC), packed cell volume (PCV) and haemoglobin concentration (Hb) were determined according to standard procedures. Blood smears were made on clean

grease free microscopic slides, as described by Fraser (1986) and stained with Giemsa stain. Total RBC and WBC were determined using the haemocytometer (Gelman-Hawsky Ltd, England), following the method described by Hewitt (1984). The PCV was determined using the microhaematocrit method, while Hb values were determined using the cyanomethemoglobin method, as described by Hewitt (1984). The colorimeter reading obtained was compared against a standard curve and the corresponding Hb values were obtained. Data collected were statistically analysed using the one way analysis of variance.

RESULTS

In the present study, haematologic investigations were carried out in 39 Mongrel bitches. Results obtained during different stages of the reproductive cycle are presented in Table 1. RBC values were significantly ($P<0.05$) higher in anoestrus bitches than at other stages of cycle. The lowest values in normal healthy bitches were recorded during pregnancy. However, there was no differences in RBC counts in immature, pro-oestrus, oestrus or dioestrus bitches. WBC values increased significantly ($P<0.05$) in transition from anoestrus to proestrus. The lowest WBC count was recorded in pregnant bitches and the highest value was recorded in non-pregnant dioestrus bitches ($P<0.05$). The patterns of change in PCV and Hb were the same in transition from anoestrus, through proestrus, oestrus and pregnancy. However, PCV values were the same in oestrus and non-pregnant dioestrous bitches, while Hb values were found to drop significantly ($P<0.05$) below the oestrus values in the non-pregnant dioestrus bitches.

Haematologic changes with age of the bitch

The variation in the blood parmeters with age was also determined in 31 bitches (Table 2). The bitches were categorized into 0-6 months, 7 months-1 year, 2-3 years and 3 years and above age groups. Higher values of RBC were observed in younger bitches than in the older ones. PCV and Hb followed the same pattern as the RBC. However, WBC values did not follow the same pattern. Highest value was recorded in the 7 months-1 year group, while lowest value was recorded in the 2-3 years group. However, the differences in values of the haematologic parometers among four age groups were non significant.

DISCUSSION

The results of this study showed that RBC counts elevated during anoestrus and dropped gradually during proestrus and oestrus to the lowest value recorded during pregnancy. This low value recorded during pregnancy may be due to the anaemia associated with pregnancy (Concannon and Lein, 1989) and may also reflect the poor nutritional status. In the non-pregnant dioestrus bitches, RBC value was non significantly higher than the oestrous animals ($P>0.05$).

WBC and PCV values increased from anoestrus to proestrus and then decreased with transition from proestrus to oestrus. Lowest values were recorded during pregnancy. A significant difference ($P<0.05$) was recorded in the WBC counts of bitches with transition from oestrus to dioestrus non-pregnant bitches. The value in non-pregnant dioestrus bitches was almost double of that recorded in pregnant bitches. This shows that WBC counts may be useful in pregnancy diagnosis in the Mongrel bitch.

PCV was lowest during pregnancy, although this did not vary significantly with anoestrus values. Concannon and Lein (1989) reported that during pregnancy, maternal haematocrit declined after implantation, with PCV normally reaching 40% by day 35 and fell below 35% at term. This may be due to the haemodilution effects of increased plasma volume, because total blood volume increases alongwith body weight increase of 20 to 55% over the course of gestation (Concannon, 1986). Haemoglobin concentration was also found to be low during pregnancy. This is also in agreement with the report of Concannon and Lein (1989).

Although great variation was noted in the haematologic parameters of bitches with variation in

Table 1: Mean values (± SD) of blood parameters of Mongrel bitches at different stages of the reproductive cycle

Cycle stage	No. of dogs	RBC ($x10^6$/µL)	WBC ($x10^3$/µL)	PCV (%)	Hb (g/dl)
Immature	8	4.89 ± 0.95b	11.67 ± 1.66a	40.25 ± 6.36a	13.23 ± 21.49a
Anoestrus	5	5.09 ± 0.62a	10.31 ± 2.27b	38.60 ± 2.85b	12.82 ± 0.96a
Proestrus	5	4.73 ± 0.79b	14.86 ± 1.99c	41.40 ± 4.16a	13.46 ± 1.40a
Oestrus	8	4.06 ± 0.81b	12.25 ± 1.52a	40.30 ± 2.12a	13.10 ± 0.62a
Pregnant	7	3.86 ± 0.36c	7.99 ± 0.65d	37.70 ± 3.77b	12.60 ± 1.13a
Dioestrus-non preg.	6	4.70 ± 1.35b	16.85 ± 1.32e	40.20 ± 2.80a	12.00 ± 2.83b

Values with different letters within a column differ significantly ($P<0.05$).

Table 2: Mean values (± SD) of blood parameters of Mongrel bitches of different age groups

Age group	No. of dogs	RBC ($x10^6$/µL)	WBC ($x10^3$/µL)	PCV (%)	Hb (g/dl)
0 to 6 months	8	4.9 ± 0.95	11.7 ± 1.7	40.3 ± 6.4	13.2 ± 2.50
7 months to 1 year	9	4.7 ± 0.76	12.5 ± 2.1	40.3 ± 2.4	13.2 ± 0.70
2 to 3 years	8	4.5 ± 0.74	9.7 ± 2.84	39.9 ± 3.5	13.1 ± 0.96
3 years and above	6	3.8 ± 0.62	11.7 ± 4.4	35.4 ± 3.6	12.3 ± 1.20

age (Table 2), no significant difference (P>0.05) was observed between age groups. Bobade *et al*. (1985) showed a significant variation in the mean values of these parameters between the local and the exotic breeds, and a higher PCV and Hb values in the female than the male local dogs.

This study indicates that WBC count in dioestrus was almost two fold the value in pregnancy. Therefore, WBC count may be employed in diagnosis of pregnancy in the Mongrel bitch.

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