A Detailed study on Haematological Abnormalities associated with Ehrlichiosis in Dogs

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Abstract

In the present study, significant haematological parameters were assessed in 42 dogs affected with canine monocyticehrlichiosis. The cases were diagnosed based on examination of blood/buffycoat smear and indirect fluorescent antibody test (IFA) from symptomatically suspected cases presented to the clinics. The parameters were assesed in an apparently healthy group (group I), group comprising of animals tested positive by both the diagnostic tests (group II) and group comprising of animals tested positive exclusively by IFA test (group III). Relevant haematological parameters including haemogram, leukogram and thrombocyte count were evaluated in all the three groups. Groups II & III showed significant (P<0.01) alterations in values from those of the control group (group I). The most striking abnormalities observed were thrombocytopenia, monocytosis and anaemia. There was no significant change observed in values between group II and III.

Key words: *Ehrlichiosis, blood parameters, canine*

Introduction

Ehrlichiosis in dogs is an important febrile disease causing anemia, pancytopenia and severe debilitation, especially at the chronic phase of the disease. The affected animals show many heamatological and biochemical abnormalities that may vary with different stages of the disease. The importance of these anomalies is that they are actually the reflections of the functioning capacity of vital organs like liver, kidney; bone marrow etc. and some of these fluctuations may serve as better prognostic indicators (thrombocytopenia, monocytosis etc.) that help the clinician to make a definite diagnosis.

Material and Methods

In the present study, a total of 42 dogs showing symptoms suggestive of Ehrlichiosis were included in the experimental group. The control group (Group I) consisted of six apparently normal healthy dogs presented to the hospital during the study period. Among the 64 animals, fifteen cases that proved positive both by blood smear examination and indirect fluorescent antibody test (IFAT) were taken as group II and 27 cases that proved positive by IFAT and negative by blood smear examination were taken as Group III. The following hematological parameters ESR, PCV, Hb, total RBC count , MCV, MCH, MCHC, total leukocyte count, differential leukocyte count and platelet count of the infected groups and the control group were estimated(Coles, 1986).

Result and Discussion

Significant deviation of the haemogram, leucogram and thrombocyte count of infected groups II and III when compared to that of the control group I is given in the tables I, II and III respectively. The most striking haematological abnormalities observed were thrombocytopenia and anaemia.

Thrombocytopenia was observed in 76.2% of cases whereas 19% showed a normal count. Out of the 42 animals, low Hb values were observed in 66.7% of animals and 61.9% showed a reduced RBC count and PCV. Erythrocyte indices were within the normal range in majority of animals. The most frequent leukocyte abnormalities noticed were monocytosis and eosinopenia. Percentage occurrence of haematological abnormalities is shown in figure I

Table I Haemogram in different groups of dogs

Group	No of Animals	Mean ± standard error						
		ESR mm/hr.	PC V(%)	Haemoglobin (g/dl)	RBCx (106/mm^3)	MCV(fl)	MCH(pg)	MCHC (g/dl)
Group I	6	1.17±031	44.93±2.45	14.15±0.37	6.89±0.11	65.24±0.85	20.54±0.33	31.5±0.41
Group II	15	5.9±0.625	34.6±1.06	10.93±0.30	5.03±0.13	69.11±2.03	21.81±0.54	31.71±0.64
Group III	27	7.24±0.71	33.06±1.09	9.87±0.31	4.42±0.18	76.5±2.34	22.79±0.61	29.96±0.48
		**	**	**	**	*	NS	NS

NS- Non significant (p≥0.05),*- Significant (p<0.05),**- Highly significant (p< 0.01)

Table II Leucogram in different groups of dogs

Groups	No. of Animals	Mean±Standard error				
		TLCx103 mm^3	Neutrophil (%)	Lymphocyte (%)	Monocyte (%)	Eosinophil (%)
I	6	10.15±0.61	71.67±	23.33±1.31	2.0±0.26	1.00±0.36
II	15	9.63±0.58	66.47±2.85	24.4±2.48	8.4±0.75	0.6±0.26
III	27	9.3±0.49	69.15±1.88	22.26±2.14	7.56±0.51	0.82±0.23
F ratio		NS	NS	NS	**	NS

NS- Non significant (p≥0.05),**- Highly significant (p< 0.01)

Table III Mean Thrombocyte count in different groups of dogs

Groups	No. of Animals	Mean±Standard error
		Thrombocyte countx105/µl
I	6	3.67±0.11
II	15	1.18±0.13
III	27	1.3±0.10
		**

**- Highly significant (p< 0.01)

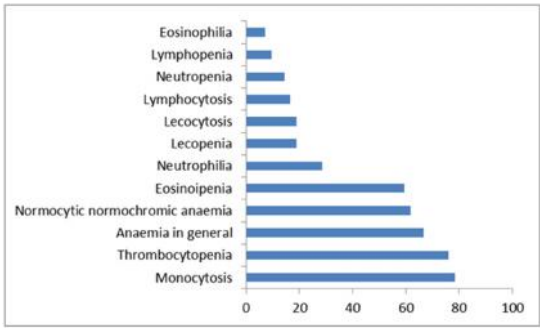

Figure I - Percentage occurrence of Hematological abnormalities in 42 dogs with Ehrlichiosis

Alterations in Haemogram

Anaemia was observed as one of the most frequent findings in the present study.

Similar findings were recorded by many previous workers (Price et al., 1987 and Harrus et al., 1997). The anaemia observed was normocytic and normochromic since the erythrocyte indices calculated were within the normal range, which confirm to the findings of Waddle and Littman (1988).

According to Cotter (2000), anaemia associated with ehrlichiosis is usually non regenerative as indicated by normocytic, normochromic anaemia unless it is associated with haemorrhage due to thrombocytopenia. The marrow may be hypercellular with an increased myeloid-erythroid ratio in the acute phase while the chronic phase is characterized by pancytopenia and hypoplasia of the marrow. Non-regenerative anaemia can also result from immune-mediated mechanism, one of the factors contributing to the pathogenesis of canine monocytic Ehrlichiosis. Generalized bonemarrow hypoplasia affecting the production of all the three cell lines i.e. the erythroid, myeloid and megakaryocytic cells leading to aplastic anaemia isassociated with chronic ehrlichiosis. (Rikihisa et al., 1992).With aplastic anaemia < 25% of the marrow is composed of haematopoetic cells

primarily lymphocytes and plasma cells and the rest is replaced with fat. In ehrlichiosisthe most prominent contributory factor to aplastic anaemia is the immune-mediated pathogenic mechanism. Affected animals are at risk for bacterial sepsis / secondary bacterial complications from granulocytopenia or bleeding from thrombocytopenia (Cotter, 2000). In the present study one such a case of aplastic anaemia with very low values of PCV(16.8%), Hb (4.5 g/dl), RBC count (1.3x106/mm3), total WBC count (1.8x103/mm3) and thrombocyte count 60,000/µl was reported. Bone marrow biopsy examination carried out in that particular case conclusively proved the occurrence of aplastic anaemia.

Two dogs in the present study showed microcytic hypochromic anaemia that might be suggestive of iron deficiency caused by chronic blood loss. This type of anaemia is consistent with chronic rather than acute external haemorrahage (Rogers, 2000). He also opined that this type of anaemia might be due to altered iron metabolism rather than its absolute deficiency. Such type of anaemia associated with ehrlichiosis was recorded earlier (Matthewman et al., 1993). Conversely, eight dogs showed macrocytic normochromic anaemia in this study. This might be due to increased activity of the bone marrow in some conditions associated with normocytic anaemia (Benjamin, 1985)

ESR

Though ESR observed in the dogs of various groups were within the normal range, a significant change was observed between control (I) and infected groups (II &III).This may be either arising from anaemia in which ESR is accelerated due to small number of cells that can settle more easily in larger volume of the fluid or due to alterations in plasma proteins. Increased globulin level increases ESR (Benjamin,1985)

Leukogram

Normal leukocyte count in majority of animals in the present study concur with the report of Madewell and Gribble(1982).

Differential Leukocyte Count

In this study a significant difference was observed only in the mean values of monocyte count of the control (2.0±0.26%) and infected groups (8.4±0.75% and 7.56±0.51% for infected groups). Though monocytosis is associated with chronic inflammatory diseases it can also occur within hoursas an early change in the same diseases that cause neutrophilia. In the present study, though neutrophilia was observed only in 28.6% cases , monocytosis could be observed in a greater proportion of cases. This may be due to the fact that monocytes have a shorter marrow transit time than neutrophils allowing the monocyte responses to occur much earlier than neutrophilia.This is commonly noticed in diseases with depletion of marrow reserves or in cases of of injury to marrow precursors (Kociba, 2000). It also occurs in association with acute stress reactions in dogs (Coles, 1986). Monocytosis associated with Ehrlichiosis has been reported previouly (Harrus et al., 1997).

No significant difference was observed among the mean differentials counts of neutrophils, lymphocytes and eosinophils in this study.

Thrombocyte count

Majority of the animals (76.5 %) were having thrombocytopenia in this study. It was considered to be the most salient and consistent haematological abnormality of dogs naturally infected with Ehrlichiosis (Waner et al., 1997; Egenwell et al., 1997).

The mechanism of thrombocytopenia depends on the stage of the disease. In acute phase of the disease, pathogenesis of thrombocytopenia includes increased platelet consumption due to inflammatory changes in blood vessel endothelium, increased splenic sequestration of platelets and immunologic destruction resulting in a decreased platelet life span (Pyle,1980). Platelet dysfunction is also equally responsible for bleeding episodes (Harrus et al., 1996). Demonstration of serum platelet-bindable anti platelet Abs in ehrlichiosis-affected dogs supports the assumption of immune destruction (Waner et

al., 1995). In severe chronic phase of the disease, decreased platelet production due to bone marrow hypoplasia is considered to be the reason for thrombocytopenia (Woody and Hoskins,1991).

Platelet count is a good screening test to identify different stages of Ehrlichiosis in dogs especially those in the subclinical phase of infection and Waner et a.l(1997) stressed the importance of its evaluation as an influential prognostic factor.

Conclusion

In this study most prominent abnormalities associated with Ehrlichia positive cases in haemogram included anaemia; leukogram included monocytosis and with regard to platelets thrombocytopenia was a salient feature.The significance of these alterations is that they do serve as better prognostic indicators.

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