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Haematological changes in Ehrlichia affected dogs

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Abstract

20 healthy dogs and 20 Ehrlichia affected dogs were selected for present study. These healthy and Ehrlichia affected dogs were subjected for various hematological parameters like Total RBC count, Total leucocyte count, Haemoglobin, Platelet count and PCV. Haematological analysis of blood samples revealed that there was a significant decrease in HB, Total erythrocyte count, Packed cell volume, platelet levels in the affected dogs compared to healthy dogs whereas there was a non-significant difference in total leucocyte count in the affected dogs compared to healthy dogs.

Keywords: haematology, ehrlichiosis, dogs

Introduction

Ehrlichiosis is a globally distributed disease caused by the bacterium belonging to Genus *Ehrlichia*. Ehrlichia organisms are gram-negative obligate intracellular bacteria with tropism for hematopoietic cells. It is transmitted by the brown dog-tick, *Rhipicephalus sanguineus*, a worldwide distributed tick. *E. canis* causes profound haematological changes including thrombocytopenia in affected dogs. Thrombocytopenia, leucopenia with bleeding tendencies is the most consistent presenting complaints in dog in both acute and chronic stages of disease [4]. On entry, organisms invade the monocyte, macrophages and epithelial cells. Monocytes multiply in numbers and entire cytoplasm is filled with them, resulting into destruction of leukocytes and thrombocytes. The severe chronic form is attributed as tropical canine pancytopenia. There is impairment in the production of blood cells. Thrombocytopenia is the most consistent blood abnormality. The causes for such reduction of platelets have been put forth as increased platelets consumptions as a result of inflammatory changes in blood vessels endothelium, increased splenic sequestrations of platelets and immunologic destructions of platelets [5]. In ehrlichiosis there is decrease in haematological parameters like red blood cell count, hemoglobin, hematocrit, platelet count. Commonly Anemia, leukopenia and thrombocytopenia are seen. Hence the study was undertaken to know various changes in the haematological parameters so that proper therapeutic measures can be undertaken.

Materials and Methods

The dogs having pyrexia and lymph node enlargement acted as a basis for selection based on the clinical signs. Further from these dogs blood samples were collected in EDTA vials. These blood samples were subjected for platelet count. The blood samples with platelet count less than 1.5 lakh/ μ l were further subjected for haematological analysis. The dogs which were healthy and came for vaccination or general check up were also subjected for hematological tests which were considered as control group and compared with the affected group. The blood was drawn from the cephalic vein and was treated with ethylenediaminetetraacetic acid as an anticoagulant and used to determine a complete blood count and the presence of blood parasites. Laboratory evaluation of samples was carried out on all 40 dogs. (20 healthy and 20 ehrlichia affected dogs). The evaluations included haematological parameters. Haematological parameters like Total RBC count, Total leucocyte count, Haemoglobin, Platelet count and PCV were estimated using mindray auto analyser.

Results and Discussion

The study was conducted at Veterinary College Hebbal, Bangalore. The results of the present study obtained are presented herewith.

In the present study 54 dogs were suspected for Canine ehrlichiosis based on the clinical signs. These 54 dogs were subjected for estimation of platelet count. Out of 54 suspected dogs 32 dogs showed platelet count less than $150 \times 10^3/\mu\text{l}$. These 32 dogs were further subjected for Polymerase chain reaction. 20 dogs showed positive for PCR. These 20 PCR positive cases were considered for haematological studies and were compared with 20 healthy dogs which were considered as control group. The blood samples from 54 suspected cases of canine ehrlichiosis were subjected for various haematological parameters.

Out of 54 suspected cases 32 dogs showed platelet count of less than $150 \times 10^3/\mu\text{l}$. In these 32 dogs 20 dogs were positive based on PCR test. These 20 dogs were subjected for detailed haematological study. The results of various haematological parameters are depicted in table 1 and fig 1. The Mean \pm SE values of various haematological parameters of canine ehrlichiosis affected group were compared with healthy dogs group and are presented here.

Hemoglobin(g/dL)

Out of 20 dogs positive for canine ehrlichiosis the Mean \pm SE of hemoglobin values in healthy control group and canine Ehrlichiosis affected dogs were; 14.78 ± 0.34 and 8.41 ± 0.33 respectively depicted in table 1 and figure 1. There was a significant ($P \leq 0.05$) decrease in haemoglobin levels in ehrlichia affected dogs compared to healthy dogs.

Total erythrocyte count ($\times 10^6$)

The Mean \pm SE of total erythrocyte count values in healthy control group and canine Ehrlichiosis affected dogs were, 6.64 ± 0.14 and 5.32 ± 0.28 respectively depicted in table 1 and figure 1. There was a significant ($P \leq 0.05$) decrease in total erythrocyte count in ehrlichia affected dogs compared to healthy dogs

Packed cell volume (%)

The Mean \pm SE of, packed cell volume values in healthy control group and canine Ehrlichiosis affected dogs were; 44.34 ± 1.02 and 25.34 ± 0.97 respectively depicted in table 1 and figure 3 There was a significant ($P \leq 0.05$) decrease in packed cell volume in the canine affected dogs compared to healthy dogs.

In our study it was revealed that there was a significant decrease in HB, Total erythrocyte count, Packed cell volume levels in the affected dogs compared to healthy dogs. Many of the research workers have reported significant decrease in these haematological values in ehrlichia affected dogs [3-8]. The reason for decrease in these parameters in ehrlichiosis may be due to bleeding tendency which may be in the form of epistaxis, peticheal haemorrhages which can be noticed in inguinal region, ventral aspect of the abdomen, myelosuppression or due to severe anaemia. The ehrlichia organisms may also suppress bone marrow which leads to impaired production of cellular components of blood thus resulting in decreased in these haematological parameters.

Total leucocyte count ($\times 10^3$)

The Mean \pm SE of, total leucocyte count values in healthy control group and canine Ehrlichiosis affected dogs were; 14.15 ± 0.52 and 15.57 ± 5.13 respectively depicted in table 1 and figure 1 There was a non-significant ($P \geq 0.05$) difference in total leucocyte count in the ehrlichia affected dogs compared to healthy dogs.

The Mean \pm SE of, total leucocyte count values in healthy control group and affected canine Ehrlichiosis dogs were; 14.15 ± 0.52 and 15.57 ± 5.13 respectively. There was a non-significant difference in total leucocyte count in the affected dogs compared to healthy dogs. Bhadesiya *et al.*, 2015 also reported that no significant difference in the total leucocyte count in ehrlichia affected dogs which corroborates with our study results. On contrary Several other workers reported decrease in the leucocyte count in ehrlichia affected dogs [10, 13, 5, 6]. These variations like,

leukopenia as reported by some workers, no changes in the leucocyte count might be due to sample collection (blood) during the stage of disease as ehrlichia has got 3 stages in the course of the disease like acute, sub-clinical and chronic stage

Total platelet count ($\times 10^3$)

The Mean \pm SE, of total platelet count values in healthy control group and Canine Ehrlichiosis affected dogs were; 339 ± 21.75 and 63.80 ± 6.62 respectively depicted in table 1 and figure 2 There was a significant ($P \leq 0.05$) decrease in total platelet count in the affected dogs compared to healthy dogs.

Manual platelet count ($\times 10^3$)

The Mean \pm SE of, manual platelet count values in healthy control group and Canine Ehrlichiosis affected dogs were; 325.10 ± 18.90 and 63.00 ± 6.20 respectively depicted in table 1 and figure 2 There was a significant ($P \leq 0.05$) decrease in manual platelet count in the ehrlichia affected dogs compared to healthy dogs.

There was a significant decrease in total platelet count in the affected dogs compared to healthy dogs. Results of our study are similar to the ones which were reported by other research workers [10, 4, 5, 6]. Decrease in the platelet levels in ehrlichia affected dogs may be due to decreased circulating half-life of platelets, reduced adhesiveness of platelet due to antiplatelet antibodies, platelet aggregation [11], increased consumption of platelets, Sequestration due to migration inhibition factor, Suppressed production, Spleen pooling and increased platelet destruction by antiplatelet antibodies [12, 13].

Mean platelet volume (FL)

The Mean \pm SE of, mean platelet volume values in healthy control group and Canine Ehrlichiosis affected dogs were; 7.72 ± 0.26 and 6.69 ± 0.11 respectively depicted in table 1 and figure 3. There was a significant ($P \leq 0.05$) decrease in mean platelet volume values in the affected dogs compared to healthy dogs.

Table 1: Comparison of haematological parameters in Canine Ehrlichiosis affected dogs with Healthy control dogs (Mean \pm SE).

SL. No	Parameter	Healthy dogs N=20	Ehrlichia Affected dogs N=20	P values
1	Hb(g/dL)	14.78 ± 0.34^a	8.41 ± 0.33^b	.000
2	PlateletCount($\times 10^3/\mu\text{l}$)	339 ± 21.75^a	63.80 ± 6.62^b	.000
3	TLC ($\times 10^3/\mu\text{l}$)	14.15 ± 0.52	15.57 ± 5.13	.785
4	TEC ($\times 10^6/\mu\text{l}$)	6.64 ± 0.14^a	5.32 ± 0.28^b	.000
5	PCV (%)	44.34 ± 1.02^a	25.34 ± 0.97^b	.000

6	MaPLT($\times 10^3/\mu\text{l}$)	325.10 ± 18.90^a	63.00 ± 6.20^b	.000
7	MPV (fL)	7.72 ± 0.26^a	6.69 ± 0.11^b	.001

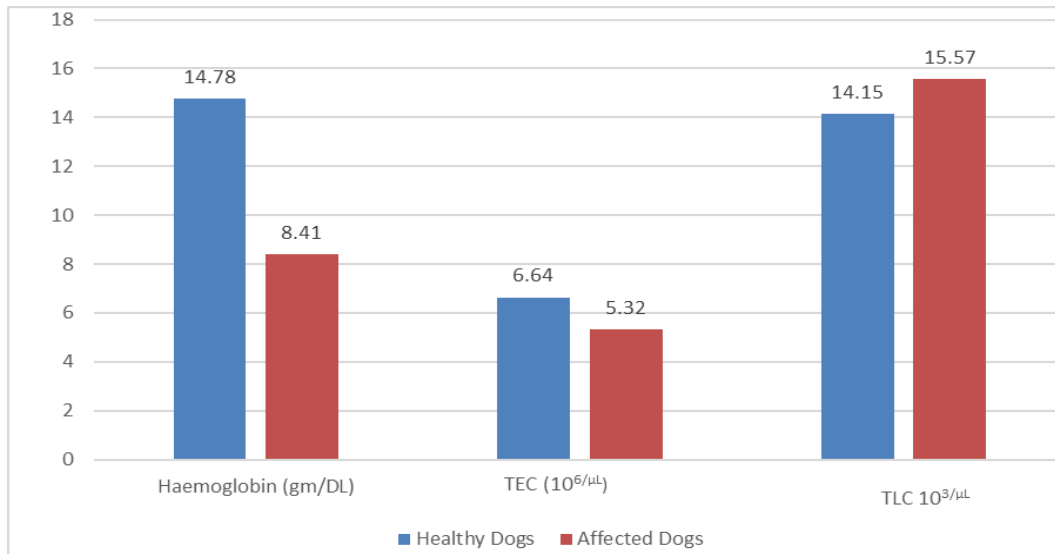


Fig 1: Bar chart depicting Comparison of Haemoglobin, TEC and TLC values of Canine ehrlichia affected group with healthy control group

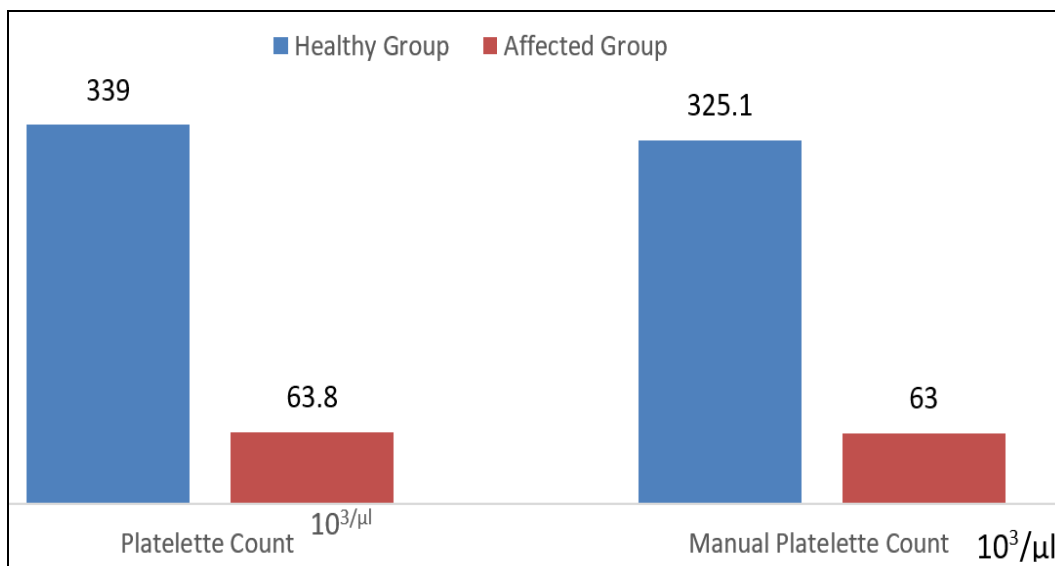


Fig 2: Bar chart depicting comparison of Platelet Count and Manual Platelet Count values of Canine ehrlichia affected group with healthy control group

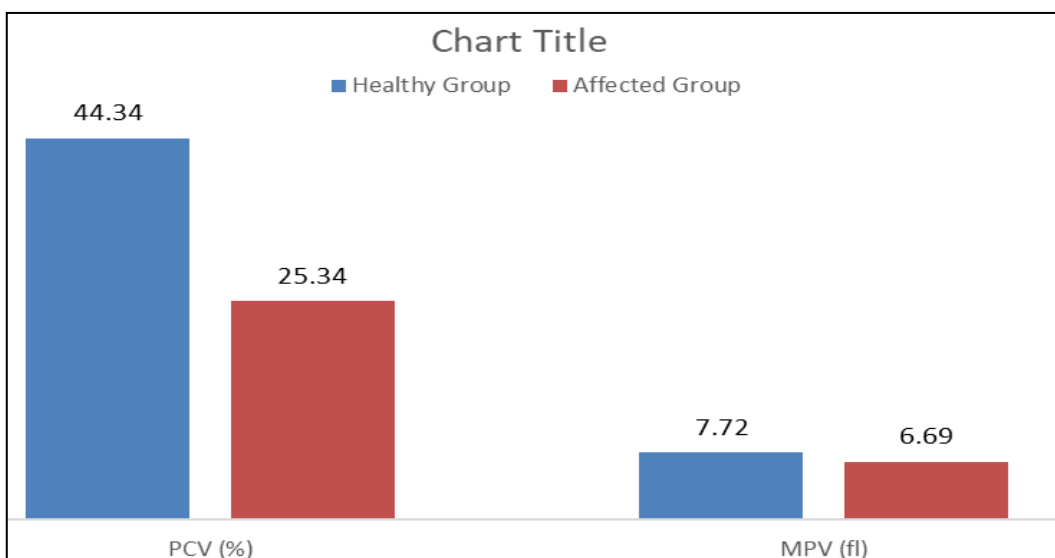


Fig 3: Bar chart depicting comparison of PCV and MPV values of Canine Ehrlichia affected group with healthy control group

Conclusion

The blood samples from 54 suspected cases of canine ehrlichiosis were subjected for platelet count. Out of 54 suspected cases 32 dogs showed platelet count of less than $150 \times 10^3/\text{ul}$. In these 32 dogs 20 dogs were positive based on PCR test. These 20 dogs were subjected for detailed haematological study. Haematological analysis of blood samples revealed that there was a significant decrease in HB, Total erythrocyte count, Packed cell volume, platelet levels in the affected dogs compared to healthy dogs whereas there was a non-significant difference in total leucocyte count in the affected dogs compared to healthy dogs.

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