Impact of Tick Infestations on Haematological Profile and Health in Labrador Dogs

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Received: August 2024 *185/24* *Accepted: February 2026*

ABSTRACT

The present study aimed to evaluate the effect of tick infestations on hematological profile in male Labrador dogs. A total of 20 adult male Labrador dogs were randomly selected for the study and they were divided into two groups: GI: control (healthy animals, n=10) and GII: infected (tick-infested, n=10). Whole blood was collected by venipuncture into EDTA vacutainers and used for the estimation of haematological parameters. Analysis of the data revealed that total erythrocyte count, hemoglobin and packed cell volume were significantly (P<0.05) lower, while eosinophil and lymphocyte counts were significantly (P<0.05) higher in the tick-infested group compared to the healthy control group. However, the total leukocyte, granulocyte and monocyte counts did not reveal any significant (p>0.05) difference between the groups. From the results, it could be concluded that the tick infestation induced significant changes in hematological profile, which in turn impaired the animal's health.

Keywords: Canine, ectoparasites, ticks, haematology

INTRODUCTION

Ticks (Ixodidae) are blood-sucking arthropods that infect both domestic and wild animals, resulting in serious external and internal illnesses in the animals (Dantas-Torres *et al.,* 2012). Tick (*Rhipicephalus sanguineus*) infestation is the most common cause of skin lesions in dogs and cats, which is often neglected by the pet owners. The blood-sucking behaviour of the ticks causes severe irritation, redness, itching, anemia and life-threatening hypersensitive reaction (Taylor *et al.,* 2012). In addition to the chronic discomfort caused by the ticks, tick infestation was associated with transmission of diseases such as Babesiosis, Theileriasis and Anaplasmosis (Gray *et al.,* 2013) in dogs. Further, the release of neurotoxins from tick saliva causes paralysis, systemic diseases and hypersensitivity reactions (Smith *et al.,* 2013). However, most cats and dogs with tick infestation exhibit no clinical symptoms with the underlying iceberg phenomenon (Akucewich *et al.,* 2002), which is the main reason for the neglect of this condition. Despite several studies that experimentally demonstrated that tick infestation results in diseases of bacterial, viral, rickettsial and protozoal origin (Grey *et al.,* 2013) by biological or mechanical transmission**,** the extent to which they parasitize, severity, hemato-biochemical changes and pathogenesis is meagerly studied. Considering the severity of tick infestation in the life cycle of dogs, there is a need to understand the patho-physiology and the extent of parasitism, which would help in the adoption of suitable management and therapeutic strategies.

Haematological and biochemical alterations are good indicators of the severity of disease, the best tools for disease diagnosis and prognosis (Nazifi *et al.,* 2010)**.** As ticks are blood-sucking

ectoparasites, alteration in haematological and biochemical parameters would assist in diagnosing the severity of infestation and also help in the management of infested dogs (Katariya *et al.,* 2018). On this background, it was hypothesized that the tick infestation would alter specific haematological indices in infested dogs. The present study, hence, aimed to evaluate the haematological parameters in tick-infested Labrador dogs.

MATERIALS AND METHODS

This study was carried out in Labrador dogs with tick infestations presented to a private pet clinic at Visakhapatnam, Andhra Pradesh, India. A total of 20 adult male Labrador dogs were randomly selected for the study. The animals were divided into two groups: GI: control (healthy animals, n=10) and GII: infected (tick-infested, n=10). The presence of ticks on the skin surface and in the hair coat of dogs was recorded and considered as infected animals (tick-infested). For haematological studies, whole blood was aseptically collected from the cephalic vein, using 24-gauge needles into a vacuum tube containing sodium ethylene diamine tetraacetate (EDTA) as an anticoagulant for haematological estimations. Total erythrocyte count (TEC), Haemoglobin (Hb), Packed cell volume (PCV), Total leukocyte count (TLC), granulocyte count, monocyte %, neutrophil %, lymphocyte % and eosinophil % were determined using hematology analyzer. Data were analyzed by SPSS software, version 16. Statistical differences between respective means for various parameters were evaluated using an unpaired t-test, and $P<0.05$ was accepted as statistically significant.

RESULTS AND DISCUSSION

As ticks are blood-sucking ectoparasites that directly cause significant alterations in the haematological profile, this study attempted to evaluate the severity/magnitude of tick infestation on the haematological features in Labrador dogs. There was a significant ($p<0.05$) decrease in RBC, Hb and PCV in the tick-infested group compared to the control group (Figures 1, 2 and 3). Similar findings (low RBC, Hb and PCV) were reported by Ahmed *et al.* (2015), Nair *et al.* (2007), Katariya *et al.* (2018) and Kebbi *et al.* (2020). A significant reduction in RBC, Hb and PCV in tick-infested dogs could be due to the blood-sucking behaviour of ticks, which causes anaemia (Katariya *et al.,* 2018). RBC and Hb were critically lower in infested animals, impairing oxygen supply and nutrient delivery to the tissues, which leads to secondary bacterial infections, making the animals weak and lethargic. However, no significant changes were seen in the neutrophil count. Further, lymphocyte and eosinophil percentages were significantly ($p<.0.05$) higher in the tick-infested group compared to the control group (Figures 4 and 5). These findings were also in accordance with other studies conducted in various other dog breeds (Patel *et al.,* 2005, Nair *et al.,* 2007 and Katariya *et al.,* 2018). Significantly higher lymphocyte percentage could have been associated with the inflammatory reactions and or physiological immune responses to combat tick infestation. Usually, eosinophilia is indicative of allergic and parasitic infection. Eosinophilia in the study could be due to the parasite-mediated allergic reaction, as reported by Avinash *et al.* (2018), as tick infestation is associated with the release of neurotoxins, triggering inflammatory and allergic reactions. However, no significant ($p>0.05$) changes were observed in the total leucocyte count, and monocyte and granulocyte percentages (Figures 6, 7 and 8). This study also emphasizes the fact that tick infestation caused significant alterations in hematological profile in dogs. Since fluctuations in the hematological variables could lead to shock and death, necessary preventive measures such as deworming, regular medication and

administration of the immunity boosters need to be carried out in pet animals, to overcome the adverse effects of tick infestation in dogs.

CONCLUSION

Tick infestation causes significant alterations in the haematological parameters in canines. An altered haematological profile significantly Haematological impairs animal health. Proper therapeutic and management-related measures must be adopted to overcome the adverse effects of tick infestation. Further studies are required to focus on the evaluation of biochemical and oxidative changes to understand the severity of tick-infestations in canines.

REFERENCES

Ahmed, A., M.A.Dar, A.A.Bhat, B.Jena, G.K.Mishra and R.P.Tiwari (2015), Study on haemato-biochemical profile in goats suffering from gastrointestinal parasitism in Jaipur district of Rajasthan, *J. of Live. Sci.,* **6:** 52-55.

Akucewich, L.H., K.Philman, A.Clark, J.Gillespie, G.Kunkle, C.F.Nicklin and E.C.Greiner (2002), Prevalence of ectoparasites in a population of feral cats from north central Florida during the summer, *Vet. ParaHaematological.,* **16:** 109(1-2): 129-39.

Ariyibi, A.A., M.O.Oyeyemi and R.A.Ajadi (2002), A comparative study of some haematology and biochemical parameters of clinically healthy Alsatian and local dogs, *African J. of Biomed. Res.,* **5**(3): 145-47.

Avinash, K., N.Arora, V.S.Rajora, Wani Ilyas, Meena Mrigesh, A.K.Das and Amit Prasad (2018), Hematobiochemical alterations in ectoparasite infestation in canines, *J. of Ento. and Zoo. Studies.* **6**(5): 743-46.

Dantas-Torres, F., B.B.Chomel and D.Otranto (2012), Ticks and tick-borne diseases: A One Health Perspective, *Trends in Parasitology*. **28**(10): 437-46.

Gray, J., F.Dantas-Torres, A.Estrada-Peña and M.Levin (2013), Systematics and ecology of brown dog tick, *Rhipicephalus sanguineus, Ticks and tick-borne diseases,* **4**(3): 171-80.

Katariya, A., N.Arora, V.S.Rajora, W.Wani Ilyas, M.Meena, A.K.Das and A.Prasad (2018), Hematobiochemical alterations in ectoparasite infestation in canines, *J. of Entom. and Zoo. Studies,* **6**(5)**:** 743-46.

Nair, S.S. and D.S.Nauriyal (2007), Diagnostic significance of heamatological changes associated with various canine dermatoses, *Intas Polivet,* **8**(1)**:** 68-72.

Nazifi, S. (2010), Diagnostic values of acute phase proteins in Iranian indigenous cattle infected with Theileria annulata, *Veterinarski arhiv,* **80:** 205-14.

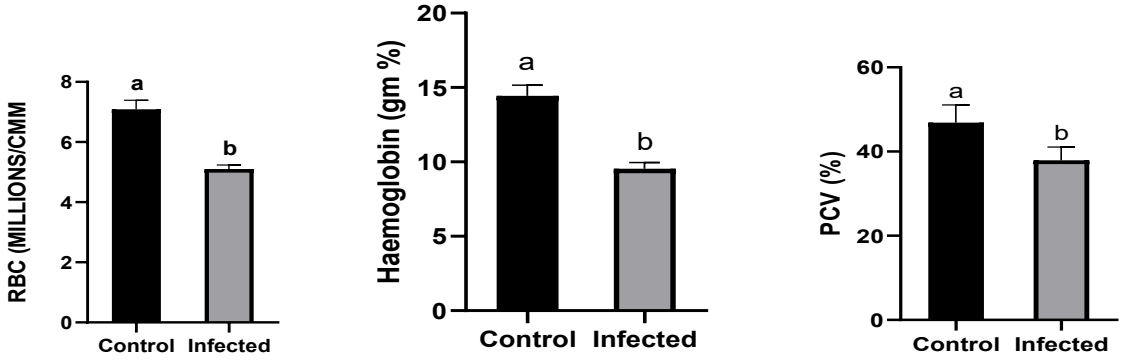
Patel, J., S.K.Maiti, P.K.Sanya and S.P.Tiwari (2005), Haemato biochemical and mineral profiles in generalized canine demodicosis, *Intas Polivet,* **6**(2)**:** 331-34.

Rinaldi, L., G.Spera, V.Musella, S.Carbone, V.Veneziano, A.Iori and G.Cringoli (2007), A survey of fleas on dogs in southern Italy, *Vet. Parasitology,* **148:** 375-78.

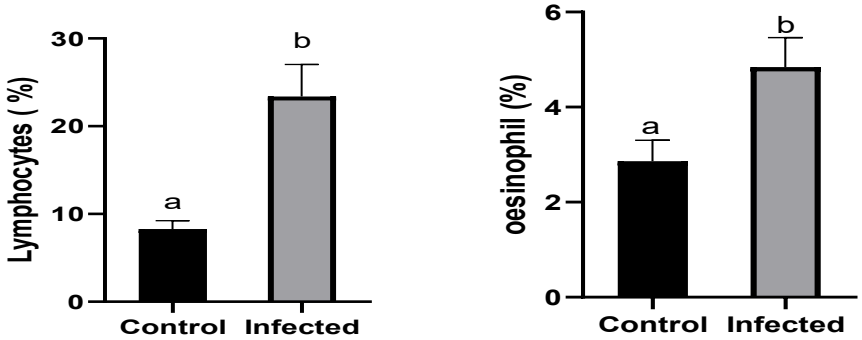
Rosa, K., O.Besseboua, M.Belhadj-Kebbi, L.Hassissen and A.Ayad (2020), Hematological and oxidative status parameters in domestic dogs naturally infested by Rhipicephalus sp**.,** *Mac. Vet. Rev*., **43**(2): 1-8.

Smith, F.D. and L.E.R.Wall (2013), Prevalence of Babesia and Anaplasma in ticks infesting dogs in Great Britain, *Vet. Para.,* **198**(1-2)**:** 18-23.

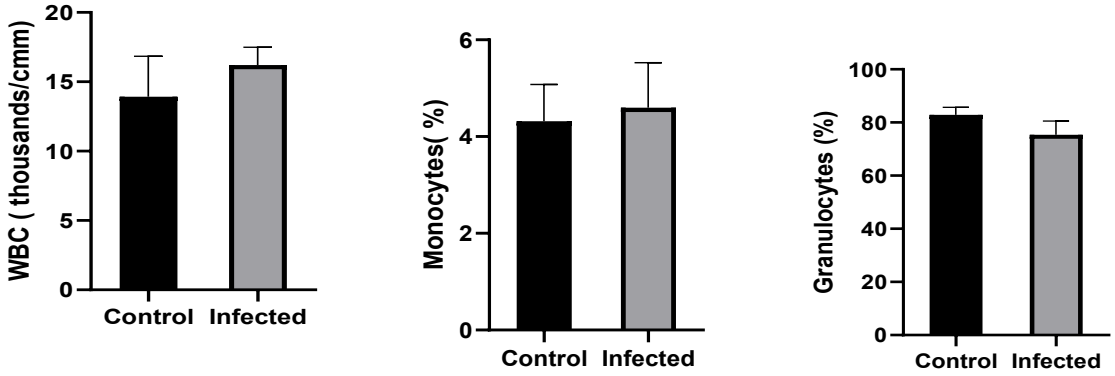
Taylor, M., O.Mediannikov, D.Raoult and G.Greub (2012), Endosymbiotic bacteria associated with nematodes, ticks and amoebae, *FEMS Immunol. Med. Microbiol*., **64**(1): 21-31.



Figures 1, 2 and 3: Effect of tick infestation on RBC, Hb and PCV in canines (n=10); Bars with different superscript differ significantly (P<0.05)



Figures 4 and 5: Effect of tick infestation on lymphocyte and eosinophil percent in canines (n=10); Bars with different superscript differ significantly (P<0.05)



Figures 6, 7 and 8: Effect of tick infestation on WBC concentration, monocyte and granulocyte percent in canines (n=10)