

Clinical Signs and Haematology Profiles of Beagle Dogs with Tick Infestation

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Abstract

Rhipicephalus sanguineus is one of the vectors that could induce diseases in dogs. A physical examination and haematology test could examine the dog's condition with tick infestation. Five dogs, beagle breeds from Veterinary Teaching Hospital, School of Veterinary Medicine and Biosciences, IPB University, have been examined for physical examination and CBC test. A haematology test was performed using a haematology analyzer and made the blood smear. Physical examination showed that 60% of dogs have a tick infestation, 80% have pallor, 60% have pruritus, 40% have crusted skin, and 100% have wounds in extremities. However, the body temperature and heart rate were relatively normal. Complete blood count test showed that red blood cells (RBC), peak cells volume, and haemoglobin (Hb) decreased (80%), MCHC increased (40%), thrombocytopenia (100%), leukopenia (40%), lymphocytopenia (60%), neutropenia (10%) and monositopenia (80%). The blood smear result showed all dogs have positive blood parasites, with the highest percentage being the third dog (0.056%). From the physical examination, CBC, and blood smear, it can be concluded that dogs with tick infestation would experience anaemia that showed by RBC, PCV, decreasing number of platelet and positive blood parasite.

Keywords: anaemia, haematology, tick infestation, physical examination, thrombocytopenia

Received: 17 March 2022

Revised: 23 August 2022

Accepted: 26 September 2022

INTRODUCTION

Tick is one of the ectoparasites that could cause health problems in dogs. The tick species that infected dogs is *Rhipicephalus sanguineus*. Papazahariadou *et al.* (2003) said that *R. sanguineus* infested 89% of dogs with tick infestation. Another study showed that many dogs with tick infestation were infested by Ixodidae (46.39%), i.e. *Boophilus* spp., *Rhipicephalus* spp., and *Haemaphysalis* spp (Adhikari *et al.* 2013).

Ticks infection could transmit disease in dogs by bloodsucking. The tick could transmit viruses, bacteria, and protozoa that cause tick-borne disease (Otranto *et al.*, 2014). A protozoan causes the most common tick-borne disease in dogs. The most common protozoan pathogen-infected in dogs is *Babesia* and *Hepatozoon*. That protozoan lives in blood cells and cause severe

disease and death in an infected dog (Schnittger *et al.*, 2012). According to Thongsahuan *et al.* (2020), the most common blood parasites infecting dogs (251 dogs) in Southern Thailand were positive *E. canis* (50,60%), *H. Canis* (39,84%), and *B. canis* (9.56%). Blood parasitic coinfection was not detected in that study.

The diagnosis of tick-borne disease in dogs is usually based on physical examination and haematological tests. According to Thongsahuan *et al.* (2020), observation of clinical signs and haematological profiles was usually used to diagnose tick-borne disease. Conventional methods such as blood smears can emphasize the diagnosis of tick-borne disease. All tick-borne diseases can be affected by haematological profiles and cause changes directly or indirectly. This study observed the clinical sign and haematological profile in dogs infected by a tick.

MATERIAL AND METHOD

Five dogs, beagle breed from Veterinary Teaching Hospital, Faculty of Veterinary Medicine, IPB University, were examined physically in May 2017. It was consist of three male and two female dogs. A medical check-up was done on the dogs. Before that, all dogs were infected with the tick in the canal.

All dogs were done a complete blood count (CBC) test and blood smear. The 1 ml blood was collected from the *antebrachial* vein and was stored into ethylene-diamine-tetraacetic acid (EDTA) vacutainer. Then, the blood was examined for CBC using a haematology analyzer (Vetscan HM5 Abaxis Inc., United States). A blood smear was done using Giemsa 20% staining for 45 minutes to observe parasitemia percentage. The reticulocyte was observed using New Methylene Blue staining. All data were interpreted descriptively.

RESULT AND DISCUSSION

Physical examination showed that 60% of dogs have a tick infestation, 80% have pallor, 60% have pruritus, 40% have crusted skin, and 100% have wounds in extremities. However, the body temperature and heart rate were relatively normal (Table 1). The tick in the dog's body is the *R. sanguineus* species. This tick is cosmopolitan and spread widely in several countries such as America, Africa, Australia, and Asia, including Indonesia. According to Hadi and Rusli (2006), out of 80 dogs in the Bogor area, 28 were infested with ticks. From observation, the ticks found on the dogs are *R. sanguineus*.

Ayodhya (2014) also reported that from 148 dogs in Rajendranagar campus animal hospital, there were 48 dogs infested by ticks. Of the 48 dogs, 38 dogs were infested by *Rhipicephalus* spp. (79.16%) and 10 dogs were infested by *Hyalomma* spp. (20.8%). The resulting study Sinaga and Hariani (2019), Prevalence of ectoparasites in pet dogs in East Kalimantan are *Ctenocephalides canis* (90%), *Rhipicephalus sanguineus* (67%), *Trichodectes canis* (57%), and *Boophilus sp.* (43,3%).

The infestation of tick can lead to animal pallor, allergic, alopecia and pruritus. Ayodhya (2014) said that the results did not show significant changes in body temperature or pulse frequency from physical examination of dogs with tick infestation. However, animals showed pallor on the mucous membrane. The saliva of ticks penetrate into dogs' bodies can induce an allergic reaction and abnormalities in dogs' skin such as pruritus, alopecia, and wound. According to Riberio (1987), tick saliva causes infection on the skin, such as pruritus.

Haematological tests (Table 2) showed 80% of dogs (n=4) decreased of RBC, PCV, and Hb value, 50% of dogs (n=2) decreased of WBC, and 100% decreased thrombocyte value. Blood smear test in this study showed that all dogs were positive blood parasites. According to Qiu *et al.* (2018), tick infestation in dogs could prevent infection of blood parasites Anaplasmatacea such as *Babesia* and *Hepatozoon*. The resulting study from Thongsahuan *et al.* (2020), from 474 blood samples in dogs infected by a tick, showed 127 dogs positive *E. canis* 100 dogs positive *H. Canis*, and 24 dogs positive *B. canis*.

The blood test result correlates with clinical signs in dogs infected by a tick. In this study, 80% of dogs showed anaemia. This condition is caused by ticks suckling the blood and transmitting the pathogen agent such as protozoal. According to Manggung (2008), an adult female tick can suck blood as much as 0.3 millilitres per day. It is also a vector of several blood protozoal diseases such as babesiosis, anaplasmosis, and theileriosis that can lead to death. Thongsahuan *et al.* (2020) reported that a tick could infect a blood parasite in the dog. Haematological profile in a dog with infection blood parasite showed anaemia, thrombocytopenia, and lymphopenia.

Parasitemia degrees in all dogs are $\leq 1\%$, showing that all dogs in this study had been mild infection. Parasitemia percentage each dog are 0.032%, 0.04%, 0.056%, 0.043%, and 0.049%. According to Ndungu *et al.* (2005), parasitemia levels were categorized based on parasitic erythrocyte percentage. In mild infection, parasitemia is 5%. This level is usually related to the clinical sign.

Table 1. Clinical findings from physical examination of dogs

Dogs	Clinical findings				
	Tick infestation	Pruritus	Crusting	Injury extremity	Pallor
1	√	-	√	√	√
2	√	√	-	√	√
3	√	√	√	√	√
4	-	-	-	√	√
5	-	√	-	√	-
Percentage	60%	60%	40%	100%	80%

Table 2. Blood profile of respective dogs

Parameters	Normal Reference*	Haematology Result of Dog				
		1	2	3	4	5
RBC (10 ⁶ /μL)	5.50 – 7.80	4.99	5.39	4.71	4.36	6.22
Hb (g/dL)	12.5 – 19.4	12.0	11.5	11.5	9.4	13.8
PCV (%)	34 – 51.5	33.90	33.41	31.53	28.0	38.43
MCV (fl)	60 – 72.0	68	62	67	64	62
MCH (pg)	22.1 – 26.5	24.0	21.4	24.4	21.5	22.1
MCHC (g/dL)	34.5 – 38.3	35.3	34.4	36.4	33.5	35.8
RDWc (%)	13.2 – 19.1	15.2	15.9	15.4	16.4	16.8
PLT (10 ³ /μL)	115 – 423	96	79	4	76	2
PCT (%)		0.09	0.06	0.0	0.08	0
MPV (fl)		9.3	10.7	7.6	9.9	6.7
PDW (%)		39.0	41.0	34.5	41.5	24.6
WBC (10 ³ /μL)	5.60 – 17.80	9.42	4.04	6.48	8.14	2.35
Limfocyte (10 ³ /μL)	1.20 – 5.50	2.89	0.66	0.46	3.05	0.43
Monocyte (10 ³ /μL)	0.50 – 1.80	0.25	0.20	0.34	0.77	0.16
Neutrophile (10 ³ /μL)	3.20 – 13.40	5.99	2.75	5.46	4.09	1.71
Eosinophile (10 ³ /μL)	0.15 – 2.90	0.26	0.41	0.22	0.21	0.05
Basophile (10 ³ /μL)	0 – 0.0	0.03	0.03	0.0	0.02	0.0
Reticulocyte (%)	0 – 1.0%**	0.79	0.42	0.85	0.94	0.83
Parasitemia (%)	Negative	0.032	0.04	0.056	0.043	0.049

*Miglio *et al.* (2020); **Thompson (2018).

CONCLUSION

Tick is one of the vectors that could transmit pathogen agents such as blood parasites. The physical examination and blood test is a method to diagnose the infection pathogen agent in blood cause tick manifestation. Dogs with tick infestation showed clinical signs of pallor and abnormality in the skin. This condition is relevant with a blood test that showed anaemia, thrombocytopenia, and infection by blood parasite.

ACKNOWLEDGEMENT

The authors thank the Veterinary Teaching Hospital, School of Veterinary Medicine and Biosciences, IPB University for using the dogs as

our case study and the Veterinary Clinical Pathology Laboratory, Division of Veterinary Internal Medicine, Department of Clinic, Reproduction, and Pathology, School of Veterinary Medicine and Biosciences, IPB University for blood samples analysis.

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