

## Original Research Article

# Therapeutic Management of *E. canis* in DOG

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## ABSTRACT

A total of eighteen clinical cases were presented at Veterinary Clinical Complex, College of Veterinary Science, Kanke, Ranchi, Jharkhand, India, which were diagnosed as monocytic ehrlichiosis on the basis of history of ticks infestation, characteristic clinical features and hematological examinations. They were grouped randomly into 3 groups of 6 dogs in each group. Group 1 is treated with Doxycycline, whereas Group 2 with oxytetracycline and Group 3 with Imidocarb. Group 3 showed 100% recovery, while Group 2 showed 66.6 %, and Group 1 showed 50% recovery on 7<sup>th</sup> day. Since the use of Imidocarb dipropionate has a number of advantages over that of Doxycycline and Oxytetracycline, comparative hematological tests were carried out to more definitively determine the efficacy of Imidocarb dipropionate in canine Ehrlichiosis. All the hematological parameters came to normalcy at the 7<sup>th</sup> day of treatment in group 3 whereas in group 1 & 2 normal parameters were observed on 15<sup>th</sup> day.

### Keywords

Dog, Monocytic  
Ehrlichiosis,  
Imidocarb,  
Doxycycline,  
Oxytetracycline

## Introduction

Ehrlichiosis is an important tick borne protozoan disease in canine caused by intracellular gram negative bacteria of the genus Ehrlichia, under the family Anaplasmataceae. *Ehrlichia canis* is the etiologic agent of canine monocytic ehrlichiosis, which is mainly transmitted by brown dog tick, *Rhipicephalus sanguineus*. Improper housing, management and grooming practices are responsible for frequent exposure of canines to different ectoparasites (Bhadesiya *et al.*, 2015). The distribution of the disease is mainly related to distribution of vectors (Smitha, 2002). Disease is mainly divided into acute, subclinical and chronic phases, each leads to greater changes in hematological parameters leading to severe weight loss and other

related symptoms. Ettinger and Feldman, (2010) reported that thrombocytopenia, leucopenia with bleeding tendencies in most consistent presenting complaints in dog in both acute and chronic stages of disease. Imidocarb is a urea derivative used in veterinary medicine as an antiprotozoal agent for the treatment and control of rickettsial diseases and other parasites.

The parasite *Ehrlichia canis* is normal inhabitant of monocytes, neutrophils and eosinophils. Ettinger and Feldman, (2010) reported that after an incubation period of 8-20 days, the organism multiplies within circulating mononuclear cells and the mononuclear phagocytosis occurs within liver, kidney, spleen and lymph nodes and

other predilection organs. Severe submandibular swelling is also observed as a result of lymphadenopathy. Some ocular findings are also observed which may be due to deposition of anti-platelet antibodies in anterior chamber. Imidocarb is chemically described as *N, N'*-bis[3-(4,5-dihydro-1 *H*-imidazol-2-yl)-phenylurea dipropionate and has a molecular weight of 496.6. The mode of action of imidocarb is not fully understood, however, two mechanisms have been proposed: interference with the production or use of polyamines, or the prevention of entry of inositol into the parasitized erythrocyte, producing starvation of the protozoan. Imidocarb dipropionate appears to act directly on the parasite, causing alteration in number and size of nuclei and in morphology (vacuolation) of the cytoplasm.

Tick-borne diseases have a tendency to cause cross-infection and this drug may be capable of fighting both canine ehrlichiosis and babesiosis simultaneously. Imidocarb dipropionate has a number of advantages over tetracycline, since long-term oral antibiotic therapy may result in problems with owner compliance and some dogs react to the high doses of tetracycline by vomiting, while treatment with imidocarb dipropionate is less dependent on owner compliance. Since imidocarb dipropionate persists for long periods in plasma and tissues, it may be possible to use this drug prophylactically against canine ehrlichiosis. The paper is based on the study of the efficiency in imidocarb over oxytetracycline and doxycycline for the treatment of *E. canis* with rapid improvement and recovery.

### **Materials and Methods**

Eighteen clinical cases of monocytic ehrlichiosis diagnosed at Veterinary Clinical Complex, College of Veterinary

Science, Kanke, Ranchi, Jharkhand, India were selected on the basis of history of ticks infestation, characteristic clinical feature & hematological examinations. They were randomly divided into three groups of 6 dogs in each group. They were having history of inappetence, fever (104<sup>0</sup> F), lethargy, weakness, anemia, hemoglobinuria, weight loss. On physical inspection, there was a rise in temperature, pale mucous membrane and swollen submandibular lymph nodes. Approximately 6 ml of blood samples were collected from positive dogs in a sterile anticoagulant vial containing ethylenediaminetetra acetic acid (EDTA) through cephalic or recurrent tarsal vein puncture. Blood samples were collected on 0<sup>th</sup>, 7<sup>th</sup>, 15<sup>th</sup>, 21<sup>st</sup> and 28<sup>th</sup> day of treatment from each dog for routine haematological examination.

Haematological parameters including total erythrocyte count (TEC, millions/u1), haemoglobin (Hb, g/ dl), packed cell volume (PCV, %), total leukocyte count (TLC), differential leukocyte count (DLC, %) and platelet (thousands/u1) were estimated following standard procedure. Blood smear was also made for subject to direct microscopic examination from giemsa stain for hemoprotozoan parasite investigation. Blood smear was examined on 1<sup>st</sup>, 3<sup>rd</sup> and 7<sup>th</sup>, 15<sup>th</sup> day of treatment. Treatment schedule was as follows:

Other supporting treatments, vitamin B complex @ 0.5ml i/m daily for 5 days and injection of iron @ 1ml i/m, was administered on alternate days for 5 occasions.

The dog owners were suggested to control the disease by controlling tick population of *Rhipicephalus sanguineus* in dog as well as in their houses by spray or powder form of amitraz, fipronil and pyrethrins.

## Results and Discussion

The clinical symptoms observed in this study were fever, anorexia, dullness, hemoglobinuria, pale mucous membrane and swollen submandibular lymph nodes which was also reported by Chipde *et al.*, (2007) & Sharma *et al.*, (2010), however after treatment, the dogs in group 3 started showing clinical recovery and became completely normal within 7 days. Presence of mature organism inclusions; morula as evident in blood smear, came negative by 1<sup>st</sup>

day of treatment in gr 3 and 7<sup>th</sup> days in gr 1&2. In the affected dogs hemoglobin and PCV decreased significantly indicating anemia. These findings were in accordance with Bhanuprakash *et al.*, (2015) and Shekhar *et al.*, (2011).

These parameters came to normal in 15 days of treatment in gr 3 and 21 days in gr 1&2. Harrus *et al.*, (2001) suggested immunological mechanism may be involved in destruction of erythrocytes causing anemia during acute stage of infection.

**Table.1** Treatment schedule

Group	No. of animals	Drug used	Dose	Days of treatment
1	6	Doxycycline	6.6 mg/kg ;po	3 weeks
2	6	oxytetracycline	20mg/kg ;s/c	14 days
3	6	Imidocarb	1ml/50kg; s/c	once

**Table.2** Haematological parameter in groups of ehrlichiosis positive dogs

Parameters	Group	0 <sup>th</sup> Day	7 <sup>th</sup> Day	15 <sup>th</sup> Day	21 <sup>st</sup> Day	28 <sup>th</sup> Day
Hb	1	7±0.13	8±0.13	8.9±0.04	11.5±0.15	12.6±0.18
	2	7.3±0.14	8.1±0.12	9.9±0.25	12.1±0.21	13.1±0.14
	3	7.2±0.29	9.4±0.16	12.4±0.3	13.2±0.17	13.6±0.16
PCV	1	21.2±0.24	24.7±0.41	26.8±0.12	34.6±0.47	39.4±0.81
	2	22.1±0.47	26.8±0.37	32.7±0.77	36.5±0.6	39.7±0.32
	3	21.8±0.18	28.3±0.35	39.7±0.53	41.1±0.3	52.2±1.11
Neutrophil	1	32.8±1.21	41.63±1.62	45.63±2.17	62.58±1.39	61.9±0.36
	2	33.8±1.15	44.41±1.59	46.59±1.62	63.13±1.08	63.1±0.65
	3	34.8±1.51	47.56±2.91	59.62±2.21	61.16±1.64	62.6±0.71
Eosinophil	1	4.89±0.78	3.81±0.72	2.25±0.52	2.59±0.53	3.1±0.49
	2	4.38±0.81	3.31±0.21	2.51±0.42	2.65±0.42	3.6±0.42
	3	4.51±0.42	1.18±0.33	1.13±0.39	1.51±0.34	2.83±0.30
Lymphocyte	1	62.1±1.78	52.6±2.1	40.6±2.9	34.1±1.54	37.8±0.47
	2	61.2±2.54	52.8±1.7	41.8±1.71	34.1±1.19	38.1±0.71
	3	60.9±1.91	48.6±3.27	29.1±1.83	32.8±1.41	38.1±0.27
Monocyte	1	2.16±0.13	3.16±0.23	4.3±0.31	5.8±0.16	7±0.25
	2	2.31±0.31	3.11±0.39	4±0.43	6±0.25	7±0.36
	3	2.14±0.23	3.61±0.42	5±0.36	6±0.36	7±0.36
Platelet count(× 10 <sup>5</sup> /ml)	1	1.9±0.23	2.9±0.21	3.7±0.27	4.4±0.18	6.8±0.3
	2	2.2±0.27	3.7±0.16	5.4±0.17	6.9±0.26	8.3±0.13
	3	2.1±0.2	4.9±0.14	5.8±0.2	7.6±0.19	8.3±0.07

**Table.3** Post treatment recovery

Treatment	Group	0 <sup>th</sup> Day	7 <sup>th</sup> Day	15 <sup>th</sup> Day	21 <sup>st</sup> Day	28 <sup>th</sup> Day
	1	6	3	4	6	6
	2	6	4	5	6	6
	3	6	6	6	6	6

Lymphocyte and Eosinophil were increased on 0 day which may be due to alteration in hemostasis as well as parasite involvement, which elucidate immune responses and hence overproduction of lymphocytes and monocytes.

Neutrophils, Monocytes seems low on 0 day of treatment as increased lymphocyte exert a cytotoxic effect upon autologous monocytes (Kakoma *et al.*, 1977). These values came to normal on 15 days of treatment in gr 3, and 28 days in gr 1&2.

Thrombocytopenia had been observed in all the infected groups which become normal in gr 3 on 7<sup>th</sup> day and on 15<sup>th</sup> day in gr 1&2. Platelets dysfunction have occurred, due to early removal of platelets at an accelerated rate by antiplatelet antibodies which were formed as a result of interaction of B cells antibody receptor with foreign antigen, which is also described by Smitha *et al.*, (2002) and Shekhar *et al.*, (2011).

Thrombocytopenia in canine ehrlichiosis may be attributed to decreased circulating half-life of platelets during acute phase of infection, reduced adhesiveness of platelets due to antiplatelet antibody, plasma inhibiting factor or direct effect of *E. canis* on circulating platelets or endothelial damage and platelet aggregation as suggested by Kuehn and Gaunt (1985).

After the treatment all parameters eventually came to normal with cessation of all clinical signs and thus complete recovery of animals.

Group 3 showed 100% recovery, whereas Group 2 66.67 % recovery, while Group 1 showed 50% recovery on 7<sup>th</sup> day of treatment. On 28<sup>th</sup> day all the animal recovered in all groups.

Group 3 showed 100% recovery, whereas Group 2 showed 66.6 % recovery, while Group 1 showed 50% recovery on 7<sup>th</sup> day of treatment. All the dogs become normal on 15 days in Group 1 & 2. The dogs returned to normal appetite and improved blood count by 28 days. Though therapy with tetracycline has shown to be effective in the treatment of canine ehrlichiosis as a result of elimination of *E. canis* parasites. Treatment with imidocarb dipropionate found best by decreasing the severity as it persists for longer period in plasma and tissues and thus responded more earlier than other ones.

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