Research Article

Intravenous Clindamycin as a Monotherapy in Treatment of *Babesia gibsoni* in Dogs

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Abstract

The present study was carried out to find out the effect of intravenous clindamycin as a monotherapy for the treatment of *Babesia gibsoni* infection in dogs along with supportive medication. During the study period, six dogs were selected after a confirmatory diagnosis of *Babesia gibsoni* in Giemsa stained peripheral blood smears examination. Reported clinical signs were pale mucous membranes, fever, emaciation, icteric mucous membranes, diarrhoea, melena, constipation, vomiting, epistaxis, lymphadenopathy, petechiae on the mucosa, and oedema of limbs. Haemato-biochemical analysis revealed anaemia and thrombocytopenia; lowered levels of serum albumin, elevated total bilirubin, ALT, and globulin levels. Dogs were treated with an injection of clindamycin @ 10 mg/kg body weight intravenously once a day for 14 days along with other supportive medications. Clinical improvement was noticed in appetite, physical activity, and in haematological parameters including haemoglobin and platelet count. But out of six dogs, one dog had a recurrence of infection after four months of therapy.

Keywords: Clindamycin, *Babesia gibsoni*, Dogs, Monotherapy

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Introduction

Canine babesiosis is a small intra-erythrocytic protozoan disease caused by *Babesia canis* and *Babesia gibsoni*. *Babesia gibsoni* is a vector-borne haemoprotozoan parasite of the genus *Babesia* which is distributed worldwide, including in India. Non-vector transmissions have also been reported by transplacental route, by blood transfusion, and through infected dog bites. Transmission of babesial sporozoites into the bloodstream of the canine host results in intra-erythrocytic multiplication and subsequent erythrocyte lysis, producing more parasites to infect intact erythrocytes [1]. *B. gibsoni* infections cause regenerative hemolytic anemia, thrombocytopenia, pyrexia, lethargy, icterus, and spleenomegaly [2]. The clinical presentation may vary from subclinical to severe disease resulting in multi organ failures and death. There are reports on dermatological lesions in dogs with *Babesia gibsoni* [3]. Many records are documented on drugs that have been used in the management of canine babesiosis, including diminazene aceturate, imidocarb dipropionate, atovaquone, and antibiotics, such as azithromycin, clindamycin, doxycycline, and metronidazole. The synergic or addictive effect of some of these drug combinations were evaluated, but complete elimination of parasitemia was not proven, frequent relapses were observed and adverse effects occurred during treatment of multiple therapies [4]. The present study was undertaken to evaluate the efficacy of intravenous clindamycin as a monotherapy for the treatment of *Babesia gibsoni* infection in dogs.

Materials and Methods

Dogs with clinical signs suggestive of babesiosis viz., weakness, pale mucous membranes with hemorrhagic spots (**Figure 1A**), fever, and jaundice (Figure 1B) were screened for Babesiosis. Peripheral blood smears were collected and subjected to Giemsa staining for microscopic examination under oil immersion objective [5]. Dogs with pleomorphic *Babesia gibsoni* in erythrocytes (Figure 1C) were considered for the present study. Dogs were treated with injection clindamycin @ 10 mg/kg body weight intravenously once a day for 14 days and supportive care with, haematinic syrup @ 10ml BID PO, Silymarin based poly-herbal syrup @ 10 mL BID PO and platelet enrich syrup along with amino acids @10ml SID PO for 30 days. Whole blood and serum were collected for haemato-biochemical analysis on the day of presentation and after completion of treatment. Hemoglobin (Hb), RBC count, packed cell volume (PCV), total leucocyte count (TLC), differential leucocyte count (DLC), and platelet count were carried out. The serum was utilized for the estimation of total protein, albumin, ALT, and total bilirubin. Clinical improvement

after therapy was assessed by the activity of dogs, clinical and haemato-biochemical findings and intensity of reduction of *Babesia gibsoni* organisms in the blood smear [6].

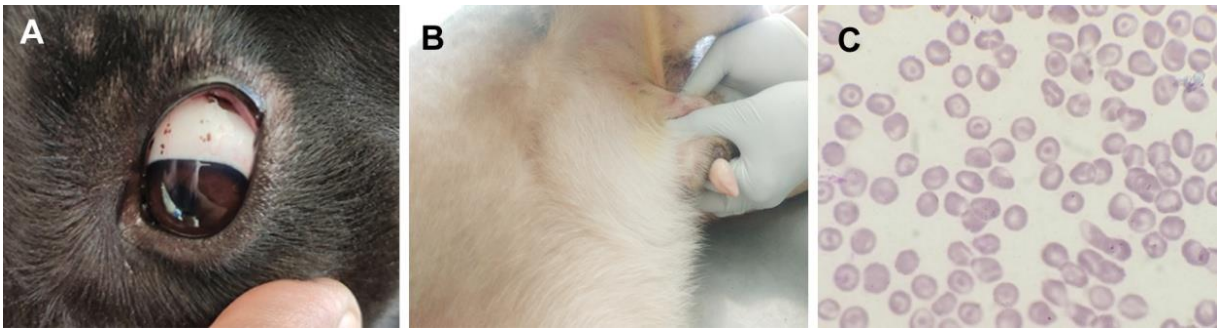

Figure 1 (A) Haemorrhagic spots over bulbar conjunctiva. (B) Icteric mucous membranes. (C) Stained dog blood smear positive for *Babesia gibsoni* in the blood smear (1000x magnification).

Results and Discussion

The common clinical signs observed were pale mucous membranes, fever, emaciation, icteric mucous membranes, diarrhoea, melena, constipation, vomiting, epistaxis, lymphadenopathy, petechiae on the mucosa, and oedema of limbs. Haemato-biochemical values observed in dogs infected with *B. gibsoni* infection were listed in **Table 1**. Haematology revealed reduced levels of haemoglobin, total erythrocyte count, and thrombocyte count. Serum analysis revealed lower levels of serum albumin, elevated total bilirubin, ALT, and globulin levels.

Table 1 Haematological and serum biochemical changes in dogs with *Babesia gibsoni*

S.No	Parameters	Dogs with *Babesia gibsoni* (n=6)		Reference range
		Before therapy	After therapy	
1	Haemoglobin (g/dL)	7.62 ± 0.85	10.62 ± 0.91	11.9-18.9
2	PCV (%)	21.45 ± 1.20	31.33 ± 2.09	35-57
3	TEC $x10^6$/cumm	4.12 ± 0.09	5.08 ± 0.11	4.95-7.87
4	TLC $x10^3$/cumm	12.48 ± 1.08	11.08 ± 2.15	5.0-14.1
5	Neutrophils (%)	66.08 ± 3.06	72.08 ± 3.00	58-85
6	Lymphocytes (%)	22.11 ± 0.98	21.11 ± 0.95	8-21
7	Monocytes (%)	4.02± 0.04	2.08± 0.03	2-10
8	Eosinophils (%)	8.08± 0.02	4.01± 0.04	0-9
9	Thrombocyte count ($x10^3$/cumm)	48.21 ± 3.04	115.98 ± 12.56	211-621
10	Total protein (g/dL)	5.98 ± 1.00	6.09 ± 1.08	5.4-7.5
11	Serum albumin (g/dL)	1.58 ± 0.07	2.88 ± 0.06	2-3-3.1
12	Globulin (g/dL)	4.31 ± 0.08	3.29 ± 0.09	2.7-4.4
13	ALT (IU/L)	63.8 ± 3.06	51.7 ± 3.05	10-109
14	Total Bilirubin (mg/dL)	3.42 ± 0.62	0.83 ± 0.89	0-0.8

While parasitic migration out of the erythrocytes causes mechanical damage to the erythrocyte which leads to a reduction in erythrocyte count and haemoglobin concentration. Another confirmed mechanism that exacerbates anaemia in *B. gibsoni* infected dogs is the erythrophagocytic capacity of peripheral blood and bone marrow macrophages. The mechanism of thrombocytopenia is platelet sequestration in the spleen or immune-mediated platelet destruction and the development of disseminated intravascular coagulopathy [4]. Apparent clinical recovery with improvement in appetite and physical activity was observed. In clindamycin treated dogs, an improvement was observed in the post-treatment values of total erythrocyte count, haemoglobin, the volume of packed red cells, and platelet count (Table 1). Wulansari *et al.*, (2003) reported that clindamycin, a dose-dependent antibiotic with the property of immune-enhancing ability, gradually reduced the level of parasitemia and induced morphological changes in parasites [7]. A similar type of haematological and serum biochemical changes were reported in dogs with other haemoprotozoan diseases like trypanosomosis [8]. But in the present study, thrombocytopenia will help to differentiate it from other haemoprotozoan diseases.

Conventional therapy for canine babesiosis includes two injections of Imidocarb dipropionate @ 5mg/kg SC or IM 2 weeks apart. It reduces morbidity and mortality but it is ineffective for the clearance of *B. gibsoni*. Another drug

used to treat Babesiosis is a single injection of Diminazene aceturate @ 3.5 mg/kg SC or IM, but this is potentially dangerous and shows a propensity to develop severe cerebral toxicity with classic cerebellar sulci haemorrhages [4]. *B. gibsoni* is very difficult to clear with such conventional therapy and dogs usually become chronic carriers or present with recurrent episodes of acute babesiosis. But it's been suggested that clindamycin might not eliminate parasites rapidly from the peripheral blood but damages it, which might stimulate humoral and cellular immunity against *Babesia* infection and result in an improvement in clinical condition [9]. Out of six dogs treated with intravenous clindamycin, one dog had a recurrence of infection after 4 months of therapy. Daily intravenous administration had one hurdle i.e. the owner difficulty to visit clinic daily and few stumbling back hurdles to educate the pet owners about daily visits. Instead, it will give promising results after the completion of the duration of therapy. Recent study on babesiosis in sheep showed the involvement of electrocardiography changes during the disease pathogenesis [10]. It is advised that continuous monitoring of dogs with clinical babesiosis for cardiac function while on treatment to prevent unnecessary complications. Further studies are recommended to record the echocardiographic changes during the disease process.

Conclusion

The present study was conducted to investigate the efficacy of injection clindamycin @ 10 mg/kg body weight intra venous once a day for 14 days as a monotherapy and was found to be effective for the successful management of clinical cases of *B. gibsoni* infection in dogs.

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