EFFICACY STUDY OF CLINDAMYCIN AS POTENTIAL MONOTHERAPY TREATMENT PLAN FOR CLINICAL CASE OF DOGS INFECTED WITH *Babesia gibsoni*

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ABSTRACT. A study was conducted in the Teaching Veterinary Clinical Complex, College of Veterinary Animal Sciences, Mannuthy to evaluate the efficacy of clindamycin as potential monotherapy treatment plan for *Babesia gibsoni* infection in dogs during the period from January 2013 to March 2014. Dogs of various breeds and age groups belonging to both sexes diagnosed of having *Babesia gibsoni* infection by blood smear examination and confirmed by PCR were selected for the study. These animals were treated with clindamycin @ 11mg/kg bw IV q24hr for 10 days and supported with haematinics. All animals showed clinical cure with improvement in appetite and physical activity, increase in haematological parameters including platelet count and improvement in serum chemistry values.

Keywords: Babesia gibsoni, clindamycin, monotherapy

INTRODUCTION

Canine babesiosis is mainly caused by *Babesia canis* and *Babesia gibsoni*. *B. gibsoni* is a small pleomorphic intraerythrocytic protozoan parasite reported most commonly than *B. canis*. *Babesia gibsoni* is gaining importance due to non-vectoral transmission included direct blood contact during biting and fighting between dogs, blood transfusion and iatrogenic infection. Kuttler *et al*. (1988) observed *Babesia gibsoni* as small, usually oval or annular shaped organisms measuring, less than three µm in length, thus appearing less than one-eighth of the diameter of the host erythrocyte. Babesiosis caused by *Babesia gibsoni* is less pathogenic and chronic in nature when compared to *Babesia canis*. Diminazene aceturate and imidocarb dipropionate are approved drugs for treating *B. canis* infection. Diminazene aceturate is showing some efficacy towards *B. gibsoni* at higher dosage rate. Because of the side effects, uses of these drugs are highly restricted

in dogs. In case of *B. gibsoni* infection approved oral therapy is a combination of atovaquone and azithromycin for 10 days costing around 16,000 rupees. Even in this combination therapy recurrence was reported in treated animals. Since the parasites are not completely eliminated by any of the anti-bestial therapies tested to date, dogs that survive in acute infections are at risk for recurrence of clinical disease and also serve as reservoir hosts. There is a need to evaluate a therapeutic regimen to treat this condition in India. Taking into consideration the above mentioned factors, the present study was undertaken to evaluate the efficacy of clindamycin for the treatment of *Babesia gibsoni* infection in dogs.

MATERIALS AND METHODS

The present study was conducted in dogs of various breeds and age groups belonging to both sexes presented to the Teaching Veterinary Clinical Complex, Mannuthy from different parts of Kerala with clinical signs suggestive of babesiosis *viz*., weakness, anorexia, pallor of mucous membranes, fever and jaundice. Blood smears were collected and subjected to parasitological investigation. Giemsa stained blood smear examination revealed pleomorphic *Babesia gibsoni* in erythrocytes. One of the most commonly observed form of *Babesia gibsoni* was Signet ring shape in erythrocytes (Figure 1).

Semi nested PCR was carried out as confirmatory method for *Babesia gibsoni* mentioned by Birkenheuer *et al.* (2003). Sequencing of 183 bp PCR product was confirmed that the amplified product was from a region of 18S rRNA gene of *Babesia gibsoni* (Figure 2). Six cases were selected and utilised for this study.

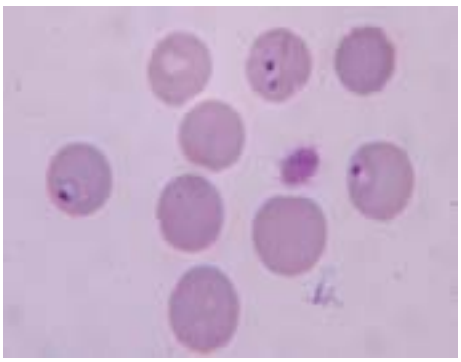

Figure 1. Giemsa-stained blood smear showing signet ring shaped *Babesia gibsoni* in erythrocytes.

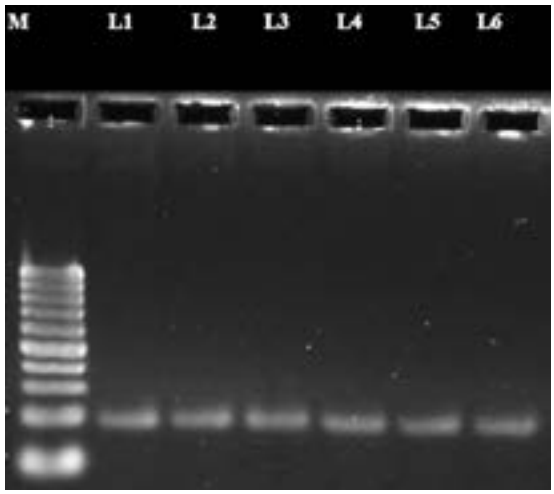

Figure 2. Gel electrophoresis showing *B. gibsoni* PCR assay. Lane M: GeneRuler 100 bp Ladder lane 1-6 positive samples.

Dogs were treated with Clindamycin @11 mg/kg bw IV q24hr for 10 days. Blood samples were collected for haematobiochemical analysis on the day of admission and on 10th post treatment day from the cephalic vein under sterile technique. All parameters were estimated by standard procedures using standard Agappe and Erba diagnostics kits. The following parameters were observed. Haemoglobin (Hb) [g/dl], RBC count [$\times 10^6$ mm^{-3}], Volume of packed red cells (VPRC) [%], Total leucocyte count (TLC) [$\times 10^3$ mm^{-3}], Differential leucocyte count (DLC) [%], Platelet count [$\times$ mm^{-3}], Erythrocyte sedimentation rate (ESR) [mm/hour], Mean Corpuscular Cell Volume (MCV) [fl], Mean Corpuscular Haemoglobin (MCH) [pg], Mean Corpuscular Haemoglobin Concentration (MCHC) [%], Total protein [g/dl], Albumin [g/dl], Globulin [g/dl], A:G ratio, Blood urea nitrogen [mg/dl], serum Creatinine [mg/dl], alanine aminotransferase [IU/L] and C-reactive protein [mg/L].

The dogs were reviewed on the 10th day of post treatment for clinical cure with improvement in appetite and physical activity, improvement in haematological parameters including platelet count and serum chemistry values. Blood smear values were re-checked on 10th day of post treatment and 30th day of post treatment for the presence of *B. gibsoni* organisms.

RESULTS

According to this study the most commonly affected animals were less than two-year-old male dogs. Among breeds, Labradors were found to be commonly affected breed.

Response to treatment was assessed by clinical improvement, haematobiochemical analysis and blood smear examination. Blood smear examination was done on day 10 and day 30 after course of treatment.

The mean rectal temperature of animals before treatment and post treatment were 103.58 ± 0.32 and 101.58 ± 0.26 ˚F respectively. Statistically significant ($p \leq 0.01$) decrease was noticed in the mean rectal temperature between pre and post treatment values. All other vital signs were within the normal range before and after treatment.

Major clinical signs and physical examination findings common to dogs infected with *Babesia gibsoni* were anorexia, fever, splenomegaly, lymphadenopathy, lethargy and pallor of mucous membranes while less common signs *viz.,* vomiting, shivering and oedema of limbs were also noticed in a few animals.

Haematobiochemical values observed in dogs infected with *B. gibsoni* infection were listed (Table 1). In all clindamycin treated animals, though not statistically significant, an improvement was observed in the post-treatment values of total erythrocyte count, haemoglobin, volume of packed red cells, total platelet count and total protein. A mild decrease was observed in erythrocyte sedimentation

Table 1. Haematobiochemical values of *B. gibsoni* infected dogs before and after treatment

Parameters	*Babesia gibsoni* infected dogs		
	Pre- treatment	Post- treatment	t value
RBC count [million/cmm]	5.32 ± 0.786	6.01 ± 0.45	1.33^{ns}
Haemoglobin [gm/dl]	12.23 ± 1.58	12.43 ± 1.03	0.22
PCV [%]	38.33 ± 5.09	39.33 ± 2.87	0.39
MCH [pg]	23.28 ± 1.49	22.87 ± 1.47	1
MCV[fl]	72.6 ± 4.69	71.75 ± 4.77	0.73
MCHC [%]	30 ± 1.21	31.66 ± 0.42	1.13
ESR [mm/hr]	23 ± 8.58	7.83 ± 2.88	2.25
TLC [/cmm]	18650 ± 2781.09	13916.67 ± 1295.48	1.5
Total platelet count [/cmm]	258666.67 ± 47250.86	290166.67 ± 46381.33	0.85
Total protein [g/dl]	6.73 ± 0.22	6.88 ± 0.20	0.66
Albumin [g/dl]	2.95 ± 0.15	2.88 ± 0.09	0.65
Globulin [g/dl]	3.73 ± 0.25	4.08 ± 0.29	1.26
A:G ratio	0.65 ± 0.14	0.70 ± 0.06	0.32
BUN [mg/dl]	29.50 ± 6.58	25.62 ± 7.89	0.33
Creatinine [mg/dl]	1.17 ± 0.09	1.24 ± 0.09	0.57
Total bilirubin [mg/dl]	0.85 ± 0.05	0.77 ± 0.04	1.01
Direct bilirubin [mg/dl]	0.29 ± 0.02	0.28 ± 0.04	0.30
ALT [IU/L]	29.92 ± 5.41	60.88 ± 23.10	1.25
C-reactive protein [mg/L]	4.40 ± 0.31	3.11 ± 0.53	1.68

rate and C-reactive protein as compared to the pre-treatment values.

In all the clindamycin treated animals, on 10^{th} and 30^{th} of post treatment blood smears were negative for *B.gibsoni*.

DISCUSSION

Apparent clinical recovery with improvement in appetite and physical activity was observed in the treatment group.

Clindamycin, a lincomycin antibiotic showed effectiveness against human babesiosis (Suzuki *et al*., 2007).

Wulansari *et al*. (2003a) reported that clindamycin, a dose dependant antibiotic with the property of immune enhancing ability inactivated or damaged *B. gibsoni* organisms in infected dogs.

Wulansari *et al*. (2003b) suggested that clindamycin (25 mg/kg bw, PO, q12h for 14 days) gradually reduced the level of parasitemia and induced morphological changes in parasite. There was degeneration

of parasites including segmentation, size reduction, localization in the cell limbic and/or torn state of the nucleus, and swelling, decrease and disappearance of the cytoplasm in majority of the treated dogs. The characteristic clinical symptoms of *B. gibsoni* infection including anaemia, anorexia, and listlessness got reduced by clindamycin treatment.

SUMMARY

The study was conducted to find out the efficacy of clindamycin for the treatment of *B. gibsoni* infection in dogs.

Six dogs positive for *B. gibsoni* on blood smear examination were utilised for this study and were treated with Clindamycin @11 mg/kg bw IV q24h for 10 days. The dogs were reviewed for clinical cure, increase in haematological values and improvement in serum chemistry on the 10th day of post-treatment. Based on this study, Clindamycin @11 mg/kg bw IV q24h for 10 days as monotherapy was found to be effective for the successful management of clinical case of *B. gibsoni* infection in dogs.

REFERENCES

1. Birkenheuer A.J., Levy M.G. and Breitschwerdt E.B. (2003). Development and evaluation of seminested PCR for detection and differentiation of *Babesia gibsoni* (Asia genotype) and *B.canis* DNA in canine blood samples. *J. Clin. Microbiol.*, **41**: 4172-4177.
2. Kuttler K.L. (1988). Worldwide impact of babesiosis. In: *Babesiosis of Domestic Animals and Man.* Ristic M. (ed.) CRC Press, Inc., Boca Raton, Florida. pp: 1-22.
3. Suzuki K., Wakabayashi H., Takahashi M., Fukushima K., Yabuki A. and Endo Y. (2007). A possible treatment strategy and clinical factors to estimate the treatment response in *Babesia gibsoni* infection. *J. Vet. Med. Sci.* **69(5):** 563 – 568.
4. Wulansari R., Wijaya A., Ano H., Horii Y. and Makimura S. (2003) Lymphocytes subsets and specific IgG antibody levels in Clindamycin treated and untreated dogs experimentally infected with *Babesia gibsoni. J. Vet. M. Sci.* **65:** 579 – 584.
5. Wulansari R., Wijaya A., Ano H., Horii Y., Nasu T., Yamanae S. and Makimura S. (2003) Clindamycin in the treatment of *Babesia gibsoni* infection in dogs. *J. Am. Anim. Hosp. Ass.* **36:** 558-562.