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Management of canine hepatozoonosis with combined therapy of imidocarb and doxycycline: A case report

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Abstract
Hepatozoonosis is a tick borne haemoprotozoan disease of dogs caused by the protozoan parasite *Hepatozoon canis*. In the present study, a case of hepatozoonosis infection and its management is reported in a non-descript male dog. On physical examination, the dog showed fever, weakness, anorexia, pale mucus membrane, and progressive weight loss with hind limb paralysis. Important haematological findings observed in this case included severe anaemia, thrombocytopenia, leucocytosis and neutrophilia. Microscopic examination of Giemsa-stained peripheral blood smear revealed the presence of gametocytes of *Hepatozoon spp.* inside neutrophils. The animal was treated with a combined therapy of imidocarb dipropionate and doxycycline with an uneventful recovery 30 days post treatment.

Keywords: Hepatozoonosis, hind limb paralysis, imidocarb dipropionate, doxycycline

Introduction
Hepatozoonosis is a tick-borne infection caused by an apicomplexan protozoon from the family Hepatozoidae that affects dogs and occasionally cats (Little and Baneth, 2011) [7]. Canine hepatozoonosis is caused by *Hepatozoon canis* (Vincent-Johnson, 2014) [14]. The principal route of infection of dogs is ingestion of a tick containing mature oocysts (Baneth *et al*., 2001) [1]. The primary vector of *Hepatozoon* infection is the brown dog tick, *Rhipicephalus sanguineus* of family Ixodidae which has a nearly worldwide distribution and is more prevalent in warmer climates. Infection with *Hepatozoon canis* is common worldwide (O'Dwyer *et al*. 2001) [8]. The clinical form of hepatozoonosis ranges from the animal being asymptomatic to the disease being fatal (Baneth *et al*., 2001) [1]. The subclinical form of the disease is more commonly observed than the acute form (Tsachev *et al*., 2008) [13]. The current article reports acute hepatozoonosis and its therapeutic management in non-descript male dog.

Case Presentation and Clinical Examination
A nine-year-old non-descript male dog was presented to Veterinary Clinical Complex, College of Veterinary and Animal Sciences, Pantnagar, Uttarakhand with a history of fever, anorexia, weakness, repetitive whole-body twitches and tick infestation for 10 days. Clinical examination revealed pyrexia (105.2 F), pale mucous membrane and poor body condition. Physical examination revealed depression, presence of ticks on external body, incoordination of the posterior limbs, repetitive whole-body twitching directing towards left side of the body and hind limb paralysis. On haematological examination (Table 1) anemia, neutrophilia, lymphopaenia, leukocytosis and thrombocytopenia was observed. Blood smear examination revealed presence of gamonts of *Hepatozoon* canis in neutrophils (Fig. 1). Ticks were processed as per the method given by Soulsby (1982) [12] and were identified as *Rhipicephalus* spp. Based on these findings, animal was diagnosed for hepatozoonosis.

Table 1: Haematological values of *Hepatozoon canis* infected dog

Parameters	0 day	14th day	28th day	Normal range (Radostits *et al*., 2007) [9]
Hb (gm/dl)	9.4	10.8	12.4	12-18
PCV (%)	22.2	27.8	39	37-55
TEC (10^6/µl)	3.9	4.7	5.9	5.5-8.5
TLC (10^3/µl)	19.4	15.9	15	5.5-16.5
Neutrophil (%)	82	78	69	60-70
Lymphocyte (%)	08	11	19	12-30
Eosinophil (%)	03	05	08	2-12
Monocyte (%)	07	06	04	1-4
Platelets (10^3/µl)	149	160	180	175-200

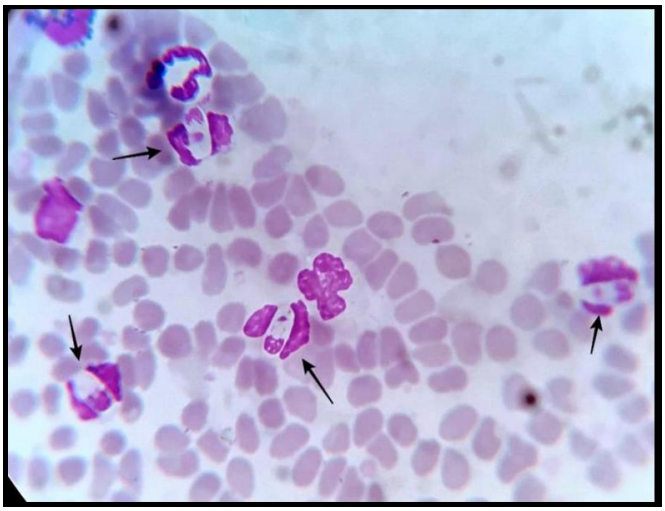

Fig 1: Photomicrograph showing presence of *Hepatozoon spp*. gamonts in neutrophil.

Treatment and Discussion

The animal was treated with combination therapy of injection Imidocarb dipropionate (Imizet 12% w/v, Intas Pharmaceutical Ltd., Ahmedabad) @ 6.6 mg/kg body weight, subcutaneously on 2 occasions at an interval of 14 days along with Doxycycline @ 10 mg/kg body weight, orally, once for 25 days. Other supportive treatment like meloxicam (Melonex® injection, 0.5% w/v, Intas Pharmaceuticals Ltd., Ahmedabad) @ 0.5 mg/kg body weight once, intramuscular for 5 days, aRBC pet syrup (Vetoquinol India Animal Health Pvt Ltd., Maharashtra) @ 5 ml, orally, BID for 25 days and Livotas pet syrup (Intas Pharmaceuticals Ltd., Ahmedabad) @ 5 ml, orally, BID for 25 days were given. Ivermectin 1% (Neomac, Intas Pharmaceuticals LTD, Ahmedabad) was given at a dose rate of 0.2 mg/kg body weight subcutaneously once. The case was monitored regularly throughout till recovery. Blood smear was negative for *H. canis* on 20th day of treatment. Haematological values were found within a normal range after 2 weeks of treatment. Animal had an uneventful recovery 30 days post treatment.

James reported the first case of *H. canis* infection in dogs from India in 1905 (Dantas-Torres, 2008) [2]. Clinical signs of canine hepatozoonosis include anorexia, pale mucous membranes, weight loss, pain, diarrhoea, vomiting, gait abnormalities, fever, polyuria, and polydipsia (Gondim *et al*., 1998) [3]. Hematological abnormalities such as anaemia, leukocytosis with neutrophilia, and monocytosis were also seen. The findings in the present case that included anaemia, weight loss, weakness, incoordination, and paralysis of the posterior limbs are similar to previous studies by Khoshnegah *et al*. (2009) [4]. Anemia, decreased haemoglobin and PCV levels, thrombocytopenia, leukocytosis, lymphopaenia and neutrophilia, all point to an acute inflammatory response to *H. canis* and are consistent with the reports of Sarma *et al*. (2012) [10]. Previously, imidocarb dipropionate and doxycycline were reported to be the most effective medications for treating *H.canis* infection (Lappin, 2010; Kwon *et al*., 2017) [6, 5] and the prognosis has been reported as good. Although there have been reports of imidocarb therapy failure in dogs, the combination of imidocarb and doxycycline demonstrated a satisfactory response in the current investigation, which is in accordance the findings of Sasanelli *et al.* (2010) [11].

Conclusion

Canine hepatozoonosis is a very common disease that dogs experience. It is accompanied by severe clinical symptoms. The alterations in the haematological parameters are due to the haemolytic anaemia caused by parasite. In the present study, treatment with the use of combined therapy of imidocarb dipropionate and doxycycline with supportive therapy were found effective against Hepatozoonosis. It is essential that adequate public awareness be raised about the need for good canine health care and the dangers connected with their indiscriminate wandering to avoid disease transmission. Dog owners should also develop a culture of effective tick and tick-borne disease prevention and control techniques, such as frequent tick bathing, screening and grooming of dogs, acaricide fumigation of kennels and dwellings, and regular use of veterinary services.

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