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Diagnosis and Therapeutic Management of *Hepatozoonosis* in Dog

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A B S T R A C T

The present communication depicts the detection and therapeutic management of canine hepatozoonosis. A total ten dogs of different breeds having symptoms of varying degrees of fever, emesis, anorexia *etc* were presented to the Department of Veterinary Clinical Complex at West Bengal University of Animal and Fishery Sciences, Kolkata 700037, India during the period from May–December 2020. Most of the infected dogs showed pale conjunctival and oral mucus membrane, peripheral lymphadenopathy and hepatomegaly. Blood was collected for hematology, serum was harvested for biochemical estimation and Giemsa stained blood smear was made for diagnosis of *Hepatozoon canis* from naturally infected dogs. Haematological and serum biochemical findings revealed hypohaemoglobinaemia and erythrocytopaenia and lowered PCV clearly indicating anemia, lymphocytosis, hyperbilirubinemia, hypoalbuminemia, hyperglobulinemia and increased transaminase activities accompanied by elevated level of Alkaline Phosphatase. These cases were diagnosed as hepatozoonosis since examination of blood smear revealed presence of *Hepatozoon canis* gamonts inside neutrophils. The affected dogs were treated with a combination therapy including single dose of Inj. Imidocarb dipropionate (6.6 mg/kg subcutaneously) and orally Tab. Doxycycline (5 mg/kg) twice daily for 28 days. Supportive therapy was given with antiemetics, hematinics and plasma expanders. Majority of the affected dogs depicted uneventful recovery after 28 days of therapeutic management.

Keywords

Hepatozoon canis, haematology, biochemical alteration, therapeutic management

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Introduction

James (1905) first reported canine hepatozoonosis from India. Two *Hepatozoon* species has been recognized namely: *Hepatozoon canis* and *Hepatozoon americanum*. *Hepatozoon* species affects mostly mammalian leukocytes and is an epicomplexan parasite of family Hepatozoidae (Baneth *et al.*, 2001). It develops asexually with merogony followed by gamontogony in a vertebrate intermediate (dog) and sexual development culminating to sporogony in a hematophagous invertebrate definitive host *i.e.*

tick (Smith, 1996). Disease transmission occurs by ingestion of *Rhipicephalus sanguineus* tick belonging to family Ixodidae. But mixed infections are possible with hepatozoonosis as single tick may harbor multiple pathogens (Banerjee *et al.*, 2008).

Subclinical infection may remain unnoticed unless concurrent infection with other pathogens is present (Otranto *et al.*, 2011). *Hepatozoon canis* gamonts are usually observed in neutrophils and macrophages (Rubini *et al.*, 2008). The present communication represents the effect of combination therapy of imidocarb dipropionate and doxycycline against *Hepatozoon canis* infection.

Materials and Methods

A total ten dogs of different breeds having symptoms of varying degrees of fever, emesis, anorexia *etc* were presented to the clinics at West Bengal University of Animal and Fishery Sciences, Belgachia, Kolkata 700037, India during the period from May–December 2020. Routine deworming and vaccination were done as per schedule in vogue.

Most of them showed pale conjunctival and oral mucus membrane, peripheral lymphadenopathy and hepatomegaly. Blood and serum samples were collected for haematology and serum biochemistry, respectively and the peripheral blood smears were prepared and stained with Giemsa stain after methanol fixation (Sathpathi *et al.*, 2014; Mondal, 2019). The stained blood smears were screened for haemoprotozoa under light microscope. Haematological analysis was carried out as per standard method (Jain, 1986) and biochemical analysis was done with semi-autoanalyzer. The haemato-biochemical values were compared with normal reference values and interpreted accordingly.

Results and Discussion

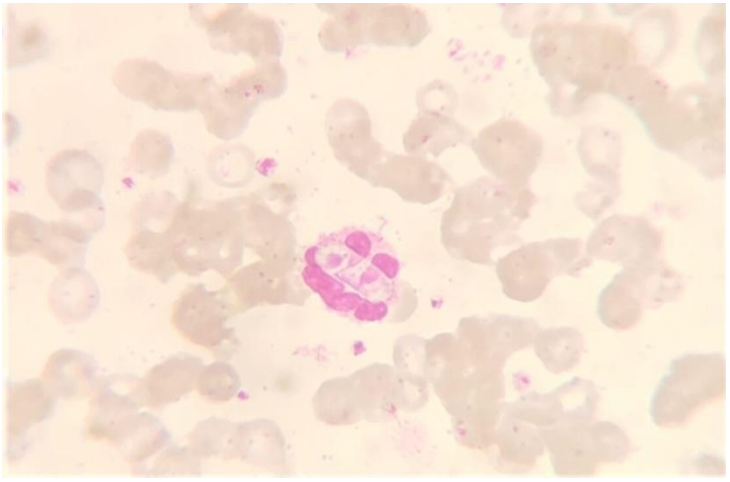
Results on haemato-biochemical examination were summarized in table. Haematological alterations revealed hypohaemoglobinaemia and erythrocytopaenia and lowered PCV clearly indicating anemia (Hb: 8.25±0.26g/dl, RBC: 3.8±0.1 million/mm^3 and PCV: 26.7±0.6%) and lymphocytosis (28.7±1.05%). Biochemical examination showed hyperbilirubinemia (0.38±0.03 mg/dl), hypoalbuminemia (2.27±0.02 g/dl), hyperglobulinemia (4.54±0.13 g/dl) and increased transaminase activities (ALT: 116.5±7.15 IU/L, AST: 44.4±2.93 IU/L) and elevated level of Alkaline Phosphatase (160.8±3.06 IU/L). The stained peripheral blood smears of all affected dogs were positive for *Hepatozoon canis* gamont in neutrophils (Fig). Based on history, clinical manifestation and laboratory findings comprised of microscopical examination and haemato-biochemical alterations, these cases were diagnosed as *Hepatozoon canis* infections.

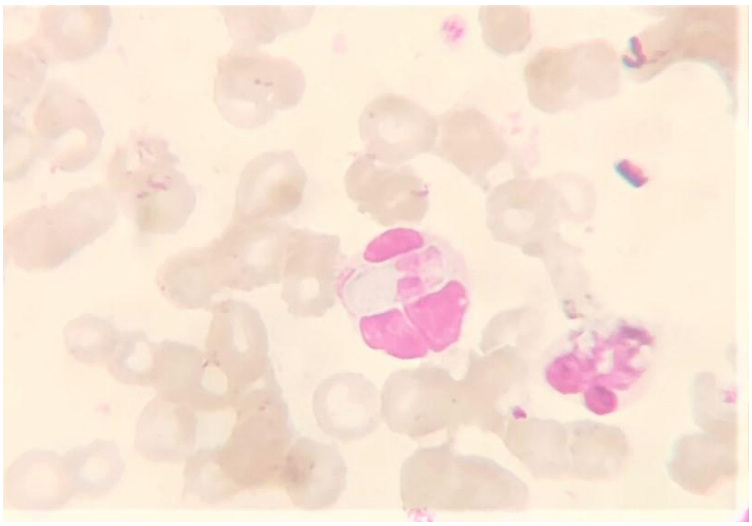
The treatment was started with combination therapy including single dose of Inj. Imidocarb dipropionate @ 6.6 mg/kg, subcutaneously and Tab. Doxyxycline @ 5 mg/kg, orally twice daily for 28 days. Fiprofort Plus TM (Fipronil + S-methoprene) spot on was applied topically for tick management. Supportive therapy was done with Inj. NS @ 250 ml intravenously, Inj. Haemaccel TM (5 ml/kg intravenously), Inj. Meloxicam @ 0.5 mg/kg, intramuscularly twice daily, Inj. Pantoprazole @1 mg/kg intravenously, Inj. Ondansetron @ 0.2 mg/kg intravenously twice daily for 3 days.

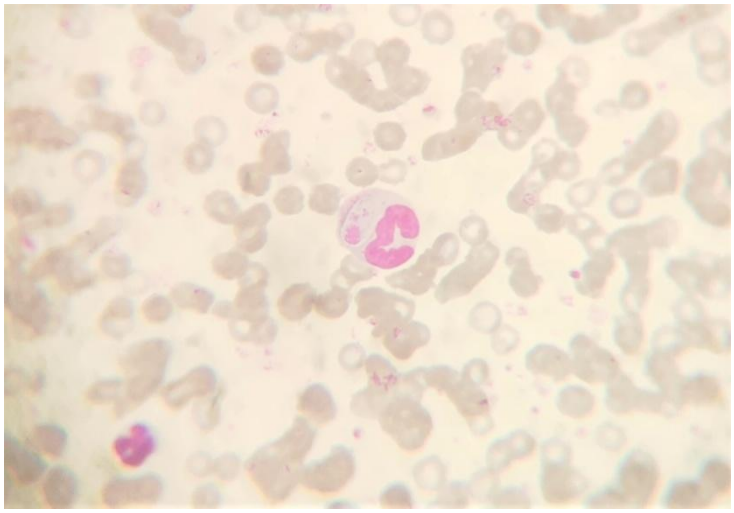
Table.1 Haemato-biochemical alterations of domestic dogs naturally suffering from hepatozoonosis (Mean±SE of ten replicates)

Parameters	Values	References
Hb (g/dl)	8.25±0.26	12-19
RBC (million/mm^3)	3.8±0.1	5.0-7.9
WBC (10^3 cells/mm^3)	12.8±0.31	5.0-14.1
Differential count		
Neutrophil (%)	67.9±0.95	58-85
Lymphocyte (%)	28.7±1.05	8-21
Monocyte (%)	2.2±0.33	2-10
Eosinophil (%)	2.1±0.23	0-9
Basophil (%)	00	0-1
PCV (%)	26.7±0.6	35-57
Platelet count (lakhs/mm^3)	2.27±0.07	2.11-6.21
Urea (mg/dl)	31.2±1.14	17-60
BUN (mg/dl)	16.5±0.48	8-28
Creatinine (mg/dl)	1.05±0.07	0.5-1.7
Na (nmol/l)	146±0.61	142-152
K (nmol/l)	4.15±0.02	3.9-5.1
Total Bilirubin (mg/dl)	0.38±0.03	0-0.3
Direct Bilirubin (mg/dl)	0.18±0.01	0-0.2
Indirect Bilirubin (mg/dl)	0.21±0.03	0-0.1
Total Protein (g/dl)	6.81±0.13	5.4-7.5
Albumin (g/dl)	2.27±0.02	2.3-3.1
Globulin (g/dl)	4.54±0.13	2.4-4.4
ALT (IU/L)	116.5±7.15	10-109
AST (IU/L)	44.4±2.93	13-15
Alkaline Phosphatase (IU/L)	160.8±3.06	1-114

Fig.1 *Hepatozoon canis* gamont in neutrophils (Giemsa stain, 1000 X)







Along with this, hematinic (Syrup Dexorange TM @ 10 ml orally twice daily) and hepatoprotectant (Syrup Sylibon TM 10 ml orally twice daily) were given for 4 weeks. After 4 weeks of therapy, majority of the ailing dogs showed marked improvement in condition and recovered.

Canine hepatozoonosis caused by *Hepatozoon canis* is an important canine haemoprotozoan disease occurring globally (Rajamanickam *et al.,* 1985; Ewing and Panciera *et al.,* 2003). Clinical manifestations like fever, emesis, anorexia were simulating with the earlier reports of (Baneth, 2006; Paşa *et al.,* 2009; Thakur *et al.,* 2018). Haemato-biochemical alterations like marked anaemia, lymphocytosis, hyperbilirubinemia, hypoalbuminemia, hyperglobulinemia and elevated levels of liver specific aminotranferase activities were in conformity with earlier findings (Sarma *et al.,* 2012; Thakur *et al.,* 2018). Anemia in hepatozoonosis might be due to huge tick infestation or bone marrow suppression (Baneth, 2006; Marchetti *et al.,* 2009; Thakur *et al.,* 2018). In the present study, hypoalbuminemia and hyperglobulinemia have been recorded in canine hepatozoonosis, as site of albumin synthesis is liver, which is mostly affected in hepatozoonosis (Paşa *et al.,* 2009; Pawar and Gatne, 2005). Doxycycline is

the drug of choice for treatment of hepatozoonosis in canines (Kumar *et al.*, 2012). It has concluded that the combination therapy of imidocarb dipropionate and doxycycline along with supportive therapy (fluids, antiemetics, hematinic and hepato-protectives) might be a successful choice for proper management of hepatozoonosis induced acute hepatitis in canine.

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