Explor Anim Med Res,
Vol.13, Issue - 1, 2023, p. 131-135
DOI : 10.52635/eamr/13.1.131-135

ISSN 2277- 470X (Print), ISSN 2319-247X (Online)
Website: www.animalmedicalresearch.org

Short Communication

CLINICAL, HAEMATO-BIOCHEMICAL AND ELECTROCARDIOGRAPHIC STUDIES IN PERSIAN BREED CATS WITH HAEMOBARTONELLOSIS

S.Sivajothi[1], B.Sudhakara Reddy[2], K.Swetha[3]

Received 27 November 2022, revised 13 January 2023

ABSTRACT: Haemobartonellosis is one of the important diseases in cats caused by *Haemobartonella felis* which invades the erythrocytes. The present communication is to report the clinical, hematological, and electrocardiographic changes in Persian breed cats with haemobartonellosis in the YSR district of Andhra Pradesh, India. During the examined period, three cats with fever, pale mucus membranes, loss of body condition, cough, and delayed capillary refill time were found to be diagnosed with haemobartonellosis The diagnosis was confirmed by the presence of pleomorphic parasites at the marginal parts of erythrocytes in stained blood smear examination. Hematology revealed low hemoglobin levels, total erythrocyte count, and packed cell volume. Serum biochemical analysis revealed low serum albumin, elevated ALT, and bilirubin. Electrocardiography revealed increased QRS amplitude, T wave duration, and QT interval. Cats were treated with doxycycline @ 10 mg/kg body weight once a day for 3 weeks, along with supportive medications. Clinical improvement was noticed by changes in appetite, mucosal color, vital parameters, the status of parasitemia, and haemogram.

Key words: Haemobartonellosis, Faline.

Haemobartonella felis is the causative agent of feline infectious anemia in cats. It is an epicellular parasite of feline erythrocytes (Jensen *et al.* 2001). As per recent studies on phylogenetic analysis of 16S rRNA gene sequences *Haemobartonella* and related organisms have been reclassified, in the genus *Mycoplasma* (Tasker and Lappin 2002). In cats, the transmission of *Haemobartonella felis* could occur trans-placentally from mother to fetus, horizontally from one cat to another through scratches, bites, and arthropod vectors such as fleas (Soto *et al.* 2017). It causes acute and chronic hemolytic anemia, depending on the degree of infection and the causative agent activity. These organisms adhere to the red blood cell membranes, causing indentation and depression on the cell surface so that the erythrocyte becomes brittle during the infection (Kurtdede and Ural 2004). Very few reports are available in India pertaining to the disease. Hence present a report on haemobartonellosis in Persian breed cats.

The study

The present study was carried out on the Persian breed cats presented to the clinic with a history of pale mucus membranes (Fig.1). Based on the stained peripheral blood smear examination, three cats were identified as suffering from clinical disease. All the cats in the present study were regularly dewormed and vaccinated. Detailed clinical examination and electrocardiography were carried out. Two ml of blood was collected into a tube containing EDTA and also into a tube with clot activator for assessment of complete blood count and serum biochemical assessment respectively. Monolayer blood smears were prepared from the marginal ear vein and carried out the Giemsa staining to examine microscopically. Out of three cats, one cat had a flea infestation.

Results and discussion

Observation of monolayer blood smear after staining is the standard protocol for detection of hemo-protozoal infections in different species of animals (Singh *et al.* 2021, Baghel *et al.* 2021, Thangaraj *et al.* 2022). Microscopic examination of the blood smear revealed the presence of rod shape, round, ring, or pleomorphic

[1]Assistant Professor and Head, Department of Veterinary Parasitology, [2]Assistant Professor and Head, Department of Veterinary Medicine, [3]MVSc Scholar, Department of Veterinary Medicine, College of Veterinary Science, Proddatur, Sri Venkateswara Veterinary University, Andhra Pradesh, India.
Corresponding author. e- mail: sivajothi579@gmail.com

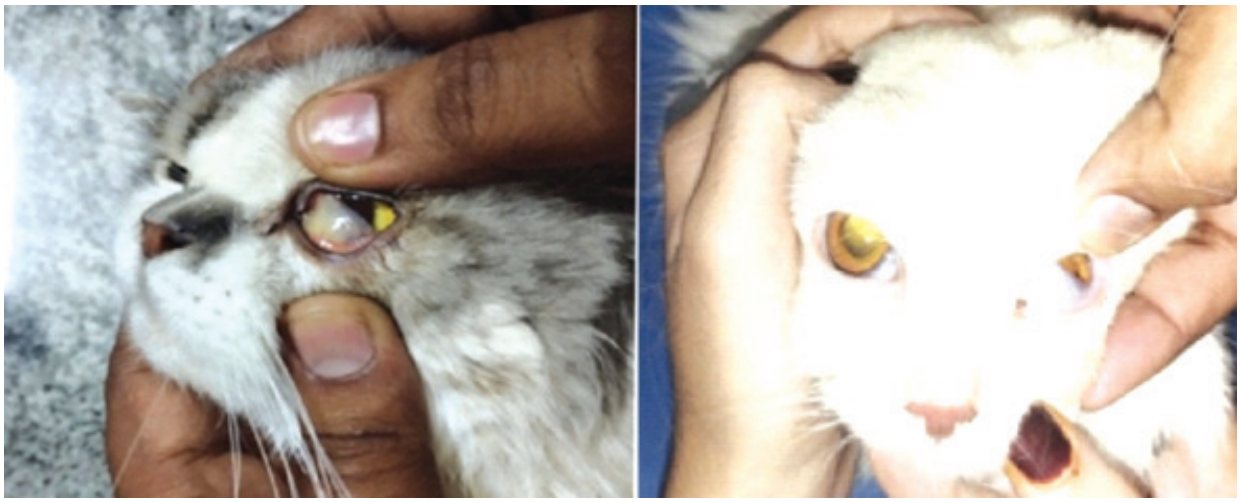

Fig. 1A. Yellowish mucus membrane; Fig.1B Pale mucus membrane.

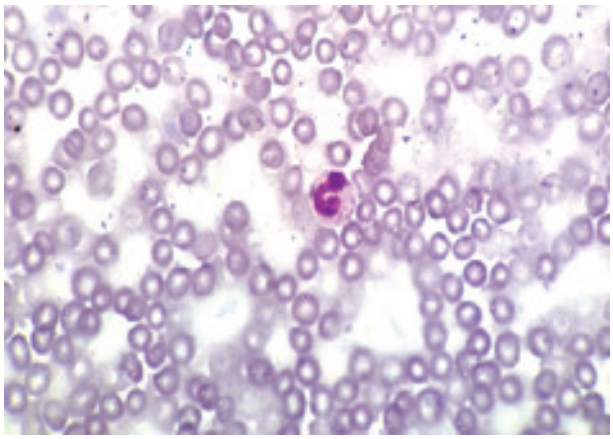

Fig. 2. Stained blood smears showing the presence of *Haemobartonella* organisms (X1000).

structures at the marginal part of the red blood cells (Fig. 2). Based on clinical symptoms and blood examination, the cats were diagnosed with Haemobartonellosis. Recorded clinical, haemato-biochemical, and electrocardiographic findings were documented in Table 1. Hematology revealed low hemoglobin levels, total erythrocyte count, and packed cell volume. Serum biochemical analysis revealed low levels of albumin; elevated levels of ALT and bilirubin. Electrocardiography revealed increased QRS amplitude, T wave duration, and QT interval (Fig.3).

All three cats were treated with oral Doxycycline @ 10 mg/kg body weight once a day, Prednisolone @ 2 mg/ kg body weight per day with a tapering of dosage, oral

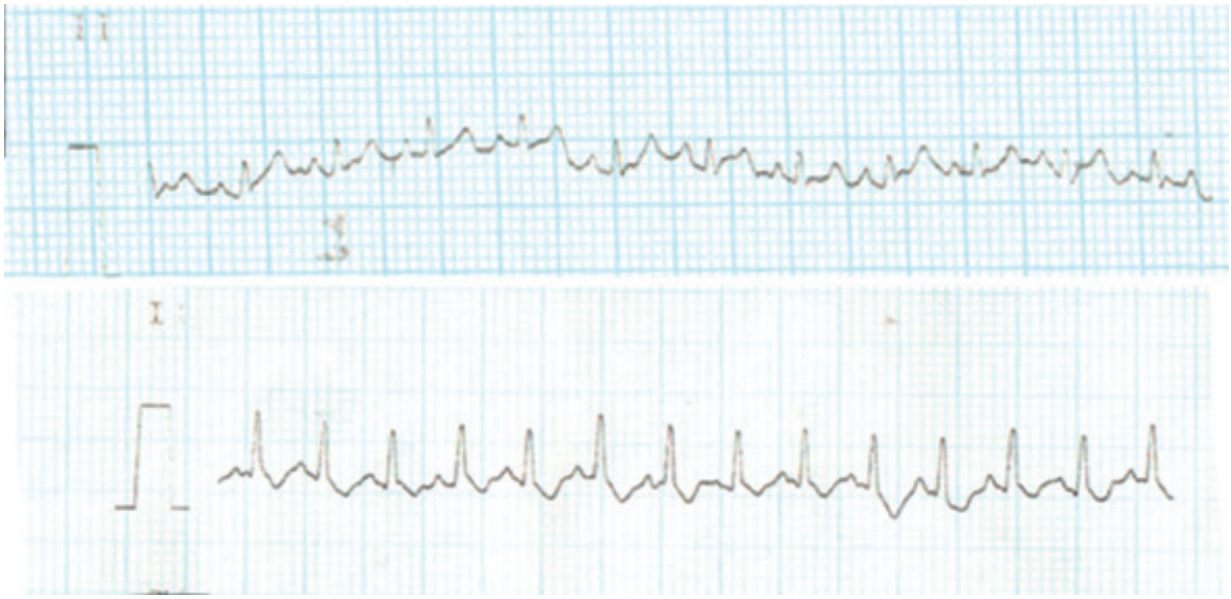

Fig. 3. Electrocardiography of cats recorded at 25 mm/sec paper speed, calibrated 10 mm/ mV.

Table 1. Showing the clinical signs and haemato-biochemical changes during the disease.

Parameter		Case -1	Case -2	Case- 3	Reference range
History		Cough, Weight loss, intermittent fever	Fever, anorexia	Fever, anorexia, cough	
Clinical signs		Fever, dyspnoea, tachypnoea, wheezing, pale mucous membranes	Fever, icteric and pale mucous membranes, lymphadenopathy	Fever, dyspnoea, tachypnoea, wheezes, pale mucous membranes	
Haemogram	Type of anaemia	Normocytic-Normochromic	Normocytic Normochromic	Normocytic-Hypochromic	
	Haemoglobin (g/dL)	3.96	6.62	4.18	10.3-16.2
	TEC x10^6/cumm	1.69	4.56	2.23	7.12-11.40
	PCV (%)	12.50	21.67	18.08	28.2-52.7
	MCV (fL)	73.96	47.52	81.07	39-56
	MCH (pg)	23.43	14.52	18.74	12.6-16.5
	MCHC (g/dL)	31.68	30.55	23.12	28.5-37.8
	TLC /cumm	13600	9,820	11,400	5.5-19.5
	Neutrophils (%)	59	63	62	65-70
	Lymphocytes (%)	22	18	21	21-25
	Eosinophils (%)	13	11	12	4-6
	Monocytes (%)	6	8	5	2-3
Serum biochemical parameters	Total protein (g/dL)	7.42	7.31	6.28	6.6-8.4
	Serum albumin (g/dL)	2.1	2.21	2.16	3.2-4.3
	ALT (IU/L)	146.5	52.1	98.2	28-109
	Creatinine (mg/dL)	1.69	1.81	1.32	0.8-2.1
	Bilirubin (mg/dL)	2.84	0.20	1.31	0.0-0.1
Electro-cardiography	P wave amplitude (mV)	0.1	0.1	0.2	0.05-0.20
	QRS amplitude (mV)	0.7	0.4	0.4	0.15-0.30
	T wave amplitude (mV)	0.3	0.1	0.3	0.05-0.30
	P wave duration (Sec)	0.06	0.04	0.05	0.03-0.04
	QRS duration (Sec)	0.05	0.04	0.04	0.03-0.04
	T wave duration (Sec)	0.12	0.04	0.08	0.02-0.06
	P-R interval (Sec)	0.16	0.12	0.10	0.06-0.10
	Q-T interval (Sec)	0.24	0.16	0.20	0.10-0.16
	Heart rate (bpm)	250	187	196	150-200

electrolyte solution, syrup containing tricholine citrate, vitamin B_{12}, silymarin, biotin, vitamin E, selenium daily for 21 days. Therapeutic response was assessed by clinical and hematological examinations of the post-treatment period (Table 2). Flea infestation was controlled by the application of a product containing Fipronil (s)-methoprene. Clinical improvement was noticed by changes in appetite, mucosal color, vital parameters, the status of parasitemia, and haemogram.

Haemobartonellosis comprises a variety of clinical symptoms including severe weakness, depression, anorexia, weight loss, fever, pale mucous membranes, and anemia (Jensen *et al.* 2001). In the present study, the cough was noticed by the two cats. *Haemobartonella felis* is one of the common causes of hemolytic anemia in cats. Hemolytic anemia is the most significant pathogenic effect and it might be due to the extravascular hemolysis which will occur in the spleen, liver, lungs, and

Table 2. Post therapeutic assessment of cats.

Parasmeter	Case-1		Case-2		Case-3	
	1st day of presentation	22nd day after therapy	1st day of presentation	18th day after therapy	1st day of presentation	21st day after therapy
Haemoglobin (g/dL)	3.96	8.15	6.62	9.12	4.18	9.28
TEC x10^6/cumm	1.69	4.28	4.56	4.68	2.23	4.08
PCV (%)	12.50	26.63	21.67	32.40	18.08	33.02
MCV (fL)	73.96	62.21	47.52	69.23	81.07	80.9
MCH (pg)	23.43	19.04	14.52	19.48	18.74	22.74
MCHC (g/dL)	31.68	30.60	30.55	28.14	23.12	28.10
TLC /cumm	13,600	10,833	9,820	9,652	11,400	10,098
Neutrophils (%)	59	62	63	62	62	61
Lymphocytes (%)	22	32	18	30	21	33
Eosinophils (%)	13	4	11	5	12	4
Monocytes (%)	6	2	8	3	5	2
Total protein (g/dL)	7.42	7.88	7.31	7.92	6.28	7.08
Serum albumin (g/dL)	2.10	2.86	2.21	2.58	2.16	2.83
ALT (IU/L)	146.5	88.92	52.1	66.9	98.2	81.6
Creatinine (mg/dL)	1.69	1.83	1.81	1.91	1.32	1.36
Bilirubin (mg/dL)	2.84	1.12	0.20	0.24	1.31	0.88

bone marrow. Intravascular hemolysis has also been reported, as has increased osmotic fragility of haemoplasma-infected red blood cells (Messick 2004). The recorded abnormalities in hematology were normocytic normochromic regenerative anemia, normocytic hypochromic anemia, and eosinophilia and monocytosis. In the present study, regenerative response corresponds to the severity of the anemia with a macrocytic, normochromic response, but if chronic inflammatory conditions exist in conjunction with haemobartonellosis, the expected response is normocytic, normochromic (Barker 2019). Eosinophilia indicates a parasitic infection which might be due to the triggering of eosinophils elevation. Monocytosis might be triggered by an inflammatory logogram. Serum biochemistry revealed hyperproteinaemia it might be due to dehydration or an acute phase response, and increased liver enzyme levels may arise from hepatic hypoxic damage Hyperbilirubinaemia can result from hemolysis (Satriawan and Octaviani 2021). Penicillins and cephalosporin were ineffective for haemobartonellosis treatment because these organisms lack the cell wall. Doxycycline is a broad-spectrum antibiotic that can prevent protein synthesis by binding to ribosomes in bacterial and parasite cells.

Conclusion

In conclusion, it is advisable, when cats with signs of anemia and coughing, haemobartonellosis may be a primary disorder. The disease can cause alterations in the electrocardiographic changes in cats and early intervention will give a favourable therapeutic response.

ACKNOWLEDGEMENT

The authors are thankful to the authorities of Sri Venkateswara Veterinary University for providing the facilities to carry out the research work.

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Cite this article as: Sivajothi S, Reddy BS, Swetha K (2023) Clinical, haemato-biochemical and electrocardiographic studies in Persian breed cats with haemobartonellosis. Explor Anim Med Res 13(1): 131-135. DOI: 10.52635/eamr/13.1.131-135.