**Case report**

**A RARE CASE OF BABESIOSIS IN A MONGREL CAT**

**Abstract**

Haemoprotozoan infections are very common and cause devastating losses and pose a major threat to the animals throughout the world. Most of the haemoprotozoan parasites are transmitted by ticks and is of great economic importance in India. A female cat approximately 3 years age was presented to the Small Animal Unit of Veterinary Clinical Complex for treatment. Pale mucous membranes, depression, anorexia, inability to stand and dehydration were major clinical manifestations and clinical examination of patient revealed elevated rectal temperature with normal respiration and pulse rate. Blood was collected aseptically from the cephalic vein for Hemato-biochemical estimation. Blood smears were prepared aseptically from ear tips and were subjected for Giemsa staining to detect any haemoprotozoans present in the animal. Giemsa staining of the blood smears showed positive for presence of *Babesia canis* in the erythrocytes and was subjected for treatment with Primaquine Phosphate and Doxycycline combination. After few days of treatment, the health of the cat improved with resolution of clinical signs.

**Key - words**: Haemoprotozoan, Ticks, Blood smears, *Babesia canis*, Primiquine, Doxycycline

**Introduction**

In India, *Babesia* infections in cats are sporadic and only partial knowledge is currently available since the numbers of described cases are limited. Feline babesiosis is a tick-borne disease caused by haemoparasites belonging to the genus *Babesia* (Penzhorn and Oosthuizen, 2020). Although more than ten *Babesia* species and subspecies have been molecularly identified in domestic cats, only a few of them have been associated with clinical disease (Penzhorn and Oosthuizen, 2020). Tick-borne diseases are recognized as important infectious diseases, posing a potential threat to the health of humans and animals. Tick-borne infections in companion animals have been increasing worldwide, which could be due to the distribution of vectors influenced by climate change, environmental and artificial factors (Slenning, 2010) and increased detection capacity with the popularization of molecular biology. As potential reservoir hosts of tick-borne causative agents, domestic dogs and cats can transfer zoonotic diseases to humans (Morelli *et al*. 2021) so the risk of feline and canine tick-borne pathogens has drawn attention from veterinary and public health research organizations. Babesiosis is an intracellular haemoprotozoan parasitic disease with an international distribution affecting many species of mammals. Multiple species under the genus *Babesia* were known to cause babesiosis in cats including *Babesia felis*, *B. herpailuri*, *B. cati*, *B. canis* subsp. *presentii*, *B. canis* subsp. *canis*, *B. pantherae*, *B. microti-like*, *B. hongkongensis*, and *B. leo* (Taboada and Lobetti, 2006, Remesar *et al*., 2022).

**Case History and Observations**

A female cat of approximately 3 years age was presented to the Small Animal Unit of Veterinary Clinical Complex of Abhilashi University for treatment. Anamnesis revealed that the animal was roaming in the nearby locality since many months. It might have left her home or had been set free by its owner and they have plucked few ticks also from its body. Pale mucous membranes (Fig 1 and 2), depression, anorexia, inability to stand and dehydration were major clinical manifestations and clinical examination of patient revealed elevated rectal temperature with normal respiration and pulse rate. We were unable to find any ticks on the cat’s body.

Blood was collected aseptically from the cephalic vein by adopting a standard protocol. The haematological parameters like Haemoglobin (Hb), Packed Cell Volume (PCV), Total Erythrocyte Count (TEC), Total Leucocyte Count (TLC), and Platelets were carried out by Auto-analyser. Differential Leucocyte Count (DLC) was carried out by Wright’s staining technique. For serum biochemical analyses, blood was collected in a sterilized vacutainer. Serum samples were separated and were subjected to estimate Total Protein, Albumin, Globulin, Bilirubin, Creatinine, Alkaline Phosphatase, Aspartate Transaminase, Alanine Transaminase and Blood Urea Nitrogen by automatic analyzer as per standard diagnostic protocols. Blood smears were collected aseptically from peripheral ear veins and were subjected for Giemsa staining to detect any hemoprotozoans present in the animal.



Fig 1. Pale mucous membrane



Fig 2. Pale and anaemic mucous membrane



**Fig 3.** **Blood smear with *Babesia canis***

**Table 1. Pre-treatment Haematological and Biochemical Evaluation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No.** | **Parameters** | **Value**  | **Range**  | **Evaluation**  |
| 1 | Hb | 4.2 g% | 8-15 | Low  |
| 2 | PCV | 13.5% | 24-45 | Low  |
| 3 | RBC | 3.56 × 106/µl | 5-10 | Low |
| 4 | TLC | 4.3 × 103/µl | 1.5-7 | Normal  |
| 5 | Platelets | 270 × 103/µl | 300-800 | Low |
| 6 | Neutrophils | 54 % | 35-37 | High  |
| 7 | Lymphocytes | 38 % | 20-50 | Normal |
| 8 | Monocytes | 5 % | 1-4 | Normal |
| 9 | Eosinophils | 2 % | 2-12 | Normal |
| 10 | Basophils  | 1 % | 0-1 | Normal |
| 11 | Total Protein | 11.5 g/dL | 6-8 | High |
| 12 | Albumin | 5.3 g/dL | 2.8-3.9 | High |
| 13 | Globulin | 6.7 g/dL | 2.6-5.1 | High |
| 14 | Bilirubin | 2.3 g/dL | 0-0.4 | High |
| 15 | Creatinine Kinase | 514 U/L | 240-260 | High |
| 16 | ALKP | 63 U/L | 11-49 | High |
| 17 | AST | 55 U/L | 7-38 | High |
| 18 | ALT | 125 U/L | 25-97 | High |
| 19 | BUN | 51 mg/dL | 18-35 | High |

Haematological abnormalities in this case of feline babesiosis were anemia, leucopenia, thrombocytopenia, neutropenia, lymphopenia. Hyperalbuminemia, Hyperglobulinemia, Hyperbilirubinemia, increased Alkaline Phosphatase increased Creatinine Kinase, increased AST, increased ALT and increased BUN reported in this study were in accordance to the earlier reports (Baneth *et al*., 2004, Ayoob *et al*., 2010, Chandra *et al*., 2018, Schoeman *et al*., 2001, Jacobson *et al*., 2000).

**Treatment and Discussion**

Giemsa staining of the blood smears showed positive for presence of *Babesia canis* (Fig. 3) in the erythrocytes and was subjected for treatment with Primaquine Phosphate and Doxycycline combination. Primaquine phosphate (Tab. Malirid) was recommended @1 mg/kg body weight PO daily for 3 consecutive days. High-dose therapy or doses exceeding 1 mg/ kg body weight, should be avoided as fatal toxicity has been reported in 4 out of 4 cats (Potgieter, 1981). Vomiting following oral therapy is the most commonly reported adverse effect (Potgieter, 1981). Supportive treatment include oral administration of Doxycycline @10mg/kg PO daily for 21 days, Hematinic syrup 1ml bid PO and Liver tonic 1ml bid PO. After 15 days of treatment the cat was clinically normal.

The subsequent severe reduction in Hb, PCV, TEC and PLT are indicative of haemolytic anemia observed generally in animals with babesiosis (Radostits *et al*., 2007). Primaquine phosphate is a member of the 8-aminoquinolone group of antimalarial drugs. It is the only drug proven to be reliably efficacious in the treatment of small feline babesial infections and is considered the drug of choice (Abinaya *et al*., 2020, Ayoob *et al*., 2010) Rapid resolution of clinical signs and decreased parasitemia is typically seen within 24–72 hours (Potgieter, 1981). The drug was well tolerated by the cat as can be seen in the improvement in the hematological and biochemical analysis post treatment of 22 days.

**Table** 2. **Post-Treatment Hematological and Biochemical Evaluation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No.** | **Parameter** | **Value** | **Range** | **Evaluation** |
| 1 | Hb | 4.8 g% | 8-15 | Low  |
| 2 | PCV | 15.7 % | 24-45 | Low  |
| 3 | RBC | 4.2 × 106/µl | 5-10 | Low |
| 4 | TLC | 4.4 × 103/µl | 1.5-7 | Normal  |
| 5 | Platelets | 330 × 103/µl | 300-800 | Low |
| 6 | Neutrophils | 52 % | 35-37 | High  |
| 7 | Lymphocytes | 36 % | 20-50 | Normal |
| 8 | Monocytes | 5 % | 1-4 | Normal |
| 9 | Eosinophils | 6 % | 2-12 | Normal |
| 10 | Basophils  | 1 % | 0-1 | Normal |
| 11 | Total Protein | 9.7 g/dL | 6-8 | High |
| 12 | Albumin | 4.5 g/dL | 2.8-3.9 | High |
| 13 | Globulin | 6.4 g/dL | 2.6-5.1 | High |
| 14 | Bilirubin | 1.7 mg/dL | 0-0.4 | High |
| 15 | Creatinine Kinase | 445 U/L | 240-260 | High |
| 16 | ALKP | 54 U/L | 11-49 | High |
| 17 | AST | 42 U/L | 7-38 | High |
| 18 | ALT | 112 U/L | 25-97 | High |
| 19 | BUN | 45 mg/dL | 18-35 | High |

Babesia can cause degeneration and necrosis in kidney convoluted tubules, consequently a rise in BUN and CK is expected (Mosqueda *et al*., 2012). Serum AST and ALT concentrations are the indicators of hepatic function and the rise in serum ALT and AST may be due to alteration of liver function as a result of babesiosis (Zulfiqar *et al*., 2012). In the present case bilirubin level was increased significantly, this alteration may be attributed to intravascular hemolysis resulting in hyperbilirubinemia and icterus (Laxmirani *et al*., 2010). The changes in the protein picture in infected animals could be due to decrease in protein production as a result of deprivation of dietary protein resulting from anorexia and fever accompanied infection also, disturbed hepatic functions and destructed RBC’s and its excretion in urine can play a role (Al-Aboud *et al*., 2005). Babesia causes kidney and liver inflammation and due to the damage to these organs there is alteration in the serum levels of TP, albumin, globulin and ALKP. Hyperalbuminemia, a relatively common finding in this study, was most likely due to dehydration, as it was mostly associated with concurrent hyperglobulinaemia (Schoeman *et al*., 2001).

**Conclusions**

The cat in this study was with severe anemia and was depressed at presentation, but seemed to have an ability to adapt to the severe anemia. It is possible that increased owner awareness of the disease in the area could have led to earlier recognition of signs of disease and subsequent presentation for treatment before the disease had progressed very far. Babesiosis should also be in the list of differential diagnosis when a case comes which is presented with anaemia and depression. Such cases emphasize the importance of a blood smear examination during any routine clinical examination of cats.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

**References**

Abinaya P, Rajkumar K, Prabavathy AA, Vijayalakshmi P. Primaquine Phosphate for Therapeutic Management of Feline Babesiosis-A Case Report. Intas Polivet. 2020;21(1):257-258.

Al-Aboud AY, Al-Deoun MA, Maroun EA. Haematological and histopathological in sheep and goats naturally infected with some single blood protozoa. Basrah Journal of Veterinary Research. 2005;4(1):10-14.

Ayoob AL, Prittie J, Hackner SG. Feline Babesiosis. J. Vet. Emer. Crit. Care. 2010;20:90-97.

Baneth G, Kenny MJ, Tasker S. Infection with a proposed new subspecies of Babesia canis, Babesia canis subsp. presentii in domestic cats. J Clin Microbiol. 2004;42(1):99-105.

Jacobson LS, Schoeman T, Lobetti RG. A survey of feline babesiosis in South Africa. Journal of the South African Veterinary Association. 2000;71:222-228.

Morelli S, Diakou A, Di Cesare A, Colombo M, Traversa D. Canine and feline parasitology: Analogies, differences, and relevance for human health. Clin. Microbiol. Rev*.* 2021;34: e0026620.

Mosqueda J, Ramirez AO, Tipacamu GA, Canto GJ. Current advances in detection and treatment of babesiosis. Current Medicinal Chemistry. 2012;19:1504-1518.

Penzhorn BL, Oosthuizen MC. *Babesia* species of domestic cats: molecular characterization has opened pandora’s box. Front Vet Sci. 2020;7:134.

Potgieter FT. Chemotherapy of Babesia felis infection: efficacy of certain drugs. Journal of the South African Veterinary Association. 1981;52:289-293

Radostits OM, Gay CC, Constable PD, Hinchcliff KW. Veterinary Medicine. 10th ed., W.B. Saunders Company, London (UK); 2007

Rani N, Lakshmi C, Sreedevi P, Annapurna K. Clinical management and haemato-biochemical changes in Babesiosis in buffaloes. Buffalo bulletin. 2010;29(2):92-94.

[Remesar](https://bmcvetres.biomedcentral.com/articles/10.1186/s12917-022-03287-4#auth-Susana-Remesar-Aff1) S, [Arnal](https://bmcvetres.biomedcentral.com/articles/10.1186/s12917-022-03287-4#auth-Jose_Luis-Arnal-Aff2) JL, [Gómez](https://bmcvetres.biomedcentral.com/articles/10.1186/s12917-022-03287-4#auth-Andrea-G_mez-Aff3) A, [Prieto](https://bmcvetres.biomedcentral.com/articles/10.1186/s12917-022-03287-4#auth-Alberto-Prieto-Aff1) A, [García-Dios](https://bmcvetres.biomedcentral.com/articles/10.1186/s12917-022-03287-4#auth-David-Garc_a_Dios-Aff1) D, [Benito](https://bmcvetres.biomedcentral.com/articles/10.1186/s12917-022-03287-4#auth-Alfredo-Benito-Aff2) A, [Panadero](https://bmcvetres.biomedcentral.com/articles/10.1186/s12917-022-03287-4#auth-Rosario-Panadero-Aff1) R, [Morrondo](https://bmcvetres.biomedcentral.com/articles/10.1186/s12917-022-03287-4#auth-Patrocinio-Morrondo-Aff1), [Díaz](https://bmcvetres.biomedcentral.com/articles/10.1186/s12917-022-03287-4%22%20%5Cl%20%22auth-Pablo-D_az-Aff1) P. A case report of fatal feline babesiosis caused by *Babesia canis* in north western Spain, [BMC Veterinary Research](https://bmcvetres.biomedcentral.com/). 2022;18:177

Schoeman T, Lobetti R, Jacobson L. Feline babesiosis: signalment, clinical pathology and concurrent infections. J S Afr Vet Assoc. 2001;72(1):4-11.

Slenning BD. Global climate change and implications for disease emergence. Vet. Pathol. 2010;47:28-33.

Subhash Chandra B, Rajkumar KA, Prabavathy BR, Vijayalakshmi P, Selvi D, Subramanian B. Incidence of Feline Babesiosis and its Diagnosis with Acridine Orange Staining Technique. Res. J. Chem. Env. Sci, 2018;6(3):109-112

Taboada J, Lobetti R. 2006. Babesiosis, In: Greene C. ed. Infectious Diseases of the Dog and Cat, 3rd ed. St Louis: WB Saunders Co. 2006;722–735.

Zulfiqar S, Shahnawaz S, Ali M, Bhutta AM, Iqbal S, Hayat S, Iqbal F. Detection of Babesia bovis in blood samples and its effect on the hematological and serum biochemical profile in large ruminants from Southern Punjab. Asian Pacific Journal of Tropical Biomedicine. 2012;2(2):104-108.