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ORIGINAL ARTICLE

Balantidiasis in an Asiatic elephant and its therapeutic management

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Abstract A 14 years old female Asiatic elephant was presented to the hospital with a history of mucoid watery diarrhea, inappetence and lethargy. Clinical examination revealed normal body temperature (98.2 °F), tachycardia (42 bpm), eupnoea (14/min), congested mucous membrane and dehydration. Haemato-biochemical parameters are well within the range. Microscopic examination of faecal sample revealed presence of live, motile and pear shaped ciliated *Balantidium coli* protozoa. Based on clinical and laboratory examination, the condition was diagnosed as balantidiasis. The animal was treated with Tab. Metronidazole (10 mg/Kg, PO, BID) for 5 days. Supportive treatment was done with antacids, hepatoprotectants and multivitamin supplements. An uneventful recovery was noticed after 5 days of treatment.

Keywords Asiatic elephant · Diarrhea · *Balantidium coli* · Balantidiasis · Metronidazole

Abbreviations

B. coli	*Balantidium coli*
bpm	Beats per minute
E. coli	*Escherichia coli*
GIT	Gastro-intestinal tract

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Introduction

The causes and patho-physiologic features of chronic diarrhea in animals still remains a mystery in most cases. The identification of the specific cause is essential for rational treatment of clinical cases and also for prevention and control of the disease. Balantidiasis is an infectious disease caused by the protozoa *Balantidium coli* and is characterized by chronic diarrhea (Islam et al. 2000; Randhawa et al. 2010). Although the disease condition reported from different parts of the world, high prevalence noticed in subtropical and tropical regions (Sampurna 2007). *Balantidium coli* is a large, ciliated protozoan parasite belonging to phylum Ciliophora, order Vestibuliferida, family Balantidiidae. *B. coli* have cosmopolitian distribution, including both domestic as well as wild animals. Pig is considered as the reservoir host for *Balantidium* (Smith 2003). *B. coli* infection has been reported from various non-human primates and domestic animals including Olive baboons, gorillas and cattle (Bilal et al. 2009; Ryan et al. 2012). Uncommon hosts for *Balantidium coli* include dog, sheep, horse and camel (Solaymani-Mohammadi and Petri 2006). Infection generally takes place through oral route by consumption of infected faeces of animals like pigs.

Life cycle of *B. coli* is completed in caecum and colon of pigs, humans, rodents and various mammals (Mehlhorn 2016). Trophozoites released from cyst cause further damage to mucosa after binary fission and passed in faeces in encysted form. In the affected animals of various species, signs like bloody and mucus containing diarrhea, abdominal pain, lethargy are present (Schuster and Ramirez-Avila 2008).

Still date, there is no case of elephant balantidiasis from India have been reported and there is a little information about clinical signs and treatment of elephant balantidiasis. This paper describes the occurrence and successful treatment of elephant balantidiasis in a 14 years old female Asiatic elephant and is the first report of elephant balantidiasis occurrence in India.

History and clinical findings

A 14 years old female Asian elephant residing in a temple premises was presented to hospital by temple authorities with a history of mucoid watery diarrhea, inappetance and lethargy, weight loss, bilateral lacrymation. Clinical examination revealed normal body temperature (36.7 °C), tachycardia (42 bpm), eupnoea (14/minute), congested mucous membrane and dehydration. Dehydration was assessed based on the factors such as watery diarrhea, less water intake, weight loss, tachycardia, dryness of the tip of the trunk and skin. The animal has been treated elsewhere with anthelmintic without any improvement. Blood samples from ear vein with and without an anticoagulant were collected for haematology and serum biochemistry, respectively. The peripheral blood smear was prepared and stained with Giemsa stain after methanol fixation. The stained blood smear was screened for haemoprotozoa under light microscope. Haematological analysis was carried out as per standard method (Jain 1986). Biochemical analysis was done with semi-autoanalyzer. Faecal sample was collected from rectum for direct microscopic and chemical examination. Benzidine occult blood test was done as per the standard method (Needham and Simpson 1952).

Diagnosis

Haematological examination revealed no significant changes when compared to the reference values (Silva and Kuruwita 1993; Klinhom et al. 2017). In serum biochemistry, slight elevation in ALT and BUN noticed which may be associated with pre-renal azotemia. The detailed haematological and serum biochemical parameters before therapy and after therapy are mentioned in the Table 1. Blood smear examination was negative for haemoprotozoan diseases. On direct microscopic examination of faecal sample, presence of motile pear shaped ciliated protozoa noticed (Fig. 1). These ciliated protozoa were confirmed to be *Balantidium coli*, which are ciliated protozoa inhabiting intestinal tract, mainly caecum and colon. Occult blood test of faecal sample was found positive. So, based on clinical and laboratory examination, the condition was diagnosed as balantidiasis.

Table 1 Haemato-biochemical examination of elephant

Parameters	Values	Normal reference range
Hb (g/dL)	12.8	10.1–15.6
TLC (cells/μl)	18,100	7202.5–23220.5
TEC (million cells/μl)	2.74	1.9–3.1
Platelet count (lakh cells/μl)	4.84	1.05–5.98
AST (IU/dL)	5	4.8–39.6
ALT (IU/dL)	19	0–5.6
Creatinine (mg/dL)	1.6	0.9–1.8
BUN (mg/dL)	21.98	4.2–19.7
Total protein (g/dL)	8.5	6.6–9.3
Albumin (g/dL)	3.5	1.5–3.5
Globulin (g/dL)	5.0	3.5–10.7
Albumin: Globulin	0.7	0.17–1.05

Fig. 1 Microscopic examination of faecal sample showing pear shaped ciliated *Balantidium coli* protozoa

Treatment and outcome

The animal was treated with Tab. Metronidazole (10 mg/Kg, PO, BID) and Tab. Ranitidine (2 mg/Kg, PO, BID) for five days. Antacid (Ranitidine) was given to the animal as its faecal sample was found to be positive for occult blood test. Supportive treatment was done with hepatoprotectant and appetizer [Syp. Liv-52™ (Himalaya Herbal Healthcare, India), 100 ml, PO, BID], multivitamins (Syp. B-complex, 100 ml, PO, BID) and probiotics [Cap. Bifilac™ (Apollo pharmacy, India), 10 capsules, PO, BID]. On fourth day of treatment, improvement in appetite was noticed, heart rate and respiratory rate and mucous membrane were normal. Animal showed marked recovery with voiding of normal solid, yellowish faeces without any mucus. Faecal sample was negative for protozoan parasite, no occult blood found in chemical examination. After the completion of therapeutic regimen, animal regained normal health condition.

Discussion

Balantidiasis is a disease affecting mainly large intestine (colon and caecum). The disease has been reported by various researchers from different species of animals, but there is no case report of balantidiasis in Asiatic elephant from India. Intestinal infection with *B. coli* has been reported from non-human primates, humans, dog, camel and cattle (Tajik and Fard 2013). In some surveys conducted in some states of India by various workers, 26.8% of camel samples in Rajasthan (Partani et al. 1998), 93% of pig samples in Jharkhand (Bauri et al. 2012) and 3.77% of cattle samples in Punjab (Singh et al. 2012) were positive for *B. coli* cysts. As there is presence of *B. coli* in Indian livestock, it may also be a spread of infection to the elephant population through contaminated water. Further, elephant may act as host and may spread the disease to farmers engaged with elephant population.

In the present case the animal was having mucoid diarrhea, inappetance and lethargy, weight loss and bilateral lacrymation. *Balantidium coli* produce hyaluronidase which potentially enhances its ability to invade the intestinal mucosa (Hassan et al. 2017). In balantidiasis, the clinical features are manifested by loose faeces to watery foetid diarrhea with dehydration, loss of appetite, retarded growth, loss of body condition and reduced production (Palanivel et al. 2005). The chronic form is associated with episodes of intermittent diarrhea, weight loss and muscular weakness (Ichhupujani and Bhatia 1994; Sudan et al. 2012). In the present case, diagnosis was done based on the presence of motile, ciliated protozoa *Balantidium coli* in microscopic faecal examination. The disease may be diagnosed by direct demonstration of the parasite (trophozoites and cysts) from faeces, intestinal scrapings and in wet mounts of fresh faeces (Hassan et al. 2017). Faecal sample was found to be positive for occult blood test. *Balantidia coli* produce no known toxins but its infection may results in ulceration of the colon wall (Hassan et al. 2017). This is attributed to activity of an enzyme hyaluronidase which digests hyaluronic acid and enhances its ability to invade the intestinal mucosa.

In the present case, the animal was successfully treated with metronidazole. The therapeutic efficacies of various drugs like metronidazole, secnidazole, benznidazole and furazolidone have been documented against *Balantidium coli* (Raether and Hanel 2003; Hassan et al. 2017). The efficacy of the drug is determined based on disappearance of clinical signs and reduction of cyst/trophozoites in faecal sample. Metronidazole has been successfully used against balantidiasis in livestock (Reddy and Reddy 1993; Patil et al. 1998). Single dose of metronidazole has resulted in considerable reduction of *Balantidium coli* trophozoites in faeces (Rahman and Samad 2010). However, complete clinical recovery with oral metronidazole was observed only in 42% cattle as reported by Hasan et al. (2017).

Conclusion

This is the first report of balantidiasis in an Asiatic elephant from India. The present case study describes the successful therapeutic management of balantidiasis in an Asiatic elephant by using oral metronidazole.

Author contributions Manuscript was written by NT as well contributed in disease diagnosis. SR had attended the case and sent samples for diagnosis. CGE contributed in disease diagnosis, management and review part. MK contributed in disease diagnosis and management.

Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest.

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