Demonstration of parasitic fauna in Indian cobra (*Naja naja*) and Indian rock python (*Python molurus*) reared in a Biological Park of Karnataka, South India

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**ABSTRACT**

This study was carried out to investigate the parasitic fauna in Indian cobra (*Naja naja*) and Indian rock pythons (*Python molurus*) under captive condition in Bannerghatta Biological Park, Bangalore, Karnataka during 2015-2016. A total of 18 fecal samples from Indian cobra and 8 from Indian rock pythons were collected and screened. From 8 fecal samples of python, 7 were found positive for ova of Ophidascaris nematode, 4 for ova of Bothridia cestode and 3 for coccidian oocysts. From 18 fecal samples of Indian cobra, 5 were positive for Rhabdias ova and 1 for coccidian oocysts. Lung impression smear taken from one Indian cobra after necropsy and stained with Giemsa stain demonstrated Rhabdias larvated ova. From necropsy of 4 Indian rock pythons, granulomatous pneumonia in lungs, haemorrhages, edema, mucosal necrosis and thickening with nodule formation in large intestine was observed due to Ophidascaris nematode, while Bothridia tape worms caused severe congestion and hemorrhage of small intestinal mucosa as well as thickening of submucosa due to inflammatory reaction. Both Ophidascaris and Bothridia are highly pathogenic and cause mortality in Indian rock pythons. The Rhabdias infestation in Cobra though not much pathogenic, heavy infestation may lead to respiratory failure. Confinement induces stress and dysecdysis affecting the health of snakes under captivity. Probably the host diet (live feed) and the hygiene maintained in the enclosures are the most important determinants of the helminthic fauna of snakes. Careful examination of live feed and cleanliness in the enclosure supported by regular deworming can control the parasitic infections in snakes.

**Key words:** Cestode, Cobra, Coccidia, Helminth, Nematode, Python, Snakes.

Indian cobra (*Naja naja*) and Indian rock pythons (*Python molurus*) are found in Indian sub-continent. A broad spectrum of internal parasites harbour on reptiles, including diverse species of protozoans, nematodes, cestodes, pentastomids, acanthocephalans and trematodes (Papini et al., 2011; Hedley et al., 2013). Overcrowding and presence of different species in a small habitat actuate development, multiplication and spreading of parasites leading to immunosuppression in reptiles, which increase the probability of pathogens to initiate infections. The reptiles may harbour parasites for considerable period of time before showing signs of clinical disease, which may be seen afterwards when the host immunological status gets compromised thereby allowing the development of evident infection (Fowler and Miller, 2003). Research on infectious, non-infectious and parasitic diseases affecting captive snakes is a matter of immense significance. Thus, the present study aimed to increase the knowledge of helminth fauna from the Indian cobra and Indian rock pythons reared under captivity at Bannerghatta Biological Park (BBP), Bangalore, Karnataka.

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Giemsa staining of the lung impression smears from Indian cobra was also done to identify parasites if any.

Out of 8 fecal samples from Indian rock pythons, 7 were found positive for Ophidascaris ova (Fig 1), 4 were positive for Bothridia ova and 3 for coccidian oocysts. Out of 18 fecal specimens from Indian cobras, 5 were positive for Rhabdias spp, and 1 was positive for coccidian oocysts. Lung impression smear taken from Indian cobra after necropsy and stained with Giemsa stain demonstrated Rhabdias larvated ova (Fig 2). During necropsy of 4 Indian rock pythons, adult round worms of Ophidascaris spp were found within the gastrointestinal tract with formation of nodules in the intestine (Fig 3a, b, c, d) and Bothridia tapeworms were also recovered from small intestines (Fig 4a, b, c). Bothridium worm tends to have white thick body and up to 35.6 to 51.0 cm long. Strobila contain numerous short proglottids. External segmentation is complete throughout strobila. Scolex is provided with fused bothrial edges and found embedded in the mucosa of the small intestine thereby blocking the entire lumen of the small intestine causing obstruction. Our findings agreed with those of Udugama-Randeniya et al. (2012). The Ophidascaris round worms in python caused granulomatous pneumonia, hemorrhagic and edematous rectum (Fig 5a), necrotic rectal mucosa (Fig 5b) and rectal mucosa thickened by fibrosis.
Bothridia spp. of tapeworms in python snake in situ; (b): Worms recovered in petridish; (c) Scolex of the Bothridia spp attached on mucosa of small intestine.

Ophidascaris spp., Kalicephalus spp. and Capillaria spp. Rajesh et al. (2015) reported parasitic fauna of captive snakes in Tamilnadu, India and showed strongyles to be predominant in Arignar Anna Zoological Park, Vandalur and Snake Park, Guindy. Our results agreed with those of Rajesh et al. (2015) with regard to Ophidascaris spp, but the morbidity and mortality rate was more in our study area.

The parasitic fauna of reptiles has been reported in Russell viper (Kavitha et al., 2014) and wild-caught snake of Kerala, India (Radhakrishnan et al., 2009). Incidence of internal parasitism might be expected considerably in snakes due to the different feeding habits of the snakes. In addition to strongyle, Strongyloides spp., Ophidascaris spp. and Capillaria spp., the mixed infections including the coccidian oocysts were also revealed during the study by Rajesh et al. (2015) at Arignar Anna Zoological Park, Vandalur and Snake Park, Guindy. Similarly, in our study we reported mixed infection of Ophidascaris spp, Bothridia spp and coccidian spp. Coccidian infection in pythons could be from the live feed such as rabbits, even though many authors reported coccidian oocyst in python fecal samples, further study is needed to know whether the coccidian infects the snakes or these are from the live feed (rabbit).

Ophidascaris spp. is one of the most important pathogen for snakes and infestation can be fatal as reported earlier (Beck and Pantchev, 2005). Brar et al. (1990) encountered worms of Ophidascaris ajgaris in pythons. Ophidascaris spp. and Hexametra spp. were the most common genera of ascarids noticed in snakes, in which they inhabit lungs, stomach, esophagus and/or small intestine and the worms could occlude the stomach leading to obstruction.
in the regurgitation, diarrhea, granulomatous and purulent pneumonia. Ingestion of intermediate hosts like frogs and rodents might cause this problem. The mixed infections in this study was in agreement with the findings of Rao and Acharya (1991), who encountered evidences of *Ophidascaris ajgaris* including *Bothridium pythonis* in Indian rock python.

Evidences of coccidian oocysts as found during the study in snakes was in agreement with the reports given by Momin et al. (1990), who quoted that the clinically significant genera of coccidia infecting reptiles were *Eimeria*, *Isospora*, *Caryospora* and *Cryptosporidia*. Husbandry practices, crowding, concurrent presence of other infections etc. might be associated with the occurrence of coccidiosis in snakes or any other reptilian group. It is noteworthy to mention that periodical sampling of snake species reared in biological parks is highly required with proper anthelmintic treatment and provision of healthy live feed. More studies on different species of terrestrial snakes covering more geographical areas are required to complete the lack of data on ophidian helminths from Indian scenario.

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