Kalicephalus sp. in a captive Russell's viper: a case report

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Abstract The occurrence of *Kalicephalus* sp. of hookworms in a Russell's viper snake maintained in Chennai snake park trust, Chennai is reported. These worms were found in the stomach and intestine. They were cylindrical, thread like and had an elongate body. Anterior end was obliquely truncated with bivalvular buccal capsule. Short, thick and muscularised oesophagus ending in a rounded bulb was observed. In males, a well developed trilobed bursa was observed and the spicules were short and equal. Typical strongyle type eggs were found in the uterus of female worms as well as in the intestinal contents.

Keywords *Kalicephalus* sp. · Snake hookworm · Buccal capsule

Introduction

Indian Russell's viper is known by a number of other names, like Daboia, Tic Polonga, etc. A highly poisonous snake of the Viperidae family, it is scientifically known as *Vipera russelli*. Russell's viper is responsible for most of the snakebite deaths within its habitat. It is highly irritable and when threatened, coils tightly, hisses, and strikes with a lightning speed. Its hemotoxic venom is a very potent coagulant, which damages tissue as well as blood cells. The

habitat of the Russell's Viper stretches from Indian farmlands to dense rain forests. It is usually found near human settlements. Russells Viper can be found in India, Sri Lanka, China, Taiwan, Borneo, Malaysian Peninsula, Java and Sumatra. Strongylid nematodes of the genus *Kalicephalus* belonging to the family Diaphanocephalidae occur in the stomach and intestine of reptiles and lizards. A total of 50 species of *Kalicephalus* has been reported in many regions of the world and these are common in snakes. Infection with *Kalicephalus* causes mild enteritis in snakes leading to secondary bacterial infection and sometimes death. This paper reports the occurrence of *Kalicephalus* spp. of hookworms observed during necropsy in a captive Russell's viper snake maintained in a snake park in Chennai, India.

Case report

Necropsy was performed in a Russell's viper snake received from Chennai Snake Park Trust, Guindy, Chennai at the Department of Veterinary Pathology, Madras Veterinary College (Fig. 1). Upon dissection of the stomach and intestine, large numbers of round worms were observed (Fig. 2). These worms were transported in normal saline to Department of Veterinary Parasitology for identification.

Case history

History of the snake revealed that it was off feed for 10 days. The snake was offered frog and mice as food. Extreme emaciation, weight loss and wrinkled skin were observed.

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Fig. 1 Dead Russell's viper snake

Fig. 2 Dissection of the stomach and intestine of snake

Fig. 3 Worm of *Kalicephalus* sp.

Gross description of the worms

On gross examination, the worms were cylindrical and elongate body (Fig. 3). Most of the worms were found to be embedded in the mucosa of the stomach and intestines, whereas some were found to be free inside the lumen of stomach and intestine. A total of 60 worms were collected, out of which 15 were males and 45 were females. Average length of male worms was 0.7 cm and that of female worms was 1.2 cm.

Processing of the worms

The worms were subjected to dehydration in ascending grades of alcohol (70, 90 % and absolute alcohol each for

Fig. 4 Head end of male worm

Fig. 5 Head end of female worm

Fig. 6 Tail end of female worm

3 min), cleared in carboic acid and mounted in DPX. The worms were then examined under 10× and 45× magnification in a light microscope.

Microscopic description of the worms

Buccal capsule was bivalvular. The buccal capsule of male and female worms is depicted in Figs. 4 and 5, respectively. Anterior end was obliquely truncated. Oesophagus was well developed and was short, thick and muscularised ending in a rounded bulb. The tail end of female worms was blunt (Fig. 6). In males, a well developed trilobed bursa was observed and the spicules were short and equal (Fig. 7). Typical strongyle type eggs were found in the uterus of female worms (Fig. 8). Eggs were oval, thin

Fig. 7 Tail end of male worm

Fig. 8 Eggs in uterus of female worm

shelled and contained segmented yolk (Fig. 9). Identification of worms was made according to the keys given by Skrjabin et al. (1961).

Discussion

Strongylid nematodes of the genus *Kalicephalus* belonging to the family Diaphanocephalidae occur in the stomach and intestine of reptiles and lizards. Junker et al. (2009) have reported and identified *Kalicephalus colubri colubri* in a captive mole snake (*Pseudaspis cana*) in South Africa. These worms were found in large numbers and were filamentous and red helminths with a white head occurred in oesophagus and stomach. Many of the worms were found to be attached to the mucosa resulting in a moderately diffuse heterophilic infiltration of the sub mucosa. Endang Purwaningsih and Mumpuni (2011) have reported *Kalicephalus* sp. of worms in three species of snakes and studied the detailed morphology of the worms. Ublaker and Dailey (1966) observed *Kalicephalus subulatus* from *Constrictor constrictor imperator* (*Boa constrictor imperator*) snake collected from Nicaragua and Mexico and studied about the morphological characteristics in detail. Santoro et al. (2012) reported *Kalicephalus viperae* from the Western whip snake *Hierophis viridiflavus carbonarius* (Colubridae) from Southern Italy. Grego et al. (2004) examined about 138 pit viper snakes (*Bothrops jararaca*) and found that *Kalicephalus inermis* were the most common. *Kalicephalus* sp. of nematodes has also been reported

Fig. 9 Strongyle type egg

from snakes in India. Gupta and Duggal (1981) have reported the occurrence of *Kalicephalus willeyi* from the intestine of *Vipera russelli* and *Naja naja*.

Junker et al. (2009) removed a total of 73 *Kalicephalus colubri colubri* worms comprising of 57 males and 16 females from the oesophagus and stomach of a captive mole snake (*Pseudaspis cana*) in South Africa. In the current study a total of 60 *Kalicephalus* sp. worms were collected from an Indian Russell's viper (*Vipera russelli*) out of which 15 was males and 45 were females. Reports say that infection with *Kalicephalus* causes mild enteritis in snakes leading to secondary bacterial infection and sometimes death (Junker et al. 2009). Cooper (1971) has also reported disease in East African snakes associated with *Kalicephalus* worms.

On gross examination, the worms were cylindrical and had an elongate body. Most of the worms were found to be embedded in the mucosa of the stomach and intestines, whereas some were found to be free inside the lumen of stomach and intestine. Junker et al. (2009) observed the worms in oesophagus and stomach and most of the worms were found to be attached to the mucosa.

Observations on morphological characters of *Kalicephalus* sp. worms revealed a buccal capsule with two lateral valves and an obliquely truncated anterior end. Oesophagus was well developed and was short, thick and muscularised ending in a rounded bulb. The tail end of female worms was blunt and in males, a well developed trilobed bursa was observed with short and equal spicules. Typical strongyle type eggs were found in the uterus of female worms. All these gross and microscopic characteristics were found to be in accordance with Ublaker and Dailey (1966), Skrjabin et al. 1961. Rattle snakes of Chennai were observed to be hosts of *Kalicephalus* sp. worms for the first time.

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