Case Report

SETARIA IN A FREE-RANGE MALE SPOTTED DEER (*AXIS AXIS*): A CASE REPORT

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ABSTRACT

The occurrence of Setaria digitata in the pleural and peritoneal cavities of a free-range male spotted deer (Axis axis) observed during necropsy is reported.A total of 25 worms were recovered out of which 23 were female worms and 2 were male worms. The worms were found in the visceral organs of the pleural cavity and peritoneal cavity. Only one female worm was found in the pleural cavity whereas all the other worms were found in the peritoneal cavity. One worm in the peritoneal cavity was found embedded in a patch of inflammatory tissue. The worms were morphologically identified as Setaria digitata. Cranial ends of both male and female worms had a central helmet with triangular lateral lips. In male worms, the cuticle was corrugated with a coiled caudal end possessing a pair of light brown-coloured unequal spicules, the right spicule was stout and thick with narrow proximal end and the left spicule had a shaft and blade. In female worms, the cuticle was smooth and tail had a smooth knob with lateral appendages. The present will help to map the status of nematode infection in spotted deers in wild and to frame strategies for control of setariosis in spotted deers.

Keywords: Spotted deer, necropsy, *Setaria digitata,* occurrence, morphology

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INTRODUCTION

The spotted deer (*Axis axis*), cheetalor axis deer is a deer species native to the Indian subcontinent,and abundant cervid species in India. It is distributed across India, Nepal, Bhutan, Bangladesh and Sri Lanka and it is listed on the IUCN Red List as least concern. Currently, no range-wide threats to spotted deers are present, and they live in many protected areas. However,

population densities are below ecological carrying capacity in many places due to hunting and competition with domestic livestock (Duckworth *et al.*, 2015). Hunting for meat has caused substantial declines and local extinctions. The spotted deer is protected under Schedule I of the Indian Wildlife Protection Act (1972). It is widely distributed across the Western Ghats in India and iscommonly found in deciduous forests, grasslands, and scrublands within this region.

Parasitic diseases are one among the major problems in spotted deer, the effects of which range from sub-clinical disease, resulting in morbidity and mortality in severely affected cases. Helminths such as flukes, tapeworms and gastrointestinal nematodes, arthropods such as flies, keds, ticks and several protozoa commonly affect spotted deer (Sepalage and Rajakaruna, 2020). Setariosis is a parasitic infection caused by nematodes of the genus Setaria, a filarial worm with a complex life cycle involving a mosquito intermediate host (Tung *et al.*, 2003). The most documented species, *Setaria digitata*, is a common parasite of domestic bovids, particularly in Southeast Asia (Kaur *et al*., 2015). While adult worms are often non-pathogenic in their natural hosts, a high parasitic burden or aberrant migration of larval stages can lead to significant pathology in non-natural hosts (Rodrigues *et al.*, 2021). This case report documents the findings of a necropsy of a three-year-old male spotted deer with *S. digitata* worms, discussing the distribution andmorphology and the lack of clinical signs.

MATERIALS AND METHODS

The death of an approximately three years-old wild male spotted deer was reported at Singara Forest range of The Nilgiris, Tamil Nadu, India.Necropsy was carried out by the Forest Veterinary Assistant Surgeon and 25 numbers of milky white nematodes were found adhering to the visceral organs in the pleural and peritoneal cavities. The worms were collected and sent in 10 percent formalin to the Department of Veterinary Parasitology, Veterinary College and Research Institute, Theni for further processing and species identification.

The worms were counted, male and female worms were separated and measured. Worms were then examined for gross morphological features and then processed by dehydrating in ascending grades of alcohol and cleared using lactophenol. Cleared specimens were directly examined under Stereozoom microscope, mounted in DPX and examined under light microscopeand the morphological characteristics were recorded.

Photographs of gross worms were taken using NIKON Digital camera-mirrorless-Z5 model with NIKKOR Z-24-70 MM F/4S lens. Photographs of the processed and cleared worms were taken using Trinocular microscope (Lawrence and Mayo-Lynx, CAT. No: LM-52-3000, Sl. No: 500700) under 4x magnification with photomicrograph and computer attachment.

RESULTS AND DISCUSSION

The nematodes recovered from the wild spotted deer were identified as *Setaria digitata* based on morphological characteristics. The worms were milky white in colour and were found adhering to the visceral organs of the pleural cavity and peritoneal cavityas reported earlier (Sundar and D'Souza, 2015). Only one female worm was found in the pleural cavity whereas all the other worms were found in the peritoneal cavity. One worm in peritoneal cavity was found embedded in a patch of inflammatory tissue (Fig. 1a). Out of the total 25 worms recovered, 23 (92%) were morphologically identified as female worms and 2 (8%) were identified as male worms. The male worms were 4.3 cm long and 0.1 cm wide, female worms were 4.8 cm long and 0.1 cm wide(Fig. 1b). Cranial end of both male and female worms had a central helmet with triangular lateral lips. In female worms, the cuticle was smooth (Fig. 2a) and tail had a smooth knob with oval lateral appendages (Fig. 2b). In male worms, the cuticle was corrugated with a coiled tail end possessing a pair of light brown-coloured unequal spicules, the right spicule was stout and thick with narrow proximal end and the left spicule had a shaft and blade (Fig. 2c).

The majority of these worms were found within the peritoneal cavity. One female worm was found embedded within a distinct inflammatory patch on the peritoneal lining. A single female worm was also found in the pleural cavity, representing a rare site of ectopic infection. Of the 25 worms, 23 were female and 2 were male worms respectively.

The worms were identified as *Setaria digitata* based on key morphological features, including a prominent peribuccal crown and the characteristic shape of the tail. However, the size of these worms observed to be smaller than the average size reported for the same species in cattle (Sarmah *et al.*, 2019).

Gross pathological examination revealed no significant lesions that could be directly attributed to the worms, and the deer was found to be in good body condition at the time of death, suggesting a largely asymptomatic infection.

This case is significant for several reasons. The recovery of 25 worms in a single animal represents a high parasitic burden, which is an important finding in a species where these infections are often considered incidental. While the deer was asymptomatic, this high worm count, coupled with the presence of one worm in an inflammatory lesion and another in the pleural cavity, suggests that while *S.digitata* may be subclinical, a high burden or aberrant migration can lead to inflammatory responses and potential pathology. The fact that the animal showed no outward signs of illness highlight the complex and often resilient, nature of host-parasite relationships in wild animals (Nayak *et al*., 2018).

The morphological identification of the worms in the spotted deer as *S.digitata* is noteworthy, as this species is primarily associated with domestic cattle. This finding suggests a spillover event or shared habitat with cattle, where the mosquito vectors of

this parasite are abundant. The observation that the worms were smaller than those typically found in cattle could be a reflection of the host-parasite adaptation, suggesting that the physiological environment or immune response in deer may influence parasite growth. Similar reports have been reported in other deer species as well (Deepa *et al.*, 2014; Angelone-Alasaad *et al*., 2016 and Čurlík *et al.,* 2019)

This case report underscores the importance of continued research into the epidemiology of *Setaria* in wild populations and the need to investigate the factors that influence parasite burden and migration.

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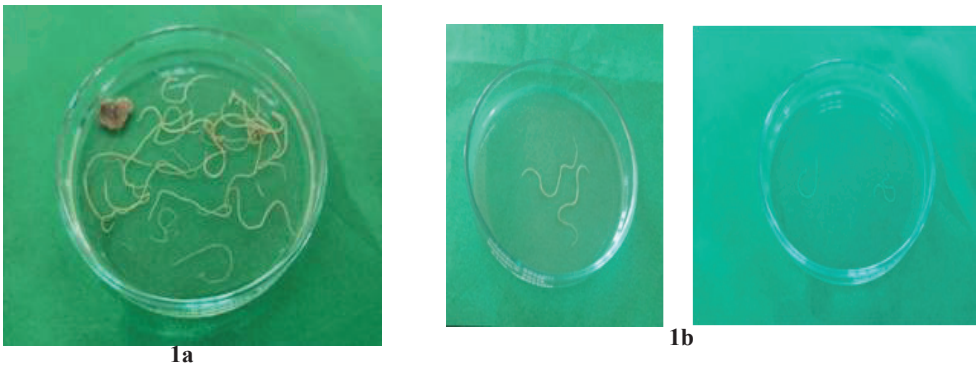
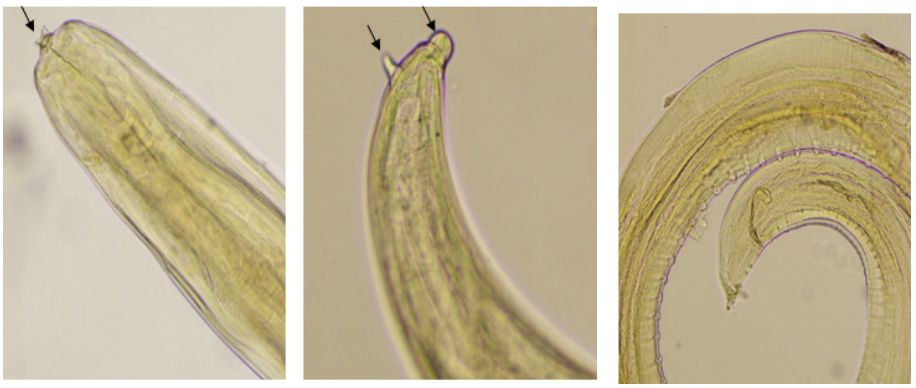


1a 1b

Fig.1. *Setaria digitata* worms recovered from spotted deer(1a), Female worms on the left and male worms on the right (1b)



(a) (b) (c)

Fig.2. *Setaria digitata* from spotted deer-(a)Female head end with central helmet and triangular lateral lips, (b)Female tail end with a smooth knob and lateral appendages and (c)Male tail end which is coiled with spicules

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