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Case Report

Trichosomoides crassicauda infection in laboratory Long-Evans rats

SK Paul*, RD Sarker, MM Rahman, B Biswas, P Dash and D Mondal
Animal Resources Facility, Infectious Diseases Division, International Centre for Diarrhoeal Disease Research, Bangladesh, 68 Shaheed Tajuddin Ahmed Sharani, Mohakhali, Dhaka-1212, Bangladesh

Abstract

Trichosomoides crassicauda (*T. crassicauda*) is a nematode inhabiting the urinary bladder of wild rats as well as laboratory rats. In most cases, it is considered to be nonpathogenic, while in some other cases, it can cause haemorrhagic cystitis, renal haemorrhages, and urinary calculi, which might influence the interpretation of research findings. Here, it is reported that *T. crassicauda* infection had been detected in a laboratory rat colony in Bangladesh, emphasizing clinical features, diagnostic findings, and preventive measures. Infection was finally controlled by maintaining strict hygiene, along with treating both the infected and non-infected colonies with ivermectin, and with iron, vitamin B complex, and zinc supplementation. (*Bang. vet.* 2025. Vol. 42, No. 1 – 2, 38 – 44)

Introduction

Rats are among the most widely used animal models in biomedical research (Perec-Matysiak *et al*., 2006). Different studies in medical research have been successfully conducted using these rat models (Gill *et al*., 1989). However, sub-clinical infections in laboratory animals are very alarming for researchers (Perec-Matysiak *et al*., 2006; Najafi *et al*., 2014).

Trichosomoides crassicauda (*T. crassicauda*), first described by Bellingham (1840), is a nematode parasite of rats, inhabiting the urinary bladder (Antonakopoulos et al., 1991; Simth and Johnson, 1995; Brown and Carter, 2002; Perec-Matysiak, 2006). After ingestion, the larvae hatch in the stomach, migrate through the abdominal and thoracic cavities or bloodstream to the lungs, and eventually reach the kidneys and urinary bladder (Yokogawa, 1920; Brown and Carter, 2002). While often asymptomatic, heavy infections can cause proliferative and inflammatory changes in the urothelium (Green *et al*., 1999). Lesions range from epithelial hyperplasia to papilloma formation, cystitis, and in some cases, association with urolithiasis (Zubaidy *et al*., 1981; Lee and Roberts, 2008; Patel and Kumar, 2015). This report

*Corresponding author:- E-mail: paul@icddrb.org
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documents a case of *T. crassicauda* infection in Long-Evans rats presenting with uroliths and haemorrhagic cystitis.

Case presentation

During routine morning observation, blood was detected in rat cages and from the penis of male rats. Rats were isolated for close monitoring and diagnosis, and further segregated according to clinical severity.

Microscopic examination of urine revealed operculated, oval eggs of *T. crassicauda* (Fig. 1).

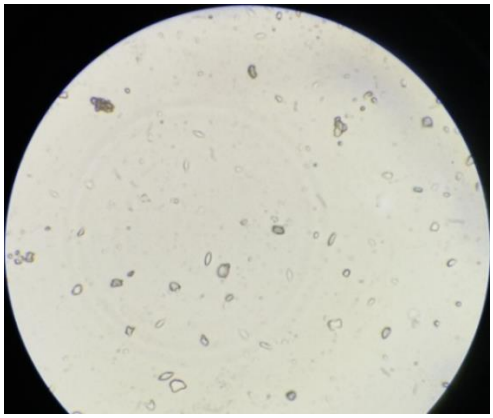

Fig. 1: Operculated oval-shaped egg of *T. crassicauda.*

Infected rats exhibited haematuria, rough hair coats, weight loss, and weakness. Based on urine microscopy, 7 out of 10 males and 2 out of 10 females were infected (Table 1).

To confirm the diagnosis, six severely affected male rats were humanely sacrificed. Postmortem findings showed that most urinary bladders had severe haemorrhages, erosion, and ulceration, often with urolith attachment. Haemorrhagic kidneys were observed in 30%, while haemorrhagic cystitis and urolithiasis were detected in 5 and 6 cases, respectively (Fig. 2; Table 1).

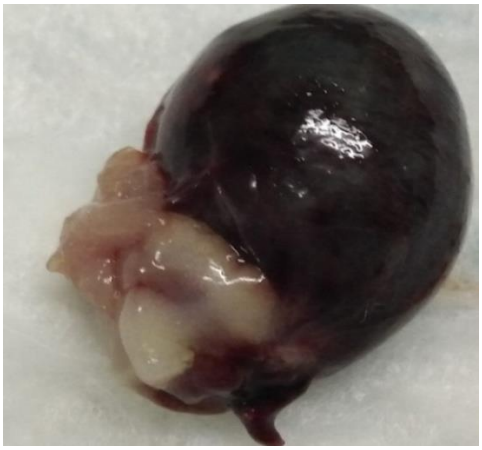

Fig. 2: Haemorrhagic cystitis.

Table 1. Antemortem and postmortem findings in laboratory rats

Variables	Age (months)	Infection rate	Clinical signs	Worm eggs	Uroliths	Haemorrhagic cystitis	Haemorrhagic kidney
Male	6	n = 8 (80%)	Haematuria (n = 5), Rough hair (n = 8), Weight loss (n = 6), Weakness (n = 7)	n = 7 (70%)	n = 6 (60%)	n = 5 (50%)	n = 3 (30%)
Female	4 – 5	n = 2 (20%)	Rough hair (n = 2)	n = 2 (20%)	Absent	Absent	Absent

Uroliths were brown, round to oval with rough surfaces, and measured 0.2 – 0.5 cm (Fig. 3).

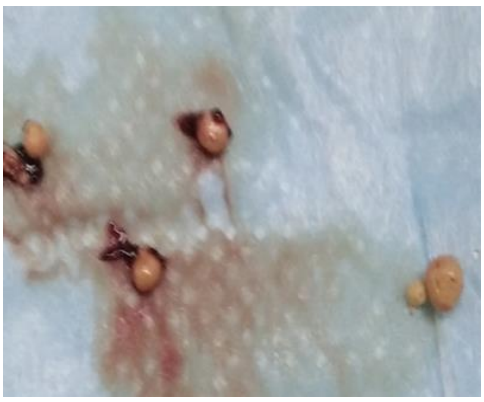

Fig. 3: Rounded or oval shaped uroliths.

Microscopic analysis of homogenized, centrifuged samples revealed extensive crystallization (Fig. 4).

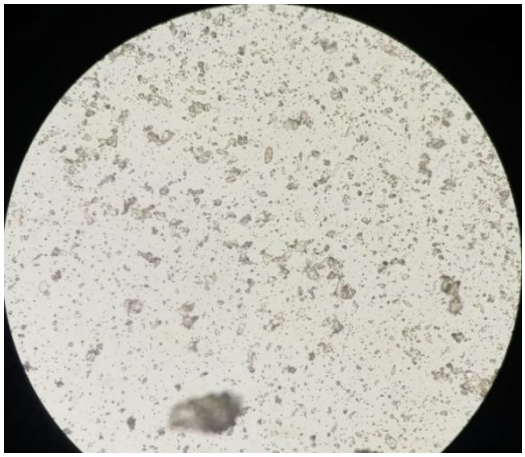

Fig. 4: Profuse crystallization present in urine.

All remaining rats were maintained under improved hygienic conditions. Prophylactic treatment included subcutaneous Vermic® (Ivermectin BP 10 mg/ml: Techno Drugs Ltd, JK Tower, 31 Segunbagicha, Dhaka-100, Bangladesh) @ 0.2 – 0.3 ml of 0.3% in two doses (Day 0 and Day 14), with three doses (Day 0, 7, 14) for severe cases (Summa *et al*., 1992). Supportive therapy with Bicozin-I® (Iron Polymaltose Complex + Vitamin-B Complex + Zinc: Square Pharmaceuticals PLC, 48 Mohakhali C/A, Dhaka-1212, Bangladesh) was provided in drinking water @ 0.5 – 1.0 ml/250 – 500 ml for 7 – 10 days (Table 2).

Table 2. Prophylactic measures

Medicine	Dose per animal	Duration
Ivermectin 0.3% solution	0.2 – 0.3 ml subcutaneously	2 doses (Day 0, 14); 3 doses (Day 0, 7, 14) in severe cases
Bicozin-I® (Iron, Vit-B Complex, Zinc)	0.5 – 1.0 ml/250 – 500 ml drinking water	7 – 10 days

Ten naturally infected Long-Evans rats aged between 4 – 6 months were observed, consisting of eight males and two females. The colony was maintained on 10 – 15g of in-house formulated rodent feed per day (containing 22% protein, 5.5% fibre, 4.5% fat, 1.5% calcium, and 0.5% phosphorus), along with free access to drinking water. Rats were socially housed in autoclavable plastic cages (60 × 7 inches), with breeding groups consisting of two females and one male, under controlled ambient conditions of 21 ± 1°C, 55 – 60% humidity, and a 12 : 12 hour light–dark cycle.

In this study, infection was more prevalent in adult breeding males (70%) compared to females (20%). Notably, no significant clinical sign was observed in females, even

when housed in the same breeding cages. Based on these findings, it is suggestive that adult female rats may serve the role of natural hosts of *T. crassicauda,* which may eventually transmit infection to males during mating or through ingestion of embryonated eggs expelled in urine (Bone and Harr, 1967; Sikora *et al*., 2021). This host specificity and transmission route mark the importance of this case report for future study.

Haematuria was a distinctive clinical sign in affected males and may be considered a cardinal indicator of *T. crassicauda* infection in colony management, which has not been reported previously. Another important finding was the presence of uroliths and haemorrhagic cystitis with the presence of profuse crystals (Fig. 4), which were clearly detected during postmortem examinations.

Although no chemical analysis of the uroliths was performed, which could have revealed potential nutritional imbalances, the colony had been maintained for decades on nutritionally balanced in-house feed. Thus, dietary imbalance was unlikely to be the primary cause of stone formation (Woodard, 1984; Ozkorkmaz, 2011). It is plausible that *T. crassicauda*, or the cellular/tissue reactions it induced, acted as the nidus for urolith development (Joint Pathology Center System Pathology, Urinary System, 2024). This was also suggested in other reports where the parasite contributed to mucoid calculi formation by increasing mucous secretion from the transitional epithelium of the urinary bladder (Smith, 1946; Cooper *et al*., 2022).

Our control strategy was effective in containing the infection and protecting the remaining rat colony. It demonstrates a practical approach to managing such cases in laboratory settings. Lastly, laboratory animals should be bred under barrier-maintained systems, considering strict hygiene, controlled environment, routine microscopic monitoring of urine and faeces for parasitic eggs, and scheduled prophylactic deworming to avoid any such infections in colonies (Summa *et al*., 1992).

Conclusions

It can be concluded that *T. crassicauda* infection occurs even in the animal colony where sanitation and hygiene are highly maintained. Therefore, any symptoms in male rats, like haematuria, hair loss, and weight loss of the animals, should alert the facility personnel.

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