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HISTOPATHOLOGICAL DETECTION OF *Trichosomoides crassicauda* IN URINARY BLADDER OF LABORATORY RATS IN NIGERIA

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ABSTRACT

Examination of histological slides of the urinary bladder from rats used in an experimental surgery revealed the presence of sections of the nematode, Trichosomoides crassicauda within the transitional epithelium. The parasite was surrounded by area of epithelial degeneration and necrosis, and area of mild to moderate epithelial hyperplasia. Inflammatory reactions were not remarkable as only a mild inflammatory process and edema in the submucosa which included eosinophils, mast cells and lymphocytes were observed in some of the slides. There was presence of embryonated eggs in female worms. This article reports the presence of this nematode parasite in laboratory rats used for research and recommends strict management and sanitary measures in laboratory animal houses.

Keywords: Histology, Nematode, *Rats*, *Trichosomoides crassicauda*, Urinary bladder

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INTRODUCTION

Trichosomoides crassicauda is a non-pathogenic nematode whose predilection site is the urinary bladder of wild and laboratory rats [1]. The parasite has a direct life cycle which allows easy spread among animals within a colony as infection occurs through the ingestion of contaminated foods and water containing embryonated eggs expelled in the urine [2,3,4]. The ingestion of such embryonated egg results in its hatching within the stomach into larvae which penetrate the stomach wall and migrate to the lungs, kidneys, ureters and urinary bladder through the blood stream [2,5,6]. Although, the larvae cannot penetrate the placental barrier during pregnancy, the infection is usually transmitted through the ingestion of feed or water contaminated with infected mother's urine to their offspring before weaning [5]. Histopathology reports showed that the parasite could appear free in the lumen of the bladder or within the urothelium where it causes catarrhal cystitis and epithelial hyperplasia in severe infections [4,7]. The association of the infection with urinary calculi and bladder tumours is not clear [4], although the parasite

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is known to cause eosinophilic granulomatous lesion [7,8], and increased mitotic index in the bladder epithelium making it more susceptible to carcinogens [1,4,5,9]. Thus, the infection can be a problem in urinary bladder carcinogenesis studies [10,11]. A subclinical infections of *Trichosomoides crassicauda* infections in rat colonies are capable of compromising the health of the animals when subjected to experimental stress, it is important that every case is recorded to ascertain the prevalence and distribution of this parasite. Based on our knowledge, this is the first reported case of *Trichosomoides infection* in laboratory animals in Nigeria and Africa. This paper reports the presence and histopathological changes associated with *Trichosomoides crassicauda* in the urinary bladder of naturally infected experimental Wistar rats.

Case history

A graduate student submitted a batch of urinary bladder samples from an experimental surgical study for histopathology. The study involved direct instillation of a probiotic into rat bladder. Bladder tissue samples were routinely processed and stained with Haematoxylin and Eosin (H and E) for light microscopy.

Microscopic examination

Histopathological examination of some of the slides revealed sections of the nematode parasite believed to be *Trichosomoides crassicauda* in the transitional epithelium (Figs. 1A and 1D) and lumen of the urinary bladder (Figs.1B and 1C) of Wistar rats based on the histological presentation in previous reports [4,6]. The parasite was surrounded by area of epithelial degeneration and necrosis, and area of mild to moderate epithelial hyperplasia. Inflammatory reactions were not remarkable as only a mild inflammatory process and oedema (Fig. 1A-D) in the submucosa which included eosinophils, mast cells and lymphocytes were observed in some of the slides. There was presence of embryonated eggs in female worms (Fig. 1B).

DISCUSSION

The use of laboratory animals such as rats is vital in biomedical research and development. Thus, the healthcare and management of animals used in research is of utmost concern as infections and diseases in animal colonies can interfere with research protocols and results. It is therefore, imperative to know the common pathogens, their rate of infection and associated pathology in such laboratory animals used in experimental studies. This report describes finding *Trichosomoides crassicauda* sections and its associated histopathological changes in the urinary bladder tissue of laboratory rats from an experimental rat colony. The histopathological changes observed in this report are similar to those reported in previous studies. The worms and the embryonated eggs observed in the transitional epithelium of the bladder in rats have been previously reported [4,5]. The hyperplasia seen in the bladder epithelium of the rats also agrees with previous report [3]. The hyperplastic proliferation of the epithelium is said to serve as a protective site for adult worms and for this reason, the rat may not require protective immunity in response to the infection [2]. Furthermore, the epithelial proliferation caused by *T. crassicauda* infection may make such rats unsuitable for bladder histology study in experiments [8].

The detection of the worms in the mucosal surface of the bladder in this report contrasts with some studies in which the worm was said to be undetectable in tissue sections due to its transparency or loss during tissue processing [12,13].

It is important to note that the activities of this worm in the course of its life cycle, including the associated migration and tissue damage [5,6] will not only affect histological experiments but also hematological studies. In any field of biomedical research, the merit of animal experiments is dependent on the strict adherence to principles of laboratory animal management. This ensures that the data obtained are both reliable and reproducible. Thus, disease prevention must be a prerequisite of any animal research as pathogens have the ability to cause morbidity and mortality. In such situations, they may compromise

the welfare of the animals and confuse the results of such studies. As a consequence of the present findings, it is, therefore, necessary to observe closely the health status of animals used in research. This should be done not just initially, but throughout the period of the study. Infections may never cause clinical disease but may cause histological or biochemical changes that have negative effects on research data. This report shows that *Trichosomoides crassicauda* infection is present among laboratory rat colonies used for research in Nigeria and thus suggest the institution of appropriate biosecurity measures in experimental animal houses to reduce the incidence of these parasites in such research facilities. There is a further need for more studies to determine the prevalence of the parasite in experimental rat colonies in Nigeria.

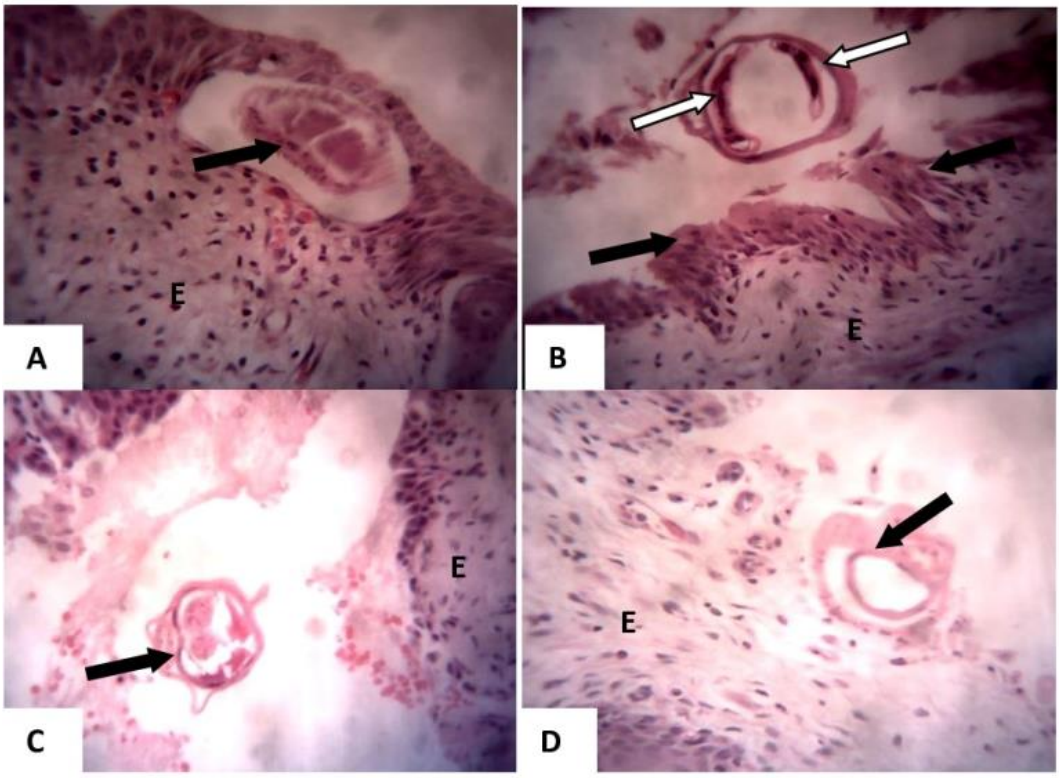

Fig.1. Photomicrograph of the infected urinary bladder showing sections of *T. crassicauda* within the transitional epithelium in 1A and 1D and within the bladder lumen in 1C (black arrows) while 1B shows cross sections of adult worms with embryonated eggs (white arrows) and hyperplasia of the transitional epithelium (black arrows). Note also the edema (E) of the submucosa in all the sections. H & E stain x 400.

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