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Mixed Infection of *Notodres cati* and *Ancylostoma caninum* Among Captive Lions (*Panthera leo*) at the Sanda Kyarimi Park, Maiduguri, Nigeria

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ABSTRACT

A mixed infection of *Notodres cati* and *Ancylostosoma caninum* was recorded among captive lions (*Panthera leo*) at the Sanda Kyarimi Park in Maiduguri, Nigeria. All of the 7 lions (3 adults and 4 cubs) examined in the Park were infested with the mite, *Notodres cati*. While, 5 (71.4%) out of the 7 examined were shedding *A. caninum* ova in their faeces. Faecal egg counts were significantly higher ($p<0.05$) among the cubs than the adult lions. All the cubs, 4 (100%) were infected and they manifested various degrees of emaciation, pallor of mucous membranes, prolonged capillary refill time and melena. Meanwhile, out of the 4 females examined, (2 adults and 2 cubs), 3 (75%) were infected and had significantly higher epg ($p<0.05$) as compared to the 3 males (1 adult and 2 cubs).The results of this study highlights the need to protect lions, particularly cubs in captivity against helminth by sustained and prompt anthelmintic medication coupled with good sanitary conditions especially during the early and most susceptible periods of their life.

Key words: Mixed infection, lions, Sanda Kyarimi Park, Maiduguri, Nigeria

INTRODUCTION

Parasites are significant pathogens of wild life and are responsible for unthriftness, decrease in reproduction rates and some times death thereby compromising their already extinct status (Davies and Anderson, 2004).

Crowding, dampness and unsanitary conditions are predisposing factors for the proliferation of both ecto and endo-parasites (Radostitis *et.al*., 1997). Such conditions are frequently found under intensification procedure such as those found in captivity as compared to extensive and free-living conditions (Young, 1980; Devos and Lambrechts, 2003). Mixed infections of endo and ecto-parasites have been reported to occur in several animal species (Soulsby, 1982).

Single infections of mites (Young, 1980; Sweatman, 1999) and nematodes (Mbaya and Nwosu, 2004) species have been reported in a variety of wild animals kept in captivity for long periods. However, mixed infections of the two parasite groups are yet to be recorded in wild captive animals. In this manuscript we report on an outbreak of clinical ancylostomiasis and notodric mange in captive lions.

Historical background

In the year 2002, the Sanda Kyarimi Park had a solitary lioness captured as a 5-month-old cub by hunters at the border sector of the Chad Basin National Park with the Wazza National Park in the Republic of Cameroon. The cub was

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confiscated by the Borno State Wildlife Unit and successfully hand-reared to adulthood with minor health problems. Two other lions (a male and a female) were acquired from a Zoological Garden in the Niger Republic. The three lions (a male and two females) remained in good health except when an outbreak of clinical toxocariasis was reported among the lions (Mbaya and Nwosu, 2004) and were routinely treated with complete recovery. The recent delivery by the (3-year-old) lioness acquired from Niger Republic produced four cubs (2 males and 2 females). However, four weeks after birth, the lioness, and her cubs developed skin conditions, which later affected the other lions, and at the same time, the cubs were passing dark coloured faeces.

MATERIALS AND METHODS

Clinical examination

On clinical examination, the lioness and her cubs were found to have skin lesions with extensive loss of hair and epidermis around the neck and left flank in the lioness and her cubs. The other adults (male and female) similarly developed the same but less severe skin lesions soon after the lioness and her cubs were released from confinement. Examination of the whelping chamber revealed a high degree of dampness due to constant defecation and urination. The major clinical signs observed during examination of the cubs also infected with ancylostomosis were emaciation, pale mucous membrane, prolonged capillary refill time and melena.

Collection and laboratory examination of samples

Skin scrapings were taken from various lesions from affected adult lions and cubs into petri dishes containing mineral oil. Fresh faecal samples were collected per rectum from the cubs while fresh faecal droppings of the adults were collected from the kennel. In addition, blood samples were collected. All collections were properly labeled. Skin scrapings were examined in mineral oil and mites identified according to standard criteria (Soulsby, 1982). Faecal samples were examined by the floatation method and egg counts determined by the modified McMaster technique using saturated sodium chloride solution as floating medium (Anon, 1977). Nematode eggs were identified using standard parasitological criteria (Dun, 1978; Soulsby, 1982). Blood smears were stained with Giemsa and examined for haemo-parasites. All the examinations were repeated two weeks later.

RESULTS

The skin scrapings from all the lions examined revealed *Notodres cati* while none of the blood smears from the same animals revealed any haemo-parasites. The faecal examination revealed *Ancylostoma caninum* eggs in faeces of 5 (71.4%) of the 7 lions examined in the Park (3 adults and 4 cubs) as shown in Table 1. Two adults (1 male and 1 female) were not infected, however, the mother, 1 (33.3 %) and the cubs 4(100%) were infected. Faecal egg counts were significantly ($p< 0.05$) higher in the cubs (367.5 ± 3.59 epg) than in the adult group (250 ± 5.6 epg). Out of the 7 lions examined, 5 (71.4%) had *A. caninum* eggs in their faeces. Out of 3 males (1 adult and 2 cubs), only the two male cubs 2 (66.7%) were infected while out of the 4 females (2 adults and 2 cubs) examined, 3 (75%; 1 adult and 2 cubs) were infected as shown in Table 1. Faecal egg counts were significantly ($p<0.05$) higher in the females (350 ± 6.6 epg) than in the males (250 ± 15.8 epg).The state of health of the cubs became better two to three weeks post treatment. This corresponded with the absence of *A. caninum* eggs in the faeces of all infected lions.

DISCUSSION

The occurrence of mange due to *Notodres cati* infestation in such an epidemic proportion among the lions might be associated with the lion's 'social grooming' habit. This is characterized by rubbing body together, playing and grooming using the tongue. The prolonged confinement of the lioness and her cubs in a soiled and damp environment caused by their urine and faeces might have played a major role in the occurrence of the disease (*Notodres cati* infestation) as earlier observed and reported in a solitary cheetah (*Acinonyx jubatus*) with extensive lesions after being subjected to long periods of strict isolation during a post capture quarantine period (Young, 1975). Similarly, other authors reported that confinement in a restricted space often caused mange infestation in epidemic proportions in domestic animals (Soulsby, 1982; Radostitis *et.al*., 1997).

The mite infection could easily have spread from mother to cubs through close contact during suckling, while the male might have contacted the mange during frequent mating which occurred soon after the female and her cubs were released from confinement. *Ancylostoma caninum* is known to infect young puppies (Soulsby, 1994) and lion cubs

(Young, 1980) primarily by either the oral or transmammary routes. However, at the time of this outbreak, the cubs (4 weeks old) were still suckling and were most likely to have acquired their infections from their mother through the lactogenic route. The larvae of this nematode have been reported to appear in milk to infect suckling pups (Smith *et. al*., 1978).

Table 1. Occurrence of *Anylostoma caninum* eggs among captive lions according to age and sex

Parameters		No. examined	No. infected (%)	Egg count/gram of faeces (epg)	
				Mean ± SD	Range
Age group	Adults (4 - 6 yrs)	3	1 (33.3)	250 ± 15.8	200 - 300
	Young cubs (4 wks)	4	4 (100.0)	367.5 ± 3.59	300 - 500
Sex group	Males	3	2 (66.7)	250 ± 15.8	200 - 300
	Females	4	3 (75.0)	350 ± 6.60	300 - 500
Total		7	5 (71.4)	317.1 ± 1.21	200 - 500

The higher rate of infection among the cubs as compared to the adult group might be associated with age susceptibility and lack of acquired immunity. Similarly, the higher rate of infection among the female group as compared to the males might be associated with the 'social grooming' habit of the lions. This is mostly done by the females within a pride by licking the anal regions of cubs to keep them clean after defecation (Young, 1980). The results of this study, therefore, highlight the need to maintain sanitary conditions during long-term confinement in lactating lionesses in order to prevent the proliferation of both endo and ecto-parasites. Furthermore, protection in the form of early and sustained anthelmintic prophylaxis for cubs and mother as well as balanced nutrition may supplement the above control measures.

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