Toxocariasis In A Lioness In Jos Zoo, Nigeria

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ABSTRACT

*Wild animals in Zoos across the globe are kept for aesthetic, educational, recreational and conservation purposes. Collections of rare and endangered species are also preserved in Zoos. Lions do well in captivity but are prone to excessive worm burden especially round worms and tapeworms though these conditions can easily be managed with adequate Veterinary services. Incidence of toxocariasis in captive African lions (*Panthera leo*) in Nigeria has largely not been reported. Jos Zoo and Wildlife Park both in Plateau State of Nigeria have lost significant number of lions to toxocariasis due to inadequate Veterinary attention*

A fatal case of toxocariasis in an African Lioness in Jos Zoological Garden, Nigeria was presented as a case study.

Keyword: Toxocariasis, Zoo, Wildlife, *Panthera leo*, veterinary

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INTRODUCTION.

Zoological gardens keep and exhibit wild animals for aesthetic, educational, recreational, and conservation purposes [1]. There are also places where rare and endangered species are preserved or repopulated for further release into the wild. Parasites are organisms that live on or in another host organism and redirect its resources for themselves. Endo-parasitism especially has constituted major causes of morbidity and mortality in animals [2]. Wild animals generally show low genetic resistance against endo-parasites due to the low exposure and wide ecological areas. This explains why parasitic infections can cause serious problems to endangered species leading to sudden and unexpected local declines in abundance when kept in a relatively small space [3]. Husbandry practices, disease prophylaxis and veterinary services vary from zoo to zoo and so the occurrence of parasites in animals housed in zoos.

In Nigeria, there is inadequate information on infectious diseases, parasites, and behavioral patterns of zoo animals. This is a major limiting factor in attempt at veterinary medical management. There is therefore need to study endo-parasitic fauna and the behavioral patterns of wild animals with regard to prevalence and geographical distribution [1].

Captive animals kept in enclosures are prone to different types of diseases including helminthiasis which is a major problem of zoo animals [4].

These parasites affect animal health and cause mortality, morbidity or both [5]. The health status of captive wild animals kept in enclosures is affected by management, feeding, environment, sanitation, and climate change [6]. A regular surveillance, control measures, effective treatment, and proper prophylaxis based on correct diagnosis therefore can improve their health situation.

The African lion (*Panthera leo*) is a big cat belonging to the genus *Panthera* [7] and particularly found in Sub-Saharan Africa and Asia. They do well in captivity but are severely prone to helminthes infestation. At the moment, information on endo-parasites of African lions (*Panthera leo*) are mainly from the free-ranging wild. Several evidence have shown that parasitic load collected from dead wild lions [8-11] have been described by several studies from African countries [12,10]. Endemic parasites of free ranging African lions have been systematically surveyed and documented [13-21]. "Taeniids, spirurids, ascarids, trichostrongylids, trichuroids, trematodes, pentastomids, and acanthocephalan parasites observed in wild free-ranging African lions are documented [12, 22, 23] and some protozoan parasite stages also are reported [14, 24, 21]." African lions like other carnivores kept in zoological gardens live together with internal and external parasites but show no serious clinical signs of ill effects of infections unless the animal is in severe depression and parasites are present in large numbers [25].

There are reports on parasites of African lions that originate from European and Asian zoological gardens and game reserves [26-32, 24,33-40,11] with no indications of the origin of the animals, diets, prey, movements, and management practices [14,41].

In Africa, free-ranging lion population is being decimated leading to increased captive breeding and artificial concentration in enclosures and small parks driven by conservation and economic value of the species [42]. As good as this rescue process is, it has not been accompanied by a corresponding knowledge of diseases affecting this species. Therefore, this seemingly important conservation effort has come with threats of disease epidemics due to pathogen build-up in the environment as a result of poor hygienic practices. Internal parasites thrives more in this case as life-cycles are completed very fast due

to limited ecological space. The captive lions may develop disease [43] due to the parasites; and infections with *Toxocara* species maybe particularly problematic [21]. Immuno-depression associated with captivity also lowers the animals' resistance to internal parasites. Consequently, baseline information on the parasites infecting captive lions becomes an important tool for disease management [41]. We present a case of debilitating effect of toxocariasis in an African lioness at the Jos zoological garden, Nigeria.

Case history

A 4-year-old African lioness (*Panthera leo*) died at the Jos Zoological Garden and was presented for postmortem examination at the Central Diagnostic Laboratory of the National Veterinary Research Institute, Vom Plateau State, Nigeria. Prior to its death, it was reported to have been inappetent, severely emaciated,

loss of fur on flanks, severely dehydrated, weak, dried muzzle, and sunken eyeballs. The lioness was said to have been de-wormed using *Pyrantel pamoate* (Ascaten) at 10mg/kg and multivitamin which were both inserted in lung tissues of a slaughtered goat and fed to the animal.

Post mortem Examination Findings

The general appearance at postmortem showed cachexia, sunken eyeballs, dried muzzle, loss of fur at the flank regions as seen in (fig. 1A). Gross pathology showed three pulmonary lesions: localized emphysema, consolidation and scattered nodules of varying sizes (fig. 1B); with pneumonia evident microscopically (fig. 1D) and marked edema. The stomach and intestines were hyperemic and lined with mucoid exudates. Along the intestinal mucosa were numerous round worms of varying lengths (fig 1C).

Fig. 1A-D, A: Carcass of a female lion, B: lioness: lungs with nodules (milk spots), localized emphysema, congestion and consolidation, C: lioness. Small intestine with creamy colored round worms (*Toxocara* spp), fig. D: Lung, bronchopneumonia, with polymorphonuclear cellular infiltration composed mainly by eosinophils, X400, H&E stain.

Sample collected and analysis

Fecal samples and worms of varying length were collected in polythene bag and petri dish respectively and sent to the Parasitology Research Laboratory of the institute for identification. The identification was done as described by [11] which revealed toxocara species.

Histopathology

Lung tissue was fixed in 10% formalin for histopathological studies at the Central Diagnostic laboratory of the institute. A lung impression smear for cytological examination was also made and stained with modified Wright-Giemsa stain revealed marked eosinophilia. Histopathological section of the lung was stained with Haematoxylin and eosin (H&E) stain and revealed marked cellular infiltrates (eosinophils, lymphocytes, plasma cells and macrophages) and a juvenile worm segment.

RESULTS AND DISCUSSION

The helminth eggs and adult worms were identified as reported in African lion [14,44-46,41,38,21]. This is the second documented case of internal parasites of African lions bred and kept in enclosures in Jos zoological garden, Nigeria. Free-ranging African lions feed on diverse prey species, and parasitism may be equally diverse. The first generation of these African lions were brought to the garden as sub-adults which have probably been exposed to the toxocara species in the wild and therefore the cycle of infection continues in the enclosure. The Jos zoological garden also has large collection of cats which are significant in the life-cycle of toxocara species.

It has been reported that lions in captivity are less susceptible to diverse internal parasites compared to those free-ranging. Captive

African lions have less varied diet and are regularly de-wormed with expert veterinary medical services available. Internal parasitic infections therefore represent true parasitism [41]. The toxocara identified in this case represent true parasitism. Other sources of exposure are multiple. The Jos zoo collects fetuses of animals slaughtered at the main Jos abattoir for the feeding of the lions which houses large number of cats. These fetuses may have been contaminated by feces of these cats and become sources of infection as also reported by [14,46]. "There are many reports of infections with *T. cati* in captive lions [15,31,38,39] but very few reports of the same parasite in free-ranging lions [26]. Differentiation of toxocara species have been difficult and not attempted in this case.

Treatment and Control

Adult worms are easily removed by anthelmintic treatment (piperazine, benzimidazole, fenbendazole, mebendazole and nitroscanate). Different anthelmintic can be administered from time to time. In the Jos zoological garden, regular treatments of all animals are carried out quarterly. A major problem experienced by the veterinary staff of the Jos zoo may be poor knowledge of weight assessment of the lions which is critical in effective drug management of the condition. Knowledge of wildlife diseases and behavioral pattern of wild animals is also inadequate. The availability of genuine anthelmintic drugs has become an additional set back in disease management. In situations where injectable drugs could be best options, restraining facilities are poor.

1. It is a known fact that nutritional deficiency increases animal susceptibility to helminthic infection, it is therefore pertinent to provide captive animals' good quality food and drinking water.

2. The housing should be such that is devoid of cracks on the floor and walls to facilitate proper cleaning and disinfection. It should provide proper drainage to avoid water logging to create unhygienic environment.
3. Stray animals have direct access into the zoo housings should be prevented as much as possible to prevent the spread of diseases to inmates.
4. Enclosures should be constructed wide enough to allow enough space for the animals to roam. This will reduce contact with infectious material and hence reduce prevalence.

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