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PULMONARY TUBERCULOSIS IN BLACK RHINOCEROS (*Diceros bicornis*) IN MYSORE ZOO

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ABSTRACT

Mysore Zoo lost two of its rhinos due to pulmonary tuberculosis 1992 and 94. Symptoms of coughing, sneezing and nasal discharge were evident only during the terminal phase of the disease. Postmortem examination revealed multiple tuberculosis nodules in the lung and in one case also in the liver. *Mycobacterium tuberculosis*, isolated from cultures, was found to be highly resistant to INH and Rifampicin. These incidences of tuberculosis in rhinos and earlier reports of this disease in Thamin deer suggest that tuberculosis is a major problem to be tackled with.

INTRODUCTION

Tuberculosis has been recognized as a serious disease in zoo animals (Theon and Himes, 1982). Though the disease has been nearly eradicated from domestic animals and humans in many developed countries, outbreaks of this zoonotic disease continue to be reported in captive exotic species (Theon, 1993). In India, the disease is endemic, causing widespread outbreaks in humans, livestock and zoo animals.

Tuberculosis has been reported in many species of wild mammals and birds in captivity (Rathore and Khera, 1982). As far as rhinos are concerned, there are numerous reports of this disease from abroad as well as from India (Arora, 1986; Mann, 1982; Barbiers, 1994). In the Mysore Zoo, occurrence of pulmonary tuberculosis due to *Mycobacterium tuberculosis*, has been noticed in black rhinos during 1992-94, causing two deaths in a total population of 9 rhinos (one Indian, two white and six black rhinos). The details of these two incidents are described here.

CASE HISTORIES

A female African black rhinoceros named "Gowri", aged 13 years, born on 14-3-97 in Mysore Zoo, was found ill on 23-8-92. Symptoms were cough, nasal discharge, respiratory distress and fever. Suspecting some bacterial infection, treatment began with boluses of Terramycin (Tetracycline HCL) and Oripim (Trimethoprim and Sulphamethoxazole). This was continued for 5 days. Soon she developed epistaxis and dyspnoea with persistent cough. Medication with antibiotics, antihistaminics and antiinflammatory drugs including cortisones for the next 3 days failed to control epistaxis and other signs. On 10-9-92, she developed sneezing with yellowish mucopurulent discharge. The animal died on 11-9-92 without showing any sign of improvement. Postmortem findings (see below) confirmed the death due to tuberculosis.

Following the death of the female, the male African black rhinoceros named "Gunda" aged about 22 years, born on 1-10-72

and brought up in Mysore Zoo, was suspected to be suffering from tuberculosis. Treatment began with Tibicin (Rifampicin) (22 capsules of 450 gm per day) and vitamin B-Complex (10 capsules per day). This was continued for a month. When he did not take any food on 19-1-94, he was treated with Digestone (100 gm orally), Terramycin (10 tablets of 500 mg per day) along with supportive therapy. This treatment continued for a week. In spite of this and subsequent treatment programmes, the animal became weak and collapsed on 28-5-94. The animal died the following day. Symptoms of sneezing, nasal discharge and shivering were observed during the last two days before death.

POSTMORTEM AND LABORATORY FINDINGS

In the first case, the lungs were found enlarged, edematous and cyanotic. Intralobular septa were thickened with multiple nodules and abscesses found on the entire surface of the lungs. About 1.5 litres of pus could be removed when the lobes were incised. The mesentery was congested and the glands were suppurated. The nasal discharge and portions of all major internal organs were sent to IAH and VB, Bangalore for diagnosis. Presence of acid fast organisms morphologically similar to *Mycobacterium* spp were noticed by direct microscopic examination of impression smear of lung tissue.

In the second case, the lungs had multiple nodules which when cut produced cheesy like pus. The necrosed and shrunken liver also had multiple nodules. The spleen was found pale, anemic and shrunken. Other organs like kidney, ileum, heart and intestines showed generalized congestion. All major internal organs were sent to IAH & VB, Bangalore for histopathological and microbiological studies. The direct microscopic examination of impression smears of lung tissue showed the presence of acid-fast bacilli morphologically similar to *Mycobacterium tuberculosis*. Cultural and sensitivity tests done at the National Institute of Tuberculosis, Bangalore not only confirmed this identification but also found the organisms to be resistant to Isonicotinic acid hydrazide (INH) and Rifampicin.

DISCUSSION

The first incidence of tuberculosis in Mysore Zoo was recorded in Thamin deer (Unpublished). The deaths of two rhinos within a span of 2 years indicate an increasing and alarming trend. The problem of tuberculosis is not unique to Mysore Zoo. The

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disease has been reported from zoos in Darjeeling, Delhi, Bombay, Kanpur, Shillong, Hyderabad, Bhilai (Rathore and Khera, 1982), Calcutta (Basak, *et al.*, 1975), Junagadh (Shah, *et al.*, 1992), Indore (Garg, *et al.*, 1990) and possibly from many other zoos. Though *M. bovis* has also been reported to be the cause of tuberculosis in these reports, *M. tuberculosis* appears to be the cause in most of the cases. On an average 5,000 to 10,000 visitors throng Mysore Zoo everyday and the situation warrants attention on the possibility of humans or zoo animals as a source of infections to each other.

Treatment of mycobacterial infections in captive wildlife is controversial because of the difficulty in making a definitive diagnosis and the unknown efficacy of antimicrobial drugs in species like rhinos (Ramsay and Zainuddin, 1993). Though Rifampicin and Isoniazid have been suggested and used in rhinos, these drugs have often failed to eliminate mycobacterial lesions (Mann, *et al.*, 1981; Barbiers, 1994).

Detection of active tuberculosis cases by observing the symptoms like cough, purulent nasal discharge and respiratory distress like dyspnoea is nearly impossible in zoos. Very often, animals remain asymptomatic until few days or few hours before death (Barbiers, 1994). A productive cough and dyspnoea may appear only shortly before death (Ramsay and Zainuddin, 1993). Various tests like, tuberculin testing with mammalian old tuberculin (PPD-B) and microscopic examination of purulent nasal discharge for acid fast bacilli are useful to detect tuberculosis cases in zoo animals. Apart from these, evaluation of delayed hypersensitivity reaction, Enzyme linked Immunosorbent Assay (ELISA) and lymphocytic migration have been used on a limited basis in large zoo animals. Of all these tests, because of vague clinical signs and equivocal skin testing, ELISA has been used with some promise in zoo species (Mann, *et al.*, 1981; Ramsay and Zainuddin, 1993).

Both *M. tuberculosis* and *M. bovis* have been attributed to be the cause of tuberculosis in rhinos. Mann, *et al.* (1981) reported tuberculosis in a black rhinoceros. *Mycobacterium* of human type was found to be the cause in rhinos of Mysore Zoo. Since zoo is a place where thousands of public visit to see the large collection of exotic species maintained in a limited space of 100 odd acres, there is every possibility to contract the disease either by man or animals. Therefore, it is essential to maintain the zoo premises clean with regular disinfection of the moats, holding cages, exhibit furnitures and barns. Whenever possible, all these facilities should have access to direct sunlight. It also becomes imperative to screen and treat workers who are infected.

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