Co-Infection by *Sarcoptes scabiei* and *Microsporum gypseum* in Free-Ranging Crab-Eating Fox, *Cerdocyon thous* (Linnaeus, 1766).

Jonatas Campos de Almeida*, Carlos Adriano de Santana Leal¹, Renata Pimentel Bandeira de Melo¹, Pedro Paulo Feitosa de Albuquerque¹, Camila de Morais Pedrosa¹, Fabiana Correa Zermiani², Roberto Citelli de Farias², Rinaldo Aparecido Mota¹

¹Universidade Federal Rural de Pernambuco, Recife, Pernambuco, Brasil. ²Parque Zoobotânico Arruda Câmara, João Pessoa, Paraíba, Brasil

**ABSTRACT**

The aim of the present study was to describe the clinical manifestation, treatment and outcome of a case of co-infection by Sarcoptes scabiei and Microsporum gypseum in Cerdocyon thous (crab-eating fox) from Northeastern Brazil.

**Key words:** dermatophytes, public health, sarcoptic mange, wild canid, zoonose

*Author for correspondence: jonatas_campos86@hotmail.com*
INTRODUCTION

There are several diseases that may be transmitted from not only domestic but also from wild animals, thus wildlife is an important component in the transmission chain of zoonosis. Nowadays, zoonoses with a wildlife reservoir constitute a public health issue worldwide and its importance has been recognized, demanding attention from scientific community. Foxes are known to carry many species of ectoparasites, the majority of which are potentially transmissible to humans, pets and livestock.

Despite the public health issue, there are few data about the real impact of skin diseases on wild carnivores. Coyote populations from Texas were monitored from 1974 to 1991, and sarcoptic mange was identified affecting 69% of animals, resulting in reproductive disorders such as the pregnancy rate reduced and ovulation problems. Concerning to the occurrence of dermatophytes in wild canids, further studies are necessary in order to provide new insights and advances related to the diagnosis, treatment and control of this mycotic infection.

The activities of wildlife veterinarians in zoo management are inestimable since they apply their knowledge and skills for the improvement of habitat conditions, nutrition, health and breeding of captive wild animals. Thus, the exposure to zoonotic diseases is one of the most important health risks for wildlife veterinarians due a close association with wild animals.

Accordingly, the present case report describes the clinical manifestation, treatment and outcome of a case of zoonotic dermatoses caused by Sarcoptes scabiei and Microsporum gypseum in Cerdocyon thous (crab-eating fox) from Brazil.

MATERIAL AND METHODS

During the autumn, five free-range Cerdocyon thous (crab-eating fox) were caught by veterinarians of a Zoo from Paraiba state, Northeastern Brazil. The animals were caught due their health condition and after a first clinical examination were referred to the quarantine room. These animals were estimated 4-month-old (young animals), being four females and one male, and their mother probably was killed in a traffic accident. The five animals were alert and responsive, and except for the skin lesions, were otherwise healthy. Chemical restraint (1% xylazine hydrochloride and 10% cetamine hydrochloride) was required to examine the crab-eating foxes.

The body surface of each crab-eating fox was examined carefully for the presence of ectoparasites such as ticks, fleas and lice. They were collected in microtubes containing 70% ethanol and fleas were washed and stored in 10% KOH solution for 24 hours before identification. An identification key was used for species identification.

Two skin scrapings from affected body parts of the crab-eating foxes were collected for mite isolation. Each skin scrapings were digested in 10% KOH and were meticulously examined for the presence and identification of mites. Detected mites were identified properly.

In order to carry out the mycological diagnosis hair and scabs were collected by coat brushing and multiple skin scrapings using sterile scalpel blade. Each sample was clarified with a 30% KOH on a glass slide for 30 minutes, followed by identification of fungal structures as hyphae and arthroconidia (arthrospores) according to previous study. Hair and scabs samples were cultured in Petri dishes containing Sabouraud Dextrose Agar with yeast extract, chloramphenicol and cycloheximide. Petri dishes were incubated aerobically at 25°C and examined.
daily for five weeks. Yeasts were evaluated macroscopically and their microscopic characteristics were observed by smear stained by Gram method. Filamentous fungi were identified by observation of texture, topography and color of the obverse and reverse of the colonies, and microscopic characteristics such as type of conidia and hyphae. Microscopic analysis was performed properly.

The crab-eating foxes were treated with ivermectin (Ivomec®, Merial, São Paulo, Brazil) 200ug/kg orally, once per week, during six weeks.

RESULTS AND DISCUSSION

Dermatological investigation revealed moderate alopecia patches (hair loss) distributed in head, ears, trunk, extremities and tail (Figure 1). Foul odor, mild to moderate scratch, small swellings and moderate incrustations also reported. The skin was wrinkled and crusty with a flaky appearance.

The fleas Ctenocephalides felis and C. canis were found in all five animals. A total of 20 fleas (thirteen C. felis and seven C. canis) were collected with a mean of four fleas per animal. Neither ticks nor lice were reported. Sarcoptes scabiei were identified in all five crab-eating fox (Figure 2).
“Hair follicles parasitized by arthroconidia were observed by direct examination in 1/5 of the samples analyzed. However this findings clearly suggests a fungal infection by dermatophytes, all samples were submitted for fungal culture to confirm the result obtained by the direct examination, once this technique is considered the gold standard”.

After three days of incubation, in all five samples were observed colonies with the following characteristics: the colony surface was matte, yellowish, convex, and wrinkled, and the undersurface was flat. These characteristics were compatible with those of Malassezia pachydermatis. With approximately seven days of culture, a flat colony, cream color at the surface and a yellow-brown reverse pigment was observed in one sample. Microscopically numerous symmetrical macroconidia, thick-walled, asperulate spindle-shaped with 3-5 septa were visualized. These characteristics were compatible with those of Microsporum gypseum.

After two weeks of treatment a significant improvement in the skin condition was observed with approximately 50% size reduction of the lesions. Four weeks post initial treatment almost all lesions had resolved and, for this reason, the treatment was maintained for two additional weeks, during which all lesions had resolved completely. There is a limited data about the occurrence and treatment of zoonotic dermatoses in wild canids, especially in crab-eating fox. To the best of the author’s knowledge, this is the first case report of co-infection by Sarcoptes scabiei and Microsporum gypseum in free-ranging crab-eating fox. The association between M. pachydermatis and S. scabiei was also observed previously11.

In Europe, sarcoptic mange infections are endemic and has been described a high prevalence in red foxes (Vulpes vulpes), leading to substantial mortality and reducing the population of red foxes over 70%.12,13,14 Dangerous sarcoptic mange outbreaks have been described in some species worldwide, with mortality rates of up to 90%.15,16,17,18. This wild canid may visit human settlements attracted by accessible food sources19, increasing incidence of accidental pseudo scabies infestation of man, pets and domestic animals5. Have been reported the possibility of adaptation between S. scabiei and red fox populations20 with description of non-fatal, restricted, subclinical cases in red foxes21. Little is known about S. scabiei infection in crab-eating foxes, but it is believed they may play a role in sarcoptic mange infection similar those by red foxes.

Dermatophytosis is an infection of the skin and its appendages caused by a group of closely related species of fungi of the genera Microsporum, Trichophyton and Epidermophyton22. There are few studies about fungal diseases in wild animals. Nonetheless, it is important to remember that many ringworm infections may be transmitted from animals to humans, being considered a public health problem10,23. Microsporum canis was first reported in silver-grey foxes24 and in red fox in a close contact with an asymptomatic Persian cat25. The relationship between the presence of dermatophytes on the hair coats of dogs and cats without skin lesions in their respective owners and other pets have been investigated26. In the present study, the crab-eating foxes affected were young (approximately 4-months-old), in accordance with a previous study that observed a higher incidence of dermatophytosis in animals less than one-year-old22.

Pathogens have been found associated with Ctenocephalides as biological vectors or intermediate hosts, such as bacteria, helminths and protozoa, representing a potential health risk for humans27. Thus, it is important to choose the adequate approach to prevent vector-borne outbreak diseases into Zoos or Center of Triage of Wild Animals, threatening other carnivore species.
The literature no provides well established protocols to treat sarcoptic mange infection and dermatophytosis in wild canids. In the most of cases, the treatment of these skin infections in dogs is adopted as model to treat wild canids achieving good results. The present case report also reports the treatment of sarcoptic mange infection in wild canid with success. In this case no antifungal treatment was performed. The complete resolution of the skin lesions may be explained by the fact that the animal is considered as carrier agent of *M. gypseum*, a common situation noticed in cats. The same condition should not be ruled out in case of dermatophytosis in wild animals.

Based on the above, information about zoonotic dermatoses in wild canids is scarce, complicating diagnosis and correct approaching of these diseases. Thus, researches are required in this field to better understand the epidemiology, pathogenesis and treatment of zoonotic dermatoses and even to develop control measures.

REFERENCES


Braz. Arch. Biol. Technol. v.61: e18160508 2018