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Natural infection by *Microsporium canis* in a capuchin monkey

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ABSTRACT: This paper described a case of a capuchin monkey (*Sapajus libidinosus*) with non-pruritic skin lesions. During the physical examination, multifocal areas of alopecia with crusts, erythema and scaling compatible with dermatophytosis were reported on the right fore and hind limbs and on tail. Fungal culture findings revealed a diagnosis of dermatophytosis due to *Microsporium canis*. The animal was successfully treated with itraconazole. This is the first report of a dermatophytosis case in *S. libidinosus* and the first description of an effective treatment in this species.

Key words: dermatology, ringworm, tinea, nonhuman primates, *Sapajus libidinosus*.

Infeção natural por *Microsporium canis* em macaco capuchinho

RESUMO: O presente trabalho relata o caso de um macaco capuchinho (*Sapajus libidinosus*) com lesões de pele não-pruriginosas. Durante o exame físico foram encontradas lesões multifocais com crostas, eritema e descamação compatíveis com dermatofitose, nos membros anterior e posterior direitos, bem como na cauda. O animal não tinha outras alterações. O diagnóstico de dermatofitose por *Microsporium canis* foi realizado através de cultura fúngica das lesões. O animal foi tratado com sucesso com itraconazol. Este é o primeiro relato de um caso de dermatofitose em *S. libidinosus* e a primeira descrição de um tratamento eficaz para esta espécie.

Palavras-chave: dermatologia, dermatofitose, tinea, primatas não-humanos, *Sapajus libidinosus*.

Dermatophytosis, also called ringworm or tinea, is a superficial infection of hair, skin and nails (MIGAKI, 1986; PIER et al., 1994; BIELITZKI, 1998; CHERMETTE et al., 2008). It may involve one or more fungal species of keratinophilic genera *Microsporium*, *Trichophyton* and *Epidermophyton* (MIGAKI, 1986; MECKLENBURG et al., 2011). The great importance of ringworm can be explained by the consequences of infections amongst animal communities, cost of treatment, difficulty of control measures, and the issue of public health- especially given that the majority of dermatophytes isolated from animals are zoonotic (PIER, et al., 1994; CHERMETTE et al., 2008).

In nonhuman primates (NHP) *Microsporium* and *Trichophyton* are usually the genera responsible for causing this pathology (BAGNALL & GRUNBERG, 1972; BIELITZKI, 1998; GIBSON, 1998). *Microsporium* spp., which is a common cause of ringworm in dogs and cats, has also been isolated

from NHP (old and new world monkeys). As for old world monkeys, this pathology has only been described in a reduced number of cases (KLOKKE & DE VRIES, 1963; SEELIGER et al., 1963; AVNI-MAGEN, et al., 2008). Regarding new world monkeys, most of the references date back several decades, with emphasis given to a case in Philadelphia (USA) of a capuchin monkey that was imported from Nicaragua (SCULLY & KLIGMAN, 1951; KAPLAN et al., 1958). Furthermore, there are no reports in literature referring to any infections by *Microsporium canis* in *Sapajus libidinosus* monkeys.

S. libidinosus is a new world monkey that belongs to the family Cebidae, and is found in the North East of Brazil. (FRAGASZY, 2004; RYLANDS, KIERULFF, 2008; ALFARO, 2012). Primates belonging to this genus are medium-sized animals with a semi-prehensile tail, and with arboreal and diurnal habits (FRAGASZY, 2004; FEDULLO, 2013).

This report described one case of dermatophytosis caused by *M. canis* in *S. libidinosus*, which was successfully treated in the Zoobotanic Park Arruda Câmara in João Pessoa, Paraíba, Brazil.

A male *S. libidinosus*, aging five to six months, was admitted to the Zoobotanic Park Arruda Câmara in João Pessoa, Paraíba, Brazil. The animal was kept in illegal captivity and had been rescued by IBAMA (Brazilian Institute of Environment and Renewable Natural Resources). Physical examination conducted by the Zoo's veterinary staff showed the presence of multifocal areas of alopecia with crusts, erythema and scaling compatible with dermatophytosis. These lesions were present in the right fore and hind limbs and in the tail. The animal had no other changes.

To establish a definitive diagnosis, skin scrapings and fur were collected from three distinct lesions and sent for microbiological analysis. Before sampling, lesions were thoroughly cleaned with alcohol to remove debris and to limit the growth of contaminants. Moreover, lesions were shaved deeply enough to cause some bleeding and to verify the presence of ectoparasites. Samples were obtained from the margin of lesions. Hair and scab samples were cultured in Petri dishes containing Sabouraud Dextrose Agar (SDA) with yeast extract, chloramphenicol and cycloheximide. Petri dishes were incubated aerobically at 25°C and examined daily for five weeks. Thick-walled, fusoid-apiculate, rough-walled macroconidia and a lemon-yellow colony pigmentation were seen. Fungal culture was positive for *M. canis* in all the samples analyzed.

The animal was treated with itraconazole (Cepav Pharma, São Paulo, Brazil), 10mg kg⁻¹ day⁻¹ PO (CARPENTER, 2012) mixed with smashed bananas and papaya for 30 days. Clinical improvement could be seen after just two weeks of treatment, with a decrease in the number of lesions and size of alopecic areas. After 20 days of treatment, significant improvements had taken place, and any clinical signs of the lesions, other than incomplete growth of hair, were completely absent. The protocol was continued for 10 more days, in order to complete the full 30 days of treatment. The animal was monitored for yet another 30 days after the last administration of itraconazole - a period during which its hair clearly grew.

Case reports on the isolation of *M. canis* in NHP dermatology, especially in new world primates, are very rare in literature (FOWLER & CUBAS, 2001). In fact, this is the first report of *M. canis* affecting *S. libidinosus*. The literature available does not provide an organized evidence-based approach to the NHP dermatological cases (BERNSTEIN & DIDIER, 2009).

However, one should be aware that they occur and can have zoonotic significance (MIGAKI, 1986; FOWLER & CUBAS, 2001; RYLANDS, 2001; SCHMIDT, 2001; BERNSTEIN & DIDIER, 2009).

Animals of any age, gender and species are susceptible to infection, but the condition is most common in young, sick, elderly and frail individuals (CHERMETTE et al., 2008). It is also possible for the animal to incubate these pathogens and develop them in favorable conditions, such as stress experienced in captivity (ROBERTS & ANDREWS, 2008). In this case, we present a young animal that had been captured by IBAMA and probably was in a very stressful situation.

Skin lesions identified in this case report are compatible with those described by several authors in other primate species in cases of dermatophytosis, although the diagnosis has only been confirmed from the isolation of pure colonies of *M. canis* in SDA. According to the literature, the main clinical features are regular alopecia with erythema and scaling, usually non-pruritic; although, various degrees of infection may modify this typical aspect. Lesions may be localized, generalized or multifocal (MIGAKI, 1986; CHERMETTE, 2008; BERNSTEIN & DIDIER, 2009).

An effective treatment is important in order to limit the spread of arthroconidia to other animals and people, as well as to minimize environmental contamination (CHERMETTE et al., 2008). This case report demonstrated that treatment with itraconazole was effective, with the animal showing no further clinical signs of infection and apparently without any side effects. The authors chose this therapy, previously used in primates (AVNI-MAGEN, 2008), because it was possible to administer it orally and only once a day, as well as because of its rarely reported side effects (GRANT & CLISSOLD, 1989). At the beginning of treatment; however, we had some difficulty in administering the medication, as it is hard to hide medication and deceive such an intelligent species. Therefore, the person in charge of the administration was always the same and was someone whom the monkey knew and liked.

In conclusion, the present report contributed to the published literature on NHP dermatology as, dermatophytosis is a result of *M. canis* infection has not been previously reported in a *S. libidinosus*. Moreover, it was also demonstrated that an oral treatment with itraconazole is effective in allowing the animal to completely recover.

BIOETHICS AND BIOSSECURITY COMMITTEE APPROVAL

We, authors of the article entitled "Naturally infection of *Microsporum canis* in a capuchin monkey" declared, for all due

purposes, that the project which gave rise to the present data has not been submitted for evaluation to the Ethics Committee of the Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal, but are aware of the content of the Brazilian resolutions of the National Council for Control of Animal Experimentation-CONCE <<http://www.mct.gov.br/index.php/content/view/310553.html>> if it involves animals. Thus, authors assume full responsibility for the presented data and are available for possible questions, should they be required by the competent authorities.

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