

DOMESTIC CAT (*Felis catus*) AS A TRANSMISSION LINK FOR DERMATOPHYTOSIS BY *Microsporum canis* TO HUMANS– CASE REPORT

GATO DOMÉSTICO (*Felis catus*) COMO ELO DE TRANSMISSÃO DE DERMATOFITOSE POR *Microsporum canis* PARA HUMANOS – RELATO DE CASO

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RESUMO: O *Microsporum canis*, espécie tida como zoofílica, é referido como a principal agente causador de dermatofitose, sendo a que possui maior ocorrência em cães e gatos, bem como o principal agente responsável pelas infecções dermatofíticas zoofílicas nos seres humanos. O objetivo do trabalho foi relatar um caso de microepidemia familiar por *M. canis* na cidade de Teresina, Piauí.

Palavras-chave: dermatofitose, zoonose, pequenos animais

ABSTRACT: *Microsporum canis*, a species considered to be zoophilic, is referred to as the main causative agent of dermatophytosis, being the one that has the highest occurrence in dogs and cats, as well as the main agent responsible for zoophilic dermatophytic infections in humans. The objective of this work was to report a case of familial microepidemic by *M. canis* in the city of Teresina, Piauí.

Key-words: dermatophytosis, zoonosis, small animals

INTRODUCTION

Dermatophytosis are infections with high morbidity and prevalence in Latin America (BETANCOURT et al., 2009), and listed as zoonoses, and thus, it is not uncommon to observe animals, as well as man affected by this disease (NEVES et al., 2011). Epidemiological data indicate that among the mycoses that affect men, dermatophytosis are the most common zoonoses in the world, being considered the third most common skin disorder in children under 12 years-old and the second among the adult population (PASQUETTI et al., 2017). Its prevalence varies according to the climate and its natural reservoirs (MACIEL & VIANA, 2005).

The disease tends to be more common in tropical and temperate climates, particularly in countries with areas of hot and humid climatic conditions (CAVALCANTI et al., 2003), with a higher incidence in the autumn and winter seasons (MACIEL & VIANA, 2005). This disease

is described as a fungal infection of keratinized tissues, horny extract, hair and nail, caused by dermatophytes of the genera *Microsporum*, *Trichophyton* or *Epidermophyton*. The lesions have clinical characteristics marked by annular or circular alopecia, covered by scales and with rapid centrifugal expansion (MORIELLO, 2017).

Although it can affect animals of any age, sex or breed, some reports show that young animals and certain breeds are more susceptible (BRILHANTE et al., 2003; BALDA et al., 2004). It is the easiest infection to be transmitted between species and, due to its recognized zoonotic potential, it has been attracting greater attention in public health, due to the close and increasing contact between pets and humans, especially children (PASQUETTI et al., 2017). Dermatophytes can be classified, according to their habitat, into three groups: geophilic, zoophilic and anthropophilic. Geophilic dermatophytes have as their primary characteristic the ability to maintain their vital viability in soils rich in human and / or animal keratin residues, while zoophilic and anthropophilic dermatophytes maintain their viability through their parasitism in animal species or in man, respectively (SIDRIM & ROCHA, 2004).

Microsporum canis, a species considered to be zoophilic, is referred to as the main causative agent of dermatophytosis, being the one that has the highest occurrence in dogs and cats, as well as the main agent responsible for zoophilic dermatophytic infections in humans (MACIEL & VIANA, 2005). Dogs and cats also play an important role as reservoirs of the species *M. canis*, and can also act as asymptomatic carriers. Human infection can occur through exposure to arthroconidia or hyphae found in the hair of these animals, apparently healthy (BENTUBO et al., 2006).

In Brazil, research reports that, in addition to the domestic cat, healthy wild felids, when kept in captivity, can also carry dermatophytes, being also sources of infection for other animals and for man (BENTUBO et al., 2006). Considering what has been exposed, the aim of this study was to report a case of dermatophytosis in a domestic cat that was transmitted to contacts in the same household.

CASE REPORT

A male feline with no defined racial pattern, approximately two months old, was assessed at a private veterinary clinic in Teresina-PI. As a rescue animal, the current guardian did not know how to report the previous clinical history. Clinical examination revealed severe itching, widespread alopecia, areas with crusts and flaking on the back, left ear, left thoracic limb and left pelvic limb (**Figure 1**).



Figure 1 - Feline patient, SRD, with disseminated alopecia, areas with crusts and flaking on the back, left ear, left thoracic limb and left pelvic limb.

To confirm the diagnosis, skin scraping of the lesions was performed, followed by observation under an optical microscope with a 100x objective. The presence of broken hair and septa hyphae was observed with ellipsoid macroconidia. Then, the examination was performed with ultraviolet light (wood lamp), in which fluorescence was observed in the regions that contained the lesions, due to the probable presence of tryptophan (**Figure 2**).



Figure 02 - Left pelvic limb with fluorescence reaction to Wood's Lamp.

Upon confirmation of the diagnosis, the treatment instituted was the use of a vaccine with inactivated *M. canis* (Biocan M®) on days 0, 14 and 38, at a dose of 1 mL, subcutaneously. We opted not to perform topical treatment to prove the real efficacy and practicality of the vaccine adopted as a therapeutic and preventive protocol.

When the patient returned to continue the protocol adopted (14 days after the first consultation), there was a significant improvement in the characteristics of the lesion (**Figure 03**). It was also found that other animals that cohabited with the feline started to present similar lesions, being a dog (1.5 years old) and two other male cats (approximately four months old). Besides that, lesions were also found on the tutor's left forearm (**Figure 04**). Initially, the lesion evolved from a circular hyperemic lesion to a scaly and itchy lesion. After medical advice, the tutor started using ketoconazole ointment, with good results about seven days after starting the treatment.

After this report, the therapeutic protocol was extended to all animals on the property. As it's an environment in which all residents were affected by the agent, it was also recommended to destroy fomites (cloths, rugs, pillows and mattresses) in addition to the daily disinfection of non-porous surfaces and rooms with 2% hypochlorite for effective disease control.



Figure 03 - Significant improvement in fungal lesions on the fourteenth day of treatment.



Figure 04 - Circular hyperemic lesion in the tutor's left forearm.

At the end of the treatment (32 days), when the patient returned for the third application of the vaccine, complete remission of the clinical signs was observed, not only for the patient initially affected but also for the other residents of the property.

DISCUSSION

The present case was of a feline with dermatophytosis lesions in several regions of the body, which later spread to the other animals in the house and also to the tutor's. Micro epidemics are defined as epidemic outbreaks in a restricted social context, where more than one case of the disease in question is recorded (PASQUETTI et al, 2017). The presence of five cases of dermatophytosis in people who frequent the same environment therefore is characterized as a microepidemic. According to Fraga et al. (2017), the agglomeration of cats in the same environment can converge to the appearance of diseases, including dermatophytosis, which is an important zoonosis widespread worldwide.

Dogs and cats are the main reservoirs and sources of infections by *M. canis*, in which the former usually have cutaneous lesions, whereas cats are characterized by having small lesions or are asymptomatic carriers, which is one of the difficulties in epidemiological control. (GONDIM & ARAUJO 2020). The feline species is considered to be the main disseminator of zoophilic fungi and a source of contagion for humans and other possible animals (BALDA et al., 2004). The fact that this animal is in frequent contact with the same environments and occupies the same niches as humans turns the home environments as important transmission factor (BIER, 2013). Dermatophytosis in small mammals and humans is caused by different species of dermatophytes with zoonotic potential. Infection occurs more frequently in the

presence of predisposing factors such as stress, overcrowding, deficiencies in diet and control, pregnancy, immunodeficiency, age, ectoparasites and other disease (FEHR, 2015). In addition to *M. canis*, other species such as *M. gypseum* and *M. mentagrophytes*, and other genera, such as *Tricophyton* and *Epidermophyton* may be involved in zoonotic cases (MORETTI et al., 2013).

According to Farias et al. (2011), cats can carry fungal arthrospores asymptomatically, being a source of environmental contamination and contagion for other animals and also humans. Among the various factors that contribute to cats being carriers of dermatophyte spores, the regional and intercontinental climatic variations stand out. The Municipality of Teresina is located between the geographical coordinates latitude 05°50'S and longitude 42°48'W and has a tropical climate (Aw') characterized by an average air temperature around 28.5 °C, relative humidity of 67.7 % and average annual rainfall of 1,430.7 mm (ALVARES et al., 2014). In this sense, the type of climate (mainly influenced by the latitude), as well as local climatic factors (solar radiation, temperature, relative humidity, etc.) can be key factors for the incidence of dermatophytosis, as stated by Neves et al., (2011).

Regarding the age group, young cats have a greater capacity to carry asymptomatic *M. canis* in their coat. Thus, kittens can be an important source of environmental contagion and intra and interspecific infection. (ANDRADE & ROSSI, 2019). These authors also affirm the importance of dermatophytosis in public health, since the cases of this disease have increased significantly in recent years, mainly due to the intimate contact with dogs and cats, which are increasingly considered members of the family. Evaluating stray cats, Fraga et al (2017) reported a higher frequency of *M. canis* in adult cats without clinical signs of skin diseases. However, Romano, Valenti & Barbara (1997) reported a higher frequency in young animals, which corroborates with what was observed in this report, and emphasizes greater attention to the introduction of puppies at home. Analyzing the historic of cats admitted to shelters in the United States, researchers observed that the prevalence of dermatophytosis was 1.8 % and that young cats were up to eight times more likely to present the disease than adults (DETAR, DUBROVSKY AND SCARLETT, 2019).

Analyzing positive pets for dermatophytosis, as well as the environments in which they lived, Neves et al. (2018) reported that the prevalence was of 37.1 % in suspect animals (n=70), and that *M. canis* was the most frequent etiological agent. They also reported that 69.2 % of the households surveyed and 50 % of the contact animals were positive for dermatophytes. The importance of pets with dermatophytosis or asymptomatic carriers as potential transmitters of the disease establishes the adoption of hygienic and sanitary measures for prevention and control. The correct guidance of tutors on measures such as bathing the animals with active antimycotics, especially in animals newly arrived on the property, the periodic cleaning of the environment with sodium hypochlorite 2%, which acts by releasing chlorine and oxygen causing enzymatic inactivation, and minimizing the exposure of animals to children, the elderly and immunosuppressed contacts, as well as other animals, also represent important prophylactic measures in the face of new cases of this disease in humans (BIER, 2013).

According to Patel & Forsythe (2010), animals with dermatophytosis should be treated in a topical and systemic manner, also linked to measures to reduce environmental contamination. However, in this work, only the inactivated vaccine with *M. canis* (Biocan M®) was used as treatment. According to Andrade et al. (2010), the use of the Biocan® M vaccine had a satisfactory effect in the treatment of all fungi that were detected on the skin of cats. It was observed, in the second dose of the vaccine (after 14 days), that the animals showed considerable improvement of the clinical signs, with thinner and less flaky skin. In the third dose of the vaccine (after 38 days), all animals were completely recovered.

The use of inactivated vaccine with *M. Canis* is a therapeutic alternative in detriment of oral treatments, especially targeting animals that do not tolerate oral treatment. In addition, the vaccine administration has practicality and safety as favorable points in relation to oral treatments with antifungals, given the low adherence by the owners to these protocols due to the long course of treatment and difficulties encountered in handling the administration of the medication and especially the risks related to the prolonged use of these medications (BOTTEOM, 2015).

In addition, the use of vaccine has the advantage over the use of oral antifungals, because it is applied subcutaneously, in three doses, ensuring a correct dosage of the drug and effective treatment for dermatophytosis caused by the fungus *M. canis*. Salci et al., (2011) reported a clinical case in which the species *Tricophyton tonsurans* was involved, and that was able to remain viable for several years, despite the excellent hygiene conditions of the environment. This report corroborates the environmental treatment based on a 2 % hypochlorite solution that was recommended in our report.

As for the clinical diagnosis and treatment of dermatophytosis, they should not be separated from specific laboratory tests. Diagnosis based on clinical signs alone can lead to a false diagnosis, which can lead to overestimation of the incidence of dermatophytosis. However, the diagnosis of such fungal infections is often performed only clinically, without the correct use of laboratory diagnostics (CAVALCANTE, 2006).

Wood's lamp is one of the diagnostic methods for dermatophyte infections. This equipment emits waves of ultraviolet light, and is routinely used in the examination of hair or tissues suspected of being affected by a dermatophytosis, which can fluoresce in the direct presence of this light when in the environment dark. The ultraviolet radiation emitted by the lamp induces greenish fluorescence due to the presence of the fungal metabolite identified as the presence of tryptophan in the hair (BIN et al., 2010). Direct microscopy is a quick and easy method to detect whether the animal has a fungal infection, where samples after correct collection are examined under an optical microscope to check for the presence of hyphae and arthroconidia (CAVALCANTE, 2006). It is important to emphasize the importance of complementary laboratory tests, in addition to anamnesis and physical examination, to confirm the diagnosis. Waller et al. (2014) reported that it is essential to perform tests such as direct microscopy (with 20% potassium hydroxide) and culture in appropriate media (Sabouraud dextrose agar).

Finally, considering the zoonotic aspect of dermatophytosis in its most general definition, as well as the current understanding of one health, it's important to highlight the importance of the Veterinary medical professional in preventing and controlling this disease, especially in the identification of the source of infection (GONDIM & ARAUJO, 2020).

CONCLUSIONS

Therefore, there was a high potential for the spread of dermatophytosis caused by *M. canis*. The treatment based on immunotherapy with inactivated *M. canis* proved to be efficient. However, it was observed that auxiliary treatment measures, mainly related to the disinfection of the environment, are a primary factor to prevent the spread to other animals and humans. Considering the zoonotic aspect of the disease, the intervention of a Veterinary becomes a crucial point in the care aiming mainly to identify the source of the infection.

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