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DOI: <http://dx.doi.org/10.36560/141020211439>Article link: <https://sea.ufr.edu.br/SEA/article/view/1439>**Mycotic zoonoses risk from clipping instruments in Pet Shops in Sinop – MT****Rayssa Tuanna Schmidt Balbinot**

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**Abstract.** Pets have conquered the daily lives of families worldwide and because they have a close relationship with humans, they can transmit mycotic zoonoses such as dermatophytosis, malassezioses and candidosis. Studies show that fungi with pathogenic potential have already been granted in clipping instruments and bath articles in veterinary clinics and in Pet Shops. In the absence of data in the city of Sinop - MT, this study aimed to isolate fungi with pathogenic potential in clipping instruments used in the routine of Pet Shops and to identify etiological agents capable of causing mycotic zoonoses. Samples were carried out in 18 clipping instruments, without cleaning, from 10 Pet Shops (A, B, C, D, E, F, G, H, I, J) in the city of Sinop - MT with swabs and sterile carpets square and then seeded in Sabouraud agar with 0.05% chloramphenicol and mycobiotic agar, incubated at room temperature (25°C) for 30 - 45 days. The dermatophytes and non-dermatophyte filamentous fungi were identified using the microculture technique and urease test and as yeasts using a urease test, zymogram, auxanogram, germ tube and corn meal agar with polysorbate 80. Of the samples from 18 clipping instruments, 15 were positive for at least one fungal genus. The yeast that showed a high prevalence of isolation in clipping instruments from the studied Pet Shops (B, C, D, E, H and J) was *Malassezia pachydermatis* (86.7%), followed by the genus *Candida spp.* (C and D; 26.7%), filamentous fungi of the genus *Aspergillus spp.* (A; 13.3%), *Microsporium canis* (B; 13.3%) and *Trichosporon spp.* (J, 6.7%). Our results demonstrate that Pet Shops treat a large number of animals daily in a single environment, which may amplify the risk of spreading zoonoses, as an asymptomatic or sick carrier animal can potentially transmit the microorganism to other animals inside the store and thus to a large number of new pet owners. There is a need to reinforce the commercial requirements specialized in bathing and grooming in the city of Sinop - MT on the good practices of cleaning and disinfection of the elements used and the environment, eliminating or eliminating the risk of contracting mycotic zoonoses.

**Keywords:** neglected fungal zoonoses, pets, mycosis.

**Introduction**

Pets have conquered the daily lives of families worldwide, promoting comfort in times of loss and change, self-esteem, social interaction, protection, being considered essential for human development (Giumellii & Santos, 2016). However, zoonoses can be directly transmitted through contact with infected animals; indirectly, through contact with the contaminated animal's environment; or via the vector route, involving transmission by

arthropods such as ticks, fleas or mosquitoes (Day, 2016).

The most common reasons for visiting veterinary clinics were related to dermatopathies, with dermatophytosis, malasseziosis and candidosis diagnosed in pets and that can cause diseases in humans (Galiza et al., 2014; Mattei et al.; 2014; Peano et al., 2020; Skeldon et al., 2020).

Dermatophytosis is a zoonosis disease, and the most common mycosis in dogs and can be transmitted to humans. Dermatophytes species are classified into three genus, *Epidermophyton*,

*Microsporum* and *Trichophyton*. The most cases in dogs are caused by *Microsporum canis*, *M. gypseum* and *Trichophyton mentagrophytes*. It can be transmitted through direct contact, both symptomatic and asymptomatic host, or by arthroconidia found in the environment. Fomites, such as brushes, blades and clipping instruments, are also potential transmitters and this is exacerbated by the fact that fungal structures of dermatophytes are resistant to environmental conditions in which infectious arthroconidia present in the fur and skin can survive for long periods (Moriello et al., 2017).

The genus *Malassezia* includes different yeast species are able to cause of dermatological diseases in humans and animals. *Malassezia pachydermatis* is a commensal organism found on the skin, in ear canals, and on the mucosal surfaces of healthy dogs that favourable growth conditions in the local environment allow the excessive multiplication of this organism, which may then function as an opportunistic secondary pathogen. Dogs may present with *Malassezia pachydermatis* otitis, dermatitis localised or generalised, or both, and other species, such as *M. furfur*, have been occasionally reported in cases of dermatitis or otitis (Peano et al., 2020).

The genus *Candida* includes several species, of which *Candida albicans* is the most common species isolated from humans and animals. Several non - *C.albicans* species have been identified in asymptomatic dogs and associated with disease such as *Candida parapsilosis* and *Candida tropicalis* (Skeldon et al., 2020).

High risk of cutaneous mycoses contagious in dogs, high cost of treatment and high risk of reoccurrence, does mycoses a public health problem (Chermette et al., 2008).

The cleaning and disinfecting surfaces and clipping instruments are recommended to control the spread of pathogens in environments, mechanically removing dirt that predisposes the growth of potentially pathogenic microorganisms (Andersen et al., 2009).

Studies show that dermatophytes, non-dermatophyte filamentous fungi (NDFF) and yeasts with pathogenic potential have been isolated in clipping instruments and bath utensils in veterinary clinics and Pet Shops (Bagcigil et al., 2010; Mattei et al., 2011; Mattei et al., 2014). In the absence of data in Sinop – MT, this study aimed to isolate potentially pathogenic fungi in clipping instruments used in Pet Shops capable to cause mycotic zoonoses.

## Materials and Methods

### Sample collection

The study sites were selected on the routine use of the clipping instrument, and collection was carried out on 18 instruments from 10 Pet Shops in Sinop - MT. The collections were carried out during the working of each Pet Shop, without cleaning of

the instruments. The samples of the clipping instruments were collected with sterile swabs and sterile carpets according to the "carpet square technique" (Mariat & Adan - Campos, 1967), stored in sterile Petri plates and transported to the laboratory for processing.

### Sample processing and identification of genera of filamentous and yeast fungi

The samples were individually spread over the surface of modified Sabouraud Dextrose agar plus chloramphenicol (40 mg/L) (SBR) (Sigma-Aldrich, St. Louis-MO, USA) and Mycobiotic agar (Difco), incubated in B.O.D. chamber (Solab, SL200/300) at 25 °C. Before the cultures were considered negative for the presence of fungi, they were observed daily for 30 days to verify fungal growth.

The fungal genera were identified by macro- and microscopic observations, namely morphology of hyphae, conidia, or spores and colonies that grew on the culture media. The filamentous fungi were identified by using diagnostic keys and descriptions reported by Pitt and Hocking in 2009 and Lacaz in 2002. The yeast-like fungi were identified by employing the diagnostic key and descriptions published by Kurtzman and Fell in 1998.

## Results and discussion

Among the 18 clippings instruments evaluated from 10 Pet Shops (A, B, C, D, E, F, G, H, I, J), 15 were positive for at least one pathogenic fungal genus, some instruments presented more than one fungus (Table 1). The high frequency of potentially pathogenic yeast specie in clipping instruments evaluated in Pet Shops (B, C, D, E, H and J) was *Malassezia pachydermatis*, followed by *Candida spp.* (C e D), *Aspergillus spp.* (A), *Microsporum canis* (B) and *Trichosporon spp.* (J).

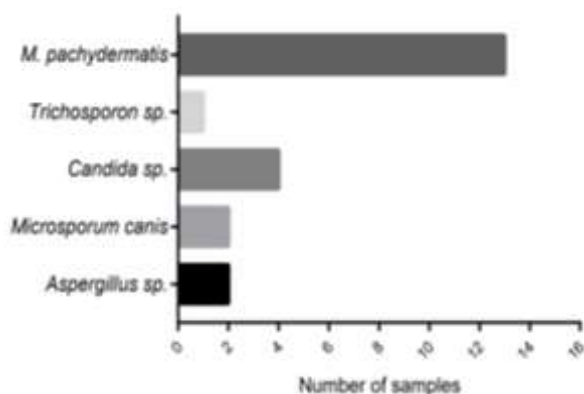
**Table 1.** Potentially pathogenic fungi isolated in clipping instruments used for pets in Pet Shops

Pet Shops	Clipping Instruments (n)	Fungi
A	2	<i>Aspergillus spp.</i>
B	3	<i>Microsporum canis</i> e <i>Malassezia pachydermatis</i>
C	2	<i>Candida spp.</i> e <i>M. pachydermatis</i>
D	2	<i>Candida spp.</i> e <i>M. pachydermatis</i>
E	2	<i>M. pachydermatis</i>
F	1	-
G	1	-
H	2	<i>M. pachydermatis</i>
I	1	-
J	2	<i>M. pachydermatis</i> e <i>Trichosporon spp.</i>

n: number of clipping instruments.

A comparison of the causative agents of mycoses over the 15 clippings instruments showed that *Malassezia pachydermatis* was the most common causative agent, with 86.7%, followed in

order by *Candida sp.* (26.7%), *Aspergillus sp.* (13.3%), *Microsporium canis* (13.3%), and *Trichosporon* (6.7%) (Figure 1).



**Figure 1:** The occurrence of potentially pathogenic fungi in clipping instruments.

Studies show that dermatophytes, non-dermatophyte filamentous fungi (NDF) and yeasts with pathogenic potential have been isolated in clipping instruments and bath utensils in veterinary clinics and Pet Shops (Bagcigil et al., 2010; Mattei et al., 2011; Mattei et al., 2014).

Our results showed positivity for more than one potentially pathogenic fungus genus isolated from clipping instruments 86.7% (n = 13) of *Malassezia pachydermatis*, 26.7% (n = 4) for *Candida sp.*, 13.3% (n = 2) for *Aspergillus sp.*, 13.3% (n = 2) for *Microsporium canis*, and 6.7% (n = 1) for *Trichosporon*. Similar results were found in clipping instruments in Pelotas – RS, isolated 37 (47,4%) yeasts for genus *Malassezia*, 27 (34,6%) for *Candida*, 2 (2,5%) for *Trichosporon*, 12 (15,3%) *Rhodotorula*, and negative for dermatophytes (Mattei et al., 2014). According to a study conducted by Carobeli et al. (2019) were isolated the presence of filamentous and yeast fungi in objects used in bathing and grooming at a Pet Shop in Maringá – PR, 33% for *Candida*, 37% for *Rhodotorula*, 13% for *Trichosporon*, and 14% for *Fusarium*, 11% for *Scedosporium*, 11% *Curvularia* and 3% for *Aspergillus sp.*

The high frequency of *Malassezia pachydermatis* (86.7%; n = 13) in clipping instruments in different Pet Shops in Sinop – MT, some authors suggest that this can be explained that yeast is a component of the microbiota of dogs and cats, and is biofilm formation, hindering its the removal of organic material and significant reduction and elimination of microbial contamination from surfaces and bathing and grooming utensils (Nakagaki et al., 2000; Mattei et al., 2014). This species can cause otitis and dermatitis in these animals and diseases in humans, showing the importance of cleaning and disinfecting environmental surfaces and fomites to prevent contamination of other animals (Peano et al., 2020).

Here, the most isolated opportunistic yeasts were *Candida spp.* (26,7%), followed by *Trichosporon spp.* (6,7%), similar results have been

identified in symptomatic dogs and cats and associated with urinary tract infections in dogs and cats, candidiasis and seborrheic dermatitis in dogs, fungal pneumonia in a dog, and nasal fungal granuloma in a cat (Melchert et al., 2008; Galiza et al., 2014; Mattei et al., 2014). These yeasts are a commensal but under favorable growth conditions allow the excessive multiplication of these microorganisms, which may then function as a pathogen of pets and humans (Colombo et al., 2011; Skeldon et al., 2020).

Of the clipping instruments evaluated, 13.3% were contaminated by *Aspergillus spp.* Studies showed that *Aspergillus* species were capable of causing lesions in the canine nasal cavity, and may progress to a disseminated form of the disease (Day, 2006; Peeters & Clercx, 2007; Galiza et al., 2014). *Aspergillus* species are saprophytic and not pathogenic to plants, animals and humans, however, they can penetrate at the site of trauma and, may cause mycoses or severe complications in immunocompromised animals (GALIZA et al., 2014).

The presente study were isolated 13,3% for *Microsporium canis* in clippings instruments, and can be spread from animal-to-animal and between animals and humans through a variety of transmission routes and contaminated fomites (Dahdah & Scher, 2008; Madrid et al., 2012). Dermatophytosis is one of the most frequent fungal infections in domestic and wild animals (Miller et al., 2013; Moriello et al., 2017), with *M. canis* is the most common dermatophyte in dogs and cats and children (Mattei et al., 2014; Murmu et al., 2015).

## Conclusion

Pet shops may amplify the risk of spreading zoonoses, as an symptomatic or asymptomatic animal can potentially transmit the microorganism to other animals within the store and, thus, to a large number of new pet owners, who may be geographically dispersed. Therefore, Pet shops can act to minimise the risk of mycotic zoonoses as far as possible.

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