











Feline sporotrichosis in the municipality of Cachoeirinha, Rio Grande do Sul: Case report

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Abstract. The One Health concept refers to the inseparability of human, animal and environmental health. The absence of well-being among any of these components generates an imbalance in global health, since One Health was developed from the term “One World, One Health”. Among the factors that jeopardize the balance between the three components mentioned, zoonoses stand out, diseases shared between humans and animals through agents with a microbiological nature. In Brazil, the metropolitan region of Porto Alegre, located in Rio Grande do Sul, encompasses a wide variety of zoonotic microorganisms with a high rate of dissemination through the interaction between the two species and due to the high population of both, such as sporotrichosis. Therefore, the present study aimed to contribute to the concept of one health by seeking to perform the microbiological diagnosis of animals treated at a Veterinary Clinical Center located in the city of Cachoeirinha, Rio Grande do Sul. To this end, monitoring of care provided during the months of March, April and May 2024 was carried out, and samples were collected in cases where there was suspicion of injury caused by microbial agents. The results confirm the high incidence of sporotrichosis in the region and highlight the importance of measures to prevent, diagnose and treat this and other diseases caused by microorganisms. Thus, multidisciplinary action in disseminating knowledge could reduce the impact of zoonoses and other diseases of microbial etiology in the community.

Keywords: Microbiology, one health, *Sporothrix* sp

Esporotricose felina no município de Cachoeirinha, Rio Grande do Sul: Relato de caso

Resumo. O conceito *One Health* refere-se à indissociabilidade da saúde humana, animal e ambiental. A ausência de bem-estar entre qualquer um desses componentes gera um desequilíbrio na saúde global, uma vez que *One Health* foi desenvolvido a partir do termo “One World, One Health”. Dentre os fatores que colocam em risco o equilíbrio entre os três componentes citados, destacam-se as zoonoses, doenças compartilhadas entre humanos e animais por meio de agentes de natureza microbiológica. No Brasil, a região metropolitana de Porto Alegre, localizada no Rio Grande do Sul, engloba uma grande variedade de microrganismos zoonóticos com alta taxa de disseminação pela interação entre as duas espécies e pela alta população de ambas, como a esporotricose. Portanto, o presente estudo teve como objetivo contribuir para o conceito de *One Health* buscando realizar o diagnóstico microbiológico de animais atendidos em um Centro Clínico Veterinário localizado na cidade de Cachoeirinha, Rio Grande do Sul. Para tanto, foi realizado o monitoramento dos atendimentos realizados durante os meses de março, abril

e maio de 2024, sendo coletadas amostras nos casos em que houve suspeita de agravo causado por agentes microbianos. Os resultados confirmam a alta incidência de esporotricose na região e ressaltam a importância de medidas de prevenção, diagnóstico e tratamento desta e de outras doenças causadas por microrganismos. Assim, a atuação multidisciplinar na disseminação do conhecimento poderá reduzir o impacto das zoonoses e outras doenças de etiologia microbiana na comunidade.

Palavras-chave: Microbiologia, saúde única, *Sporothrix* sp

Introduction

In 2008, the World Health Organization (WHO), the World Organization for Animal Health (OIE), and the Food and Agriculture Organization of the United Nations (FAO) launched an initiative called "One World, One Health," in which the term "One Health" was the suggested concept to demonstrate the inseparability of human, animal, and environmental health ([Carnero & Pettan-Brewer, 2021](#); [Gibbs & Anderson, 2009](#); [Kahn, 2017](#); [Salmanov et al., 2018](#)). One Health is a scientifically established and validated concept of great social importance that initially emerged from the integrated study of zoonoses ([Bezerra et al., 2021](#); [Kahn, 2017](#); [Osburn et al., 2009](#); [Salmanov et al., 2018](#)).

The term zoonosis was first used in 1855 by physician and anthropologist Rudolf Virchow and refers to diseases shared between humans and other animals ([Bagot & Arya, 2008](#); [Sánchez et al., 2022](#)). Among the determinants associated with the emergence of zoonoses are human interaction with ecosystems, biodiversity loss, land-use changes, climate change, and the trade and consumption of wildlife, which facilitate interactions between infectious agents and the human species ([Sánchez et al., 2022](#)). Thus, it is evident that the One Health concept is strictly linked to and threatened by zoonotic diseases. It is estimated that 61.6% of pathogens affecting humans are zoonotic. Additionally, 75% of pathogens are considered emerging in both the human species and other wild animals ([Sánchez et al., 2022](#)). For example, among the main diseases currently affecting humans and animals is sporotrichosis, a subcutaneous mycosis caused by thermophilic fungi belonging to the genus *Sporothrix*. Currently, there are approximately 53 species within the *Sporothrix* genus, with certain species of clinical significance, such as *Sporothrix brasiliensis*, which has a high prevalence in Latin America ([Ramos et al., 2024](#)).

The disease is both neglected and emerging, affecting humans and animals, causing severe public health issues, and is currently considered an unprecedented zoonotic epidemic in Brazil, especially in the Southeast and South regions, where *Sporothrix brasiliensis* is the primary species infecting cats ([Baptista et al., 2021](#)). In recent decades, the main transmission mode of this disease has shifted to zoonotic transmission, particularly through scratches or bites from infected mammalian animals, especially domestic cats. As a result, there has been a significant increase in the endemic incidence of this mycosis in some regions of Brazil, including Rio Grande do Sul ([Ramos et al., 2024](#)). The clinical manifestation of sporotrichosis in cats varies from skin lesions such as ulcers and nodules to mucosal infections and respiratory issues. In more severe cases, the fungus may spread, a process dependent on the host's predisposition and the virulence of *Sporothrix* sp. ([Ramos et al., 2024](#)).

Therefore, adopting practices aimed at promoting health among animals and the human population is essential for combating and preventing toxoplasmosis and other zoonoses. In Brazil, the municipality of Porto Alegre conducts prenatal screening for congenital toxoplasmosis ([Mitsuka-Breganó et al., 2010](#)). Including the previously mentioned diseases, it is estimated that there are currently over 200 types of zoonoses ([Gremião et al., 2020](#)). Given these established facts, it is crucial to emphasize the importance of preventive measures, proper diagnosis, and treatment of diseases caused by microorganisms through the interaction of healthcare professionals using the One Health approach. One Health is an integrated and unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems. It recognizes that the health of humans, animals, plants, and the overall environment (including ecosystems) is strictly interconnected and interdependent ([Sánchez et al., 2022](#)).

It is evident that human interaction with animals contributes to the spread of pathogenic agents. For example, the Metropolitan Region of Porto Alegre has an estimated population of approximately 4.4

million inhabitants ([IBGE, 2020](#)), while the animal population includes around 815,400 dogs and cats ([GCA, 2024](#)). The increasingly close coexistence between humans and animals ([Valente Sá, 2018](#)) combined with the estimated population numbers of both, justifies the high incidence of zoonotic diseases in the region. For instance, dog owners are 2.17 times more at risk of contracting leishmaniasis (LV) compared to individuals without dogs. The risk increases further with the number of dogs per household, as owners with two dogs have a 3.36 times higher risk than those without dogs ([Valente Sá, 2018](#)). The number of cases has increased in areas where the vector was previously absent, such as in the state of Rio Grande do Sul, gaining epidemiological significance in the Brazilian healthcare system ([Valente Sá, 2018](#)).

The present study aimed to contribute to the One Health concept by conducting microbiological diagnoses of animals treated at a Veterinary Clinical Center located in the municipality of Cachoeirinha, Rio Grande do Sul, Brasil.

Ethical aspects

The present study was previously submitted to and approved by the Ethics Committee on Animal Use of Centro Universitário CESUCA (protocol N°. 008/2024).

Sample collection

For the present study, consultations conducted at the Veterinary Clinical Center of an institution located in the municipality of Cachoeirinha, Rio Grande do Sul, Brasil, were monitored during the months of March, April, and May by professors and students from the Veterinary Medicine and Biomedicine programs. Samples suspected of containing lesions caused by microbial agents were collected using a sterile swab in a transport medium.

Microbiological processing of samples

Samples suspected of sporotrichosis were first subjected to direct examination (Gram staining) and subsequently inoculated onto Sabouraud agar. They were incubated at 25°C for seven days, with daily monitoring to identify fungal structure growth. For Sabouraud agar plates where fungal colony growth was observed, the adhesive tape technique was performed ([Burton & Engelkirk, 2005](#)). The results obtained were compared with the findings from the direct examination of the samples.

Results and discussion

Three cases are presented in the figure below. In A and B, the case of feline with skin lesions on the right forelimb and left hindlimb is reported. The owner reported difficulty in healing the lesions. Direct examination revealed the presence of moderate cellularity composed of macrophages and neutrophils, in addition to yeast-like structures. Microbiological culture showed the presence of delicate, hyaline, septate filamentous structures (hyphae) and conidiophores that give rise to conidia. In C and D, the case of a feline with deep lesions on the left hindlimb is reported, and the owner also reported difficulty in healing. Direct examination revealed high leukocyte cellularity and the presence of yeast-like structures. The culture showed numerous septate hyphae and conidia that resembled “daisy flowers”. In E and F, we report the case of a feline that was rescued by a local non-governmental organization that immediately began using antifungals due to the severity of the lesions. Direct examination revealed the presence of yeast-like structures, but the culture examination did not show filamentous structures, probably due to the use of antifungals.

In the present study, it was possible to perform the microbiological diagnosis of sporotrichosis in three felines treated, thus making macroscopic and microscopic comparisons in relation to the findings of other studies. According to other authors, the disease is histologically related to a predominantly granulomatous inflammatory response, with variations mainly in the predominance of macrophages or epithelioid cells and in the other components of the inflammatory response ([Bazzi et al., 2016](#)), with characteristic oval or elongated cigar-shaped yeast cells with 2 to 6 µm in diameter ([Charles et al., 2017](#)). In experimental studies in mice, it was noted that the histopathological lesions of sporotrichosis vary with the stage of the disease, initially with the formation of abscesses and a high fungal load associated

with the participation of macrophages and lymphocytes (Miranda et al., 2013). During the course of the disease, macrophages are activated and differentiate, forming granulomas, there is a decrease in the fungal load, a reduction in abscesses and an increase in the number of plasma cells (Miranda et al., 2013).

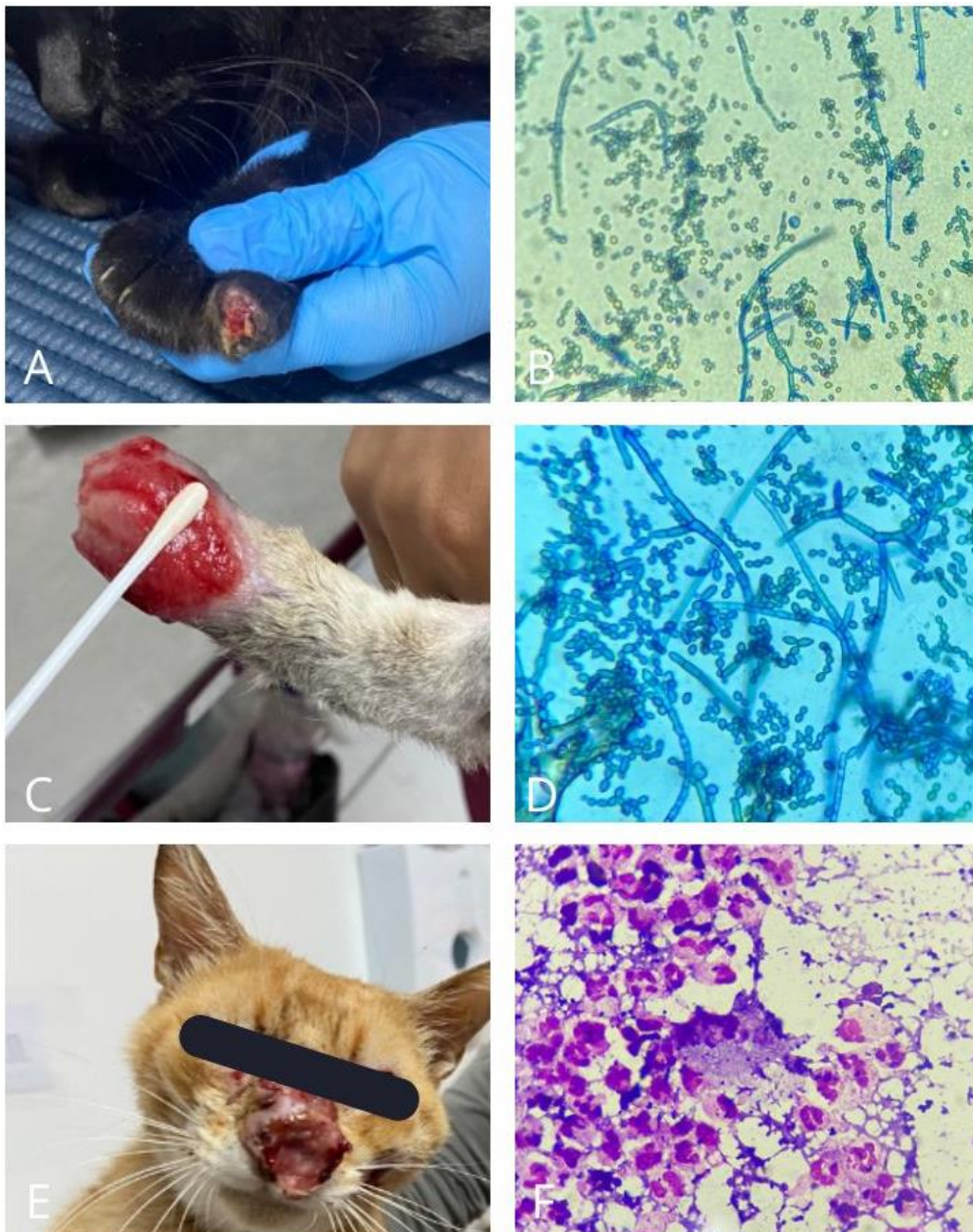


Figure 1. In **A**, **C** and **E** are represented figures of the lesions, and in **B**, **D** and **F** are represented what was observed microscopically.

Regarding the macroscopic characteristics of the lesions, the reviewed studies defined the lesions as a single skin lesion or as several disseminated lesions with systemic and even fatal involvement, with nodules and ulcers being the most common types (Silva et al., 2022). When the feline has respiratory disease, it indicates that sporotrichosis is progressing towards the worst course of the disease and probably indicates treatment failure (Silva et al., 2022). The histopathology of lesions on the nose of cats associated with *Sporothrix* spp. demonstrates a high frequency of poorly organized granulomas, with severe pyogranulomatous inflammation infiltrating subcutaneous tissue, mucosa, muscle, cartilage and bone, and a high fungal load. Well-organized granulomas and the presence of epithelioid cells were associated with control of fungal load and good general condition (Silva et al., 2022).

Transmission of the disease occurs through the most relevant pathogenic species *Sporothrix schenckii* sensu stricto, *S. brasiliensis*, *S. globosa* and *S. mexicana* (Schechtman et al., 2022), with *S. brasiliensis* being present in 96.5% of the cases studied in Brazil and having been described as the most virulent species and manifesting with atypical presentations, such as disseminated sporotrichosis in immunocompetent patients, conjunctival or mucosal involvement and hypersensitivity reactions (Schechtman et al., 2022). It is speculated that *S. brasiliensis* managed to infect cats through the ingestion of infected rats (which are also infected through ingestion) and, subsequently, the fungus managed to adapt to cat saliva since its body temperature varies between 37.7 and 39.1° C. The pH of its saliva is 7.5–8.0, conditions similar to those of decomposing plant material, where the fungus is found in the environment (Bonifaz et al., 2024).

A recent study (Morgado et al., 2022) mentions that South America is the continent with the highest prevalence of animal sporotrichosis (81%), followed by Asia and Europe. In South America, most isolates are concentrated in Brazil (Veasey et al., 2022) and then in Argentina, and occur mainly in cats, followed by dogs (Almeida-Silva et al., 2022). As previously mentioned, the most commonly reported species in these demographic areas ends up being *S. brasiliensis*. In the present study, the phenotypic identifications performed can identify the genus, but not the species of *Sporothrix*. Molecular tests would be necessary to identify the species (Thomson et al., 2023). However, regardless of the species, itraconazole remains the drug of choice for the treatment of feline sporotrichosis and its efficacy as monotherapy has been previously documented by several authors (Barros et al., 2010; Gonçalves et al., 2019; Gremião et al., 2015; Souza et al., 2018).

According to the World Health Organization (WHO, 2023), the control of this variant also requires collaboration between multidisciplinary veterinary medical teams. There is also an association between some sporotrichosis outbreaks and climatic events in cases of flooding, suggesting that the occurrence of this mycosis may be affected by climate change (Toriello et al., 2022; WHO, 2023). The fact is that environmental factors triggered by global warming may be causing imbalances in ecosystems, leading to greater exposure of animals and humans to new pathogens, and favoring the adaptation and resistance of existing species (Bonifaz et al., 2024). Therefore, environmental disturbances caused by large-scale natural events, such as hurricanes, tornadoes, and floods, can alter the environment's growth, distribution, and dispersion of fungi (Smith & Casadevall, 2023).

Human sporotrichosis has long been associated with a sporadic disease among rural residents, especially farmers (Brandolt et al., 2019). Although this is no longer the endemic reality of the disease, it is known that sporotrichosis is probably misdiagnosed in endemic areas, either due to lack of knowledge by attending physicians or as a result of general and nonspecific clinical signs and symptoms in humans (Orofino-Costa et al., 2017; Rodrigues et al., 2020).

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