Medical Mycology, 2025, **63**, myaf051
https://doi.org/10.1093/mmy/myaf051
Original Article
Advance access publication date: 9 June 2025

Cat-transmitted sporotrichosis by *Sporothrix brasiliensis*: Focus on its potential transmission routes and epidemiological profile

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Abstract

Cat-transmitted sporotrichosis (CTS) by *Sporothrix brasiliensis* is an important epizoonosis with alarming numbers of cases involving felines, canines, and humans. Considering the increasing incidence of CTS this study sought to elucidate the epidemiological characteristics of cats with sporotrichosis and evaluate the potential transmission routes of *S. brasiliensis* in several biological samples from cats with sporotrichosis. Samples were collected from ulcerated skin lesions, front paws, nasal cavity, and droplets collected from sick cats during sneezing episodes in a veterinarian university hospital, in the city of Curitiba, southern Brazil, between June 2021 and April 2022. A total of 100 cats with sporotrichosis were enrolled in the study. The fungus was isolated in 60% of samples from the nasal cavity and 71% of respiratory droplets. The growth of *S. brasiliensis* on the right and left front paw was observed in 41% of the cats included, and in 38%, there was growth of the fungus even without an apparent lesion on the paw. Of the infected cats, 64% had multifocal lesions throughout the body. The identification of *S. brasiliensis* in samples of exudate, paws, nasal cavity, and sneeze droplets suggests that transmission can occur not only through classic routes, but also through the movement of the infected cat, as well as through respiratory droplets expelled by the cat sneezing or nasal drip. Furthermore, the presence of *S. brasiliensis* on the paws of sick cats indicates the possibility that the fungus is being disseminated in the environment in which the animal lives.

Lay Summary

Cat-transmitted sporotrichosis, caused by *Sporothrix brasiliensis*, is an emerging fungal disease that has become a major public health concern in Brazil. *Sporothrix brasiliensis* has been isolated from several biological samples, suggesting non-classical routes of transmission of sporotrichosis.

Key words: *Sporothrix brasiliensis*, sporotrichosis, zoonotic infection, transmission route, public health.

Introduction

Sporothrix brasiliensis, a thermo-dimorphic fungus, is the most prevalent agent of epi-zoonotic sporotrichosis in Brazil and its emerging in South American bordering countries.[1–4] In Brazil, Cat-transmitted sporotrichosis (CTS) affects thousands of humans, domestic cats and dogs.[5–9]

The most common transmission routes include the traumatic transcutaneous or transmucosal implantation of the yeast cells through scratches and bites.[10] Exudates from feline ulcerative mucocutaneous lesions may harbor a huge yeast burden and be capable of infecting the ocular mucosa even without a history of trauma.[11,12] Recently, Bastos et al.[13] identified that respiratory samples from cats with sporotrichosis are also potential sources of transmission of *S. brasiliensis* respiratory droplets created by a sneeze contain viable *Sporothrix* yeast that can infect humans and other animals that have experienced mucocutaneous exposure. Other studies also highlight the isolation of *Sporothrix* spp. on the paws of apparently healthy cats, which may indicate a possible source of transmission from colonized paws.[14,15]

Since it became a notifiable disease in the state of Paraná (SESA Resolution No. 93/2022), in 2024 the number of confirmed cases, according to epidemiological data from the Paraná State Health Department (SESA), reached 4816, 932, and 50, in cats, humans, and in dogs, respectively. Other regions in Brazil also reported outbreaks like Rio de Janeiro, Rio Grande do Sul, Minas Gerais, Espirito Santo, and São Paulo.[6,16–20] In recent decades, CTS has also had wide geographic expansion in countries in Latin America with few cases already reported in Europe and North America.[1,21,22]

Received: March 14, 2025. **Revised:** May 2, 2025. **Accepted:** June 6, 2025

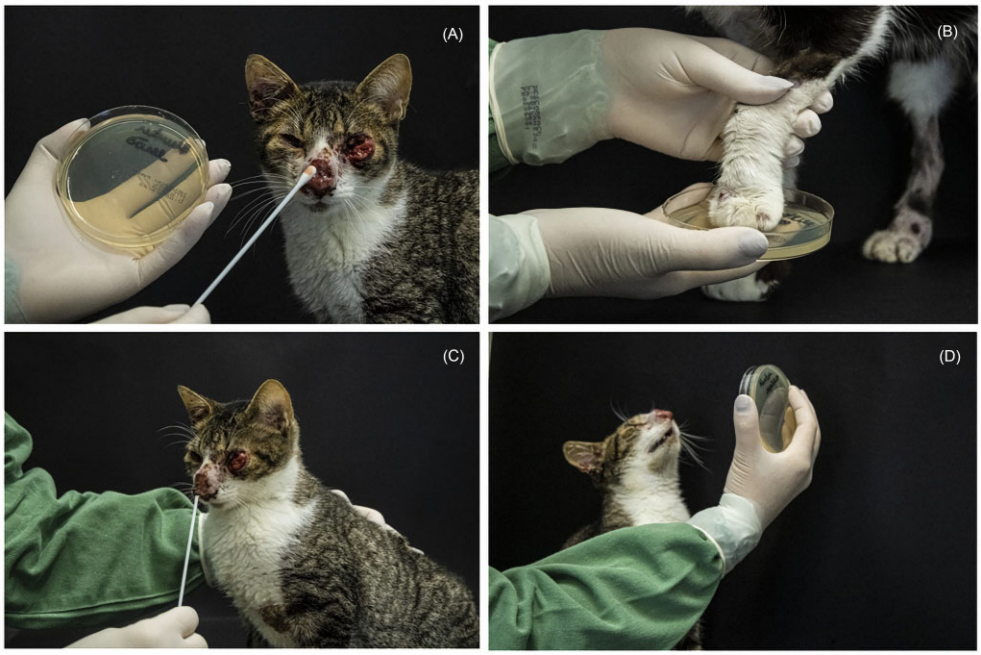

Figure 1. Sequence for collecting biological samples from a cat with sporotrichosis. (A) Exudate from an ulcerated lesion collected by sterile swab; (B) Paw imprint in culture medium/Mycosel agar; (C) Secretion collected by sterile swab introduced into the nasal cavity; and (D) Collection of droplets/respiratory secretions expelled during sneezing.

This study intended to contribute to expanding knowledge about the epidemiological aspects of the disease in felines, which indirectly helps in understanding the spread of human cases in the state. Furthermore, identifying other possible transmission routes through the analysis of biological materials from cats helps us to understand human cases in which there is no inoculation of the fungus through the classic routes of biting and scratching. Thus, the study aimed to elucidate the epidemiological characteristics of infected cats and evaluate the potential transmission routes of *S. brasiliensis* in several biological samples from cats with sporotrichosis in the city of Curitiba, Paraná State, Brazil.

Materials and methods

Study design

This was a prospective study that included cats treated at a veterinary teaching hospital in Curitiba, southern Brazil, between June 2021 and April 2022 with suspected sporotrichosis. The inclusion criteria were domestic cats with clinical and/or epidemiological suspicion of sporotrichosis, presenting at least one skin lesion.

Animal sample collection

For each cat included in the study ($n = 100$), different biological materials were collected: ulcerated skin lesions ($n = 100$), right and left front paws ($n = 200$), nasal cavity ($n = 100$), and droplets expelled by sneezing ($n = 28$).

The skin lesions and nasal cavities were collected using a sterile swab (Fig. 1A,C). A direct imprint was made on the Mycosel agar culture medium from the right and left front paws regardless of the presence of lesions (Fig. 1B). For respiratory secretions droplets expelled during sneezing, a Mycosel agar plate (Becton Dickinson - BD) was placed in front of the animal's nostrils, and a sterile swab was used to stimulate sneezing (Fig. 1D).

Data source and data collection

Epidemiological data were collected through a structured questionnaire, covering detailed information such as gender, age, weight, neighborhood of residence, lifestyle, reproductive status, as well as aspects such as contact with other animals, plants, and soil.

According to the location and number of lesions, clinical forms were classified into fixed forms, lymphocutaneous, disseminated form, and ocular forms. To collect the exudate samples, at least one lesion was required along the length of the animal's body (unifocal) or multiple lesions spread across the body (multifocal). To collect the paws and nasal cavity the animal could have lesions or not (Supplemental Content 1).

Laboratory tests

Cytopathological was performed only on ulcerated skin lesions, while fungal culture was performed on all types of specimens (ulcerated skin lesions, nasal cavity, paws, and sneeze). In cats with multiple skin ulcers, cytopathology and culture were collected from the same lesion and the most affected region. For cytological evaluation, the slides were fixed and stained using a Romanowsky-type stain (Rapid Panothic-Laborclin) to visualize fungal structures. Mycosel agar was utilized for fungal culture. All samples were incubated at 25°C–30°C until 30 days. Once the colonies had grown, they were identified by micromorphology and molecular sequencing. Isolated strains were identified by micromorphology as *Sporothrix* spp. according to the Atlas of clinical fungi.[23]

Molecular analysis

Sporothrix isolates were identified at species level by partial Calmodulin sequence. DNA extraction was performed by using a cetyltrimethylammonium bromide protocol,[24] followed by PCR amplification using primers CL1 (5′-GAR TWC AAG GAG GCC TTC TC-3′) and CL2A (5′-TTT TTG CAT CAT GAG TTG GAC-3′), and by sequenced amplicons using a BigDye Terminator v3.1 Cycle Sequencing Kit (Applied Biosystems). Consensus sequences were produced using BioEdit v 7.2.5, and alignment was performed using MAFFT online interface. Finally, phylogenetic reconstructions were done in MEGA v7.0.26, using maximum likelihood with 1000 bootstrap replicates.

All isolates with molecular characterization were deposited in the Microbiological Collection of Parana Network/Taxonline (https://www.cmrp-taxonline.com/) (Supplemental Content 2).

Statistical analysis

To analyze the epidemiological and demographic profile of the animals, a descriptive statistical analysis was performed. For data related to the results of biological sample collections, Microsoft Excel® 365 and Minitab® 19 spreadsheets were used. For inferential analysis, Pearson's χ^2 distribution was applied for association, and the value of $P < .05$ was considered statistically.

Ethics statement

This study was approved by the Ethics Committee on Research in the Use of Animals of the Pontificia Universidade Católica do Paraná under the registration number 01 691/2019.

Results

A total of 100 cats were enrolled in the study with confirmed sporotrichosis by culture. The disease was more prevalent in male cats (66%), aged between 1 and 2 years (49%), and average weight of 3.97 kg (range 1.6–7.6). Most of the cats were not castrated (57%). In 77% of cases, the owners had other animals in the same residence. Of those, 66% were cats, 10% were dogs, and a single guardian had a domestic rabbit ($n = 1$). In 25% of the cases, the cat had contact with another sick cat in the same residence. Additional information and details are presented in Table 1.

Feline sporotrichosis was reported in 31/75 neighborhoods in the city of Curitiba and 4/29 municipalities in the city's metropolitan region (Fig. 2). In the analysis, 57% of the cats were indoors with outdoor access.

Isolation methods and characterization of the strains

A total of 100 cytological examination and 428 culture specimens were done to confirm the sporotrichosis infection in the cats. Fungal culture demonstrated growth of filamentous colonies, with membranous and white aspects in 56% of collected samples ($n = 240$) (Fig. 3A). Cytologic analyses showed presence of oval and elongated yeastlike cells in a cigar form that are compatible with *Sporothrix* spp. in 50% of cases (Fig. 3B). Microscopic analysis showed hyaline, thin, septate, and branched hyphae, with unicellular, hyaline or brown conidia, globose to ovoid, resembling a daisy flower, compatible with genus *Sporothrix*(Fig. 3C).

From the 28 samples collected from respiratory secretions eliminated by sneezing, 20 (71%) showed growth of *Sporothrix* spp. Regarding culture collected from the nasal cavity, *Sporothrix* spp. was observed in 60% (60/100) of sam-

Table 1. Demographic characteristics of 100 cats with sporotrichosis in Curitiba, Brazil.

Demographic variables	TOTAL *N* (%)
Age (years)	
< 1	7 (7%)
1–2	49 (49%)
3–4	21 (21%)
5–6	17 (17%)
7–8	6 (6%)
Sex	
Male	66 (66%)
Female	34 (34%)
Neutering	
Yes	38 (38%)
No	57 (57%)
Not informed	5 (5%)
Cat's lifestyle	
Indoor	35 (35%)
Indoor with outdoor access	57 (57%)
stray cats	8 (8%)
Contact with other sick cats	
Yes	25 (725%)
No	75 (75%)
Contact with soil and plants	
Yes	86 (86%)
No	14 (14%)

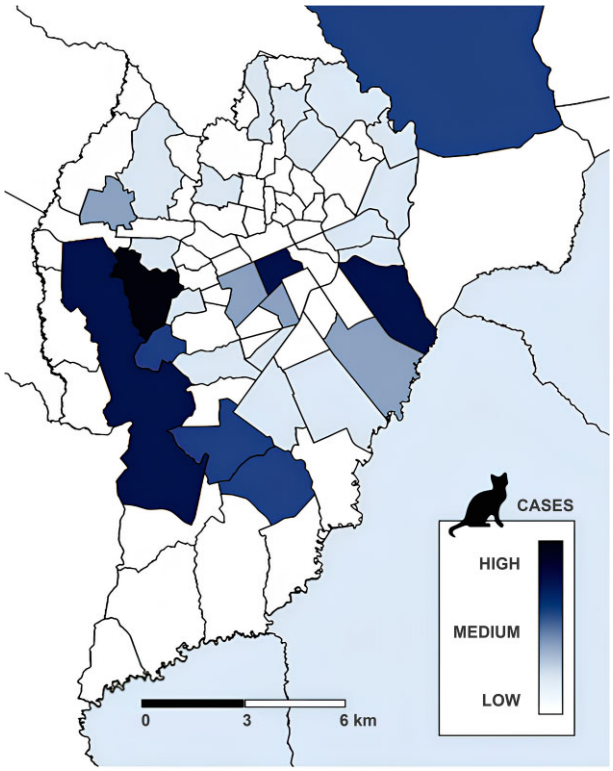

Figure 2. Distribution of feline sporotrichosis cases in the city and metropolitan region of Curitiba/Brazil between 2021 and 2022.

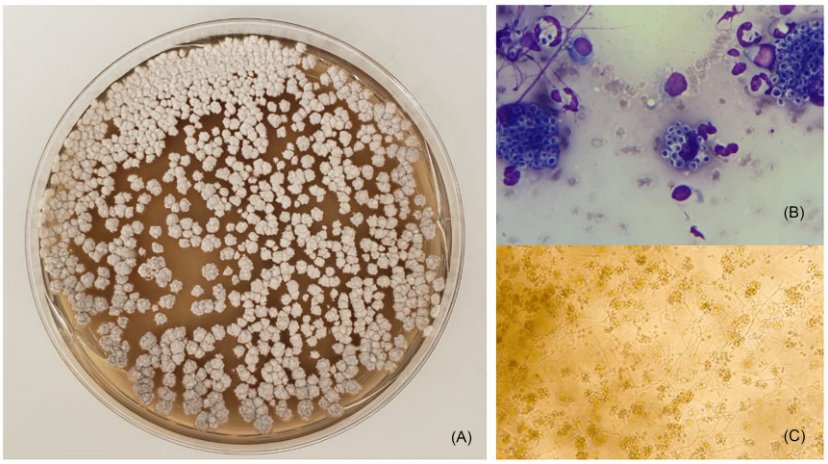

Figure 3. (A) Macromorphology on Mycosel agar of *Sporothrix* in filamentous phase; (B) Impression smear from skin ulcer showing numerous yeast cells (1000x magnification); and (C) Micromorphology of *Sporothrix* in the filamentous phase (400x increase).

ples, of that, the fungal culture was positive in 68% of cats with sporotrichosis nasal cavity lesion (34/50) and in 52% of samples collected from cats without any nasal abnormities (26/50) ($P = .102$, Table 2).

Considering the cultures of samples collected from the front paws (right and left), *Sporothrix brasiliensis* growth was observed in 40% (81/200) of them. Of the cats that had no apparent lesions on their paws, the fungal culture was positive in 38% (67/178) of the samples, while cats with paw lesions had a positive culture in 64% (14/22) of the cases ($P < .05$, Table 2).

Regarding the distribution of skin lesions, 36% of the cats had unifocal lesions and 64% of the cats had multifocal lesions. Fungal culture has higher isolation in cats with multifocal lesions (92%, 59/64) when compared with unifocal lesions (56%, 30/36) (Table 2).

Of the skin lesion samples, 79% ($n = 100$) have a culture positivity, of that, 96% ($n = 48$) have both positivity for culture and cytological examination. However, in 62% ($n = 31$) of the cases, positivity was observed only in the culture samples with negative result for the cytological examination.

Of the 100 animals in the study, 74% (74/100) were analyzed by molecular identification. The phylogenetic reconstruction of the calmodulin gene sequence clustered all isolates, with *S. brasiliensis*, identified the species as the only etiological agent (Fig. 4). Of these, 28.4% were from cat sneezes (21/74), 12.2% were from lesions on the cat's right or left paw (9/74), 17.6% from nasal lesions ($n = 13/74$), and 41.9% from other sporotrichosis lesions (31/74) (Supplemental Content 2).

Discussion

The present study provides insights into the potential transmission routes of *Sporothrix brasiliensis* to humans, demonstrating that even without apparent skin lesions in some felines, the fungus was isolated and may play an important role in the transmission of sporotrichosis. Furthermore, it describes geographic and epidemiological information about cats treated in Curitiba and nearby.

A higher prevalence was observed in unneutered male cats of reproductive age and with free access to the street. These data corroborate with data already published which suggests that cats with the habit of going outside are more susceptible to becoming infected than cats, that don't use go out to fight for food, territory, or by the female.[6,25,26] In another study, it was observed that the chances of *Sporothrix* positivity in animals that live partially at home are 3.02 times greater than in cats that do not have access to the street.[27]

In this study, we observed that 25% of animals may become infected after having contact with another sick cat in the same residence. It is noteworthy from these data that guidance to the owner must be clear and objective, highlighting that the animal diagnosed with sporotrichosis must be isolated from the others until clinical cure, which can vary from weeks to months (median time 4 months).[28,29] In the study by Paiva et al.,[30] the authors observed that the distance between animals is linked to cases of spread of the fungus, so it is essential to keep the cat in a separate environment, to minimize direct contact with other animals and humans.

Almost all infected animals had contact with soil and plants, which could be a potential route of environmental transmission. In the study by Lecca et al.,[27] there was no statistically significant association between environmental variables and a positive diagnosis for sporotrichosis. Macêdo-Sales et al.[25] also evaluated contact with plants and soil and the results demonstrated that 72% of cats that had contact with soil and/or plants had a positive culture, a lower percentage than cats' healthy people in contact with the environment. Nahal et al.,[31] 49% of human patients reported trauma involving plants and/or contact with soil, with *S. brasiliensis* being the predominant species. For the authors, non-zoonotic sporotrichosis is associated with infections acquired after traumatic inoculation with plants and/or contact with soil. Although the possibility of a classic route of transmission from soil and plants should not be ruled out, studies appear to support the hypothesis that direct transmission from infected cats plays a more important role in the transmission and ongoing outbreaks of sporotrichosis in Brazil.[27,32]

Cats with ulcerated lesions, mainly containing exudate, are more susceptible to transmitting *Sporothrix*, either through direct contact or through wiggling (the act of shaking the body), affecting mostly mucous membranes, including the

Table 2. Isolation of *Sporothrix* spp. from different clinical samples.

Variable (*N*)		Positive culture (%)	Negative culture (%)	*P*-value
Droplets from the sneeze (28)		20 (71%)	8 (29%)	
Nasal cavity (100)				.102
	With injury (50)	34 (68%)	16 (32%)	
	Without injury (50)	26 (52%)	24 (48%)	
Paws (200)				.019*
	With lesions (22)	14 (64%)	8 (36%)	
	Without lesions (178)	67 (38%)	111 (62%)	
Distribution skin lesions (100)				<.001*
	Unifocal (36)	20 (56%)	16 (44%)	
	Multifocal (64)	59 (92%)	5 (8%)	
Culture total (428)		240 (56,1%)	188 (43,9%)	
Cytology results (100)				<.001*
	Positive (50)	48 (96%)	2 (4%)	
	Negative (50)	31 (62%)	19 (38%)	

Legend: * χ^2 test.

ocular region.[10,33] In this context, this study demonstrated highly positive culture in exudate specimens, which indicates a high risk of transmission occurring through this material. Besides, the main clinical manifestation observed in this study was disseminated forms, with multifocal lesions, therefore has an increased risk of transmitting fungus when compared with cats that present a single lesion (unifocal/fixed cutaneous). It should be emphasized that the care taken when handling an animal that presents one or multiple injuries must be the same, highlighting the use of personal protective equipment by the handler, isolation of the animal, hygiene of the environment, and adequate treatment.

Nasal lesions are frequent manifestations in cats with sporotrichosis, and may have an ulcerated appearance, with the presence of blood, pus, or crust or just a nasal elevation (nasal nodule). In those cats, we observed that *S. brasiliensis* was isolated in nasal swab in most of them, however, it was intriguing, half of the cats that did not present any lesion or nasal elevation had positive culture, indicating a potential risk of transmission, which could be eliminated through respiratory droplets from sneezing or through dripping secretions.[13]

The first study that proposed sneezing as a new transmission route was conducted by the same authors,[13] however, the fungal species had not been investigated. In this study, we identify that all samples from respiratory secretions expelled by a cat's sneeze are *S. brasiliensis*. This is the main study that reports a possible new route of transmission of sporotrichosis, and with the molecular identification completed, it is highlighted that human cases, especially the ocular forms, deserve attention for diagnosis and appropriate treatment.

Cats with sporotrichosis that did not have lesions suggestive of sporotrichosis on their paws tested positive for *Sporothrix* in 38% of the samples. Souza et al.,[14] the authors isolated *Sporothrix* from the paws of 29.1% of healthy cats that lived with sick cats, demonstrating the importance of clinically healthy cats carrying the fungus on their paws. In another study carried out in Peru, where there are no reports of zoonotic transmission, the authors also isolated *S. schenckii* from the nails of healthy cats (2.38%), demonstrating the importance of investigation in the feline population even in non-endemic areas.[15] Other studies on the investigation of *Sporothrix* in the paws or claws of cats demonstrate a lower frequency of positivity in animals without lesions suggestive of sporotrichosis in this location.[25,29,34,35] Although there is no proof of transmission from paws colonized by *Sprothrix*, the results found in this study demonstrate the importance of research on the feline population, mainly for guidance on the care of sick cats.

We also evaluated the results of cytopathology and fungal culture. Although culture is the gold standard method, cytopathology is a good diagnostic screening resource to detect *Sporothrix* yeast cells with sensitivity between 52.6% and 87%.[36,37] In our study, negative cytopathological results but with positive culture (62%) may be associated with the initiation of treatment with compounded itraconazole in some cats included in the research, which could reduce the sensitivity of the method, however, studies show that compounded itraconazole is not bioequivalent to the reference medicine therefore would not be an effective treatment for feline sporotrichosis.[38,39] Cytopathology is a quick, simple, and low-cost technique, it is advisable that the veterinarian performs this examination in cases where sporotrichosis is suspected, however, it is important to associate culture when possible because the sensitivity of the method is greater.[25,36]

According to the molecular analysis, all isolates were identified as *S. brasiliensis*, the agent is commonly associated with cat transmitted sporotrichosis in Brazil as reported previously.[32] Those strains with near-complete calmodulin gene sequencing, showed a high degree of similarity with previously sequenced isolates from Rio de Janeiro, Curitiba, and Paraguay.[2,8,32] Multi-typing analysis based on several isolates from Brazil indicates that zoonotic transmission from *S. brasiliensis* is based on clonal and recombinant *Sporothrix* species,[40] in addition, molecular clock typing show that multiple zoonotic introductions happened during the last decades, but the epidemiological strains from Curitiba match with the strains from Rio de Janeiro epicenter of the disease.[41]

The main limitation of this study was not evaluated if there was transmission of sporotrichosis from cats included and their tutors, although the owners who reported lesions were referred for medical evaluation at a reference center.

The cases of sporothrichosis in felines in the city of Curitiba was highest in the Campo Comprido district, which has a total population of almost 27 000 inhabitants, an area of 8,55 km^2, and with most of the population living in houses.[42] A region that also presented a significant number of cases in felines was the Industrial City of Curitiba. According to Cognialli et al.,[8] this location also has a higher incidence of human cases. This neighborhood borders Campo Comprido and is also mostly made up of houses. The animal with sporotrichosis acts as

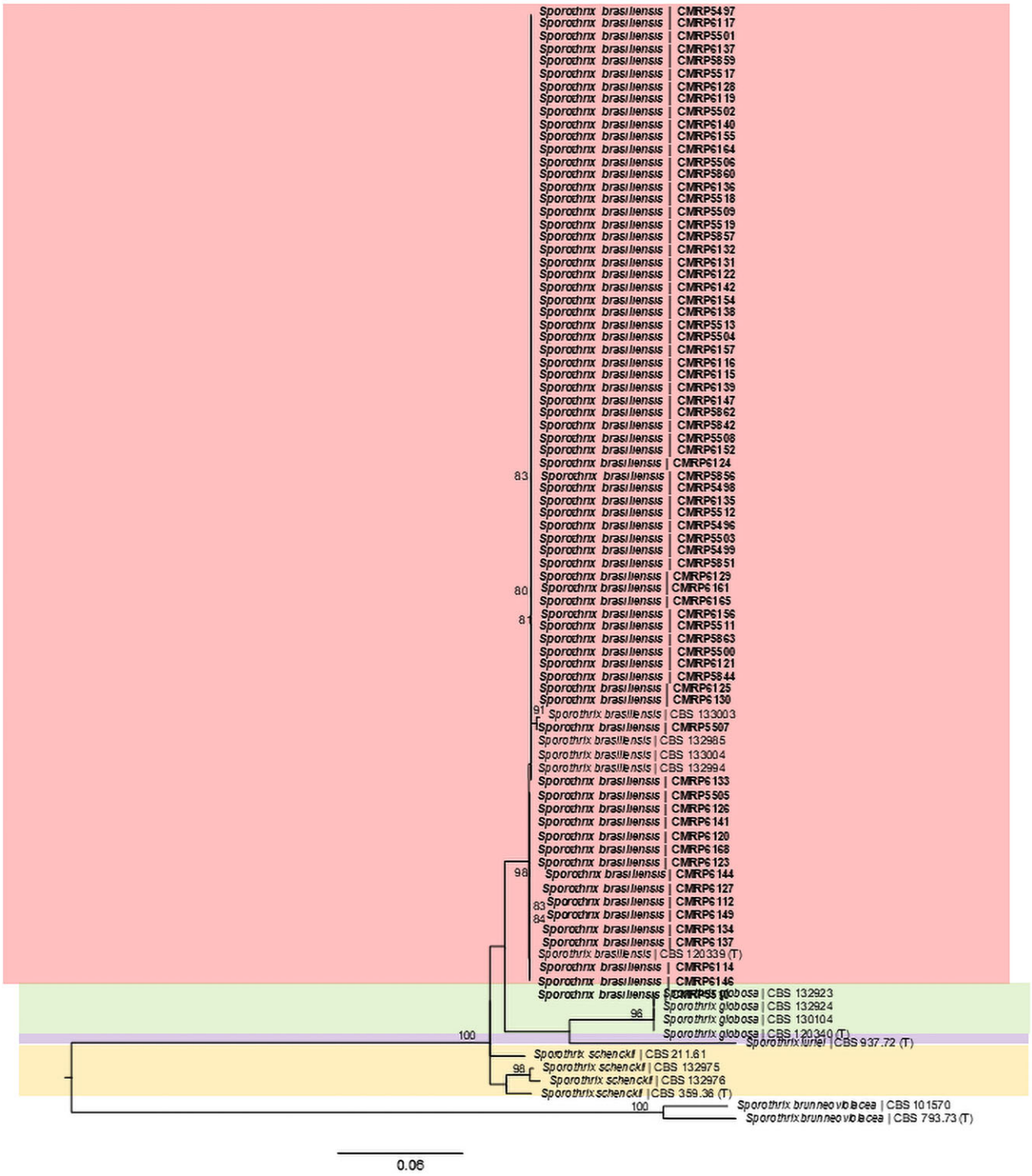

Figure 4. Phylogenetic tree of the *Sporothrix* pathogenic clade based on calmodulin near-complete, genes constructed with maximum likelihood implemented in MEGA 7.0.26. Bootstrap values >80 from 1000 resampled data sets. *Sporothrix brunneviolacea* (CBS 793.73) was taken as outgroup. *Sporothrix brasiliensis* is represented inside the red box, *S. schenckii* is represented inside the yellow box, *S. globosa* is inside the green box, and *S. luriei* is inside the purple box. New strains isolates from the presented study are marked in bold.

a sentinel for possible new human and animal cases, which is why disease prevention and control actions must be linked not only to human cases but also to cats from a one-health perspective.[30] These results can assist in prevention and control actions in areas with a greater number of human and feline cases.

CTS is an endemic and neglected disease in continuous expansion not only in Brazil, and there are still several gaps on the infection. Therefore, the present study contributes mainly with possible new routes of zoonotic transmission and unpublished data on epidemiology in the city of Curitiba, Brazil.

Acknowledgements

We thank Lili Volochen and Adriana de Fátima Gabriel for all their support in processing the laboratory samples and Raquel Marra for data from Secretaria Estadual de Saúde (SESA).

Author contributions

Fernanda de Andrade Galliano Daros Bastos (Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing—original draft, Writing—review & editing), Marconi Rodrigues de Farias (Data curation, Investigation, Methodology, Resources, Supervision, Validation, Writing—review & editing), Isabella Dib Ferreira Gremião (Data curation, Methodology, Supervision, Validation, Writing—review & editing), Francelise Bridi Cavassin (Data curation, Formal analysis, Methodology, Supervision, Validation, Visualization, Writing—review & editing), Fabiana dos Santos Monti (Data curation, Resources, Supervision), Rogério Rodrigues Vilas Boas (Data curation, Software, Writing—review & editing), Bruno Paulo Rodrigues Lustosa (Data curation, Methodology, Software, Writing—review & editing), Emanuel Razzolini (Data curation, Methodology, Software, Writing—review & editing), Vânia Aparecida Vicente (Data curation, Funding acquisition, Methodology, Resources, Software, Validation, Writing—original draft, Writing—review & editing), and Flávio Queiroz-Telles (Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Software, Supervision, Validation, Visualization, Writing—original draft, Writing—review & editing)

Supplementary material

Supplementary material is available at *Medical Mycology* online.

Funding

This work was supported by the National Council for Scientific and Technological Development (CNPq) [grant number: 409422/2021-5, 409184/2022-5, and 316213/2023-3 to V.A.V].

Declaration of interest

The authors have no relevant financial or non-financial interests to disclose.

References

1. Rossow JA, Queiroz-Telles F, Caceres DH, et al. A one health approach to combatting *Sporothrix brasiliensis*: Narrative review of an emerging zoonotic fungal pathogen in South America. *J Fungi (Basel)*. 2020;6(4): 247. https://doi.org/10.3390/jof6040247
2. do Prado CM, Razzolini E, Santacruz G, et al. First cases of feline sporotrichosis caused by *Sporothrix brasiliensis* in Paraguay. *J Fungi (Basel)*. 2023;9(10): 972. https://doi.org/10.3390/jof9100972
3. Santiso G, Messina F, Arechavala A, et al. Sporotrichosis in Argentina: Clinical and epidemiological analysis. *Biomedica*. 2023; 43(Suppl 1): 109–119. https://doi.org/10.7705/biomedica.6886
4. Thomson P, González C, Blank O, et al. Sporotrichosis outbreak due to *Sporothrix brasiliensis* in domestic cats in Magallanes, Chile: A one-health-approach study. *J Fungi (Basel)*. 2023;9(2): 226. https://doi.org/10.3390/jof9020226
5. Gremião ID, Miranda LH, Reis EG, Rodrigues AM, Pereira SA. Zoonotic epidemic of sporotrichosis: Cat to Human transmission. *PLoS Pathog*. 2017; 13(1): e1006077. https://doi.org/10.1371/journal.ppat.1006077
6. Poester VR, Mattei AS, Madrid IM, et al. Sporotrichosis in Southern Brazil, towards an epidemic? *Zoonoses Public Health*. 2018; 65(7): 815–821. https://doi.org/10.1111/zph.12504
7. Figueiredo ABF, Magalhães MAFM, Tassinari WS, et al. Spatial distribution of canine sporotrichosis in Rio de Janeiro, Brazil (1998–2018) and its correlation with socioeconomic conditions. *J Fungi (Basel)*. 2022;8(11): 1207. https://doi.org/10.3390/jof8111207
8. Cognialli RCR, Cáceres DH, Bastos FAGD, et al. Rising incidence of *Sporothrix brasiliensis* infections, Curitiba, Brazil, 2011–2022. *Emerg Infect Dis*. 2023; 29(7): 1330–1339. https://doi.org/10.3201/eid2907.230155
9. Xavier MO, Poester VR, Trápaga MR, Stevens DA. *Sporothrix brasiliensis*: epidemiology, therapy, and recent developments. *J Fungi (Basel)*. 2023;9(9): 921. https://doi.org/10.3390/jof9090921
10. Queiroz-Telles F, Bonifaz A, Rossow J, Chindamporn A. *Encyclopedia of Infection and Immunity*. *Sporothrix* and Sporotrichosis. Oxford: Elsevier, 2021. https://doi.org/10.1016/B978-0-12-818731-9.00046-X
11. Ribeiro CR, Silva BP, Almeida Costa AA, et al. Ocular sporotrichosis. *Am J Ophthalmol Case Rep*. 2020; 19: 100865. https://doi.org/10.1016/j.ajoc.2020.100865
12. Ramírez-Soto MC, Tirado-Sánchez A, Bonifaz A. Ocular sporotrichosis. *J Fungi (Basel)*. 2021;7(11): 951. https://doi.org/10.3390/jof7110951
13. Bastos de Andrade Galliano Daros F, Raimundo Cognialli RC, Rodrigues de Farias M, et al. Spread of *Sporothrix* spp. through respiratory droplets from infected cats: A potential route of transmission. *Med Mycol*. 2022; 60(11): myac079. https://doi.org/10.1093/mmy/myac079
14. Souza LL, Nascente PS, Nobre MO, Meinerz ARM, Meireles MCA. Isolation of *Sporothrix schenckii* from the nails of healthy cats. *Braz J Microbiol*. 2006; 37(3): 372–374. https://doi.org/10.1590/S1517-83822006000300031
15. Kovarik CL, Neyra E, Bustamante B. Evaluation of cats as the source of endemic sporotrichosis in Peru. *Med Mycol*. 2008; 46(1): 53–56. https://doi.org/10.1080/13693780701567481
16. Caus ALO, Zanotti RL, Faccini-Martínez ÁA, et al. Epidemiological and clinical aspects of sporotrichosis in Espírito Santo State, Southeast Brazil: A study of three decades (1982–2012). *Am J Trop Med Hyg*. 2019; 100(3): 706–713. https://doi.org/10.4269/ajtmh.18-0667
17. Gremião IDF, Oliveira MME, Monteiro de Miranda LH, et al. Geographic expansion of sporotrichosis, Brazil. *Emerg Infect Dis*. 2020; 26(3): 621–624. https://doi.org/10.3201/eid2603.190803
18. Rabello VBS, Almeida MA, Bernardes-Engemann AR, et al. The historical burden of sporotrichosis in Brazil: A systematic review of cases reported from 1907 to 2020. *Braz J Microbiol*. 2022; 53(1): 231–244. https://doi.org/10.1007/s42770-021-00658-1
19. Colombo SA, Bicalho GC, de Oliveira CSF, et al. Emergence of zoonotic sporotrichosis due to *Sporothrix brasiliensis* in Minas Gerais, Brazil: A molecular approach to the current animal disease. *Mycoses*. 2023; 66(10): 911–922. https://doi.org/10.1111/myc.13631
20. de Freitas VLT, Rocha FMM, Ribeiro EN, et al. Seasonality of sporotrichosis in Brazil: A modelled analysis of the epidemic in São Paulo, 2011–2020. *Mycoses*. 2023; 66(8): 643–650. https://doi.org/10.1111/myc.13594
21. Rodrigues AM, Della Terra PP, Gremião ID, et al. The threat of emerging and re-emerging pathogenic *Sporothrix* species. *Mycopathologia*. 2020; 185(5): 813–842. https://doi.org/10.1007/s11046-020-00425-0

22. Barnacle JR, Chow YJ, Borman AM, et al. The first three reported cases of *Sporothrix brasiliensis* cat-transmitted sporotrichosis outside South America. *Med Mycol Case Rep*. 2023; 39: 14–17. https://doi.org/10.1016/j.mmcr.2022.12.004
23. de Hoog GS, Guarro J, Gene JF, Figueras MJ. *Atlas of clinical fungi*. Centraalbureau voor Schimmelcultures (CBS); 2000.
24. Vicente VA, Attili-Angelis D, Pie MR, et al. Environmental isolation of black yeast-like fungi involved in human infection. *Stud Mycol*. 2008; 61: 137–144. https://doi.org/10.3114/sim.2008.61.14
25. Macêdo-Sales PA, Souto SRLS, Destefani CA, et al. Domestic feline contribution in the transmission of *Sporothrix* in Rio de Janeiro State, Brazil: A comparison between infected and non-infected populations. *BMC Vet Res*. 2018; 14: 19. https://doi.org/10.1186/s12917-018-1340-4
26. Silva GM, Howes JCF, Leal CAS, et al. Surto de esporotricose felina na região metropolitana do Recife. *Pesqui Vet Bras*. 2018; 38: 1767–1771. https://doi.org/10.1590/1678-5150-pvb-5027
27. Lecca LO, Paiva MT, Oliveira CSF, et al. Associated factors and spatial patterns of the epidemic sporotrichosis in a high-density human populated area: A cross-sectional study from 2016 to 2018. *Prev. Vet. Med*. 2020; 176: 104939. https://doi.org/10.1016/j.prevetmed.2020.104939
28. Schubach TM, Schubach A, Okamoto T, et al. Evaluation of an epidemic of sporotrichosis in cats: 347 cases (1998–2001). *J Am Vet Med Assoc*. 2004; 224: 1623–1629. https://doi.org/10.2460/javma.2004.224.1623
29. Gremião IDF, Martins da Silva da Rocha E, Montenegro H, et al. Guideline for the management of feline sporotrichosis caused by *Sporothrix brasiliensis* and literature revision. *Braz J Microbiol*. 2020; 52(1): 107–124. https://doi.org/10.1007/s42770-020-00365-3
30. Paiva MT, de Oliveira CSF, Nicolino RR, et al. Spatial association between sporotrichosis in cats and in humans during a Brazilian epidemic. *Prev Vet Med*. 2020; 183: 105125. https://doi.org/10.1016/j.prevetmed.2020.105125
31. Nahal J, Coelho RA, Almeida-Silva F, et al. Non-zoonotic transmission of sporotrichosis: A translational study of forty-three cases in a zoonotic hyperendemic area. *J Fungi (Basel)*. 2024; 10(9): 610. https://doi.org/10.3390/jof10090610
32. Rodrigues AM, Teixeira MM, de Hoog GS, et al. Phylogenetic analysis reveals a high prevalence of *Sporothrix brasiliensis* in feline sporotrichosis outbreaks. *PLoS Negl Trop Dis*. 2013;7(6): e2281. https://doi.org/10.1371/journal.pntd.0002281
33. Etchecopaz AN, Lanza N, Toscanini MA, et al. Sporotrichosis caused by *Sporothrix brasiliensis* in Argentina: Case report, molecular identification and *in vitro* susceptibility pattern to antifungal drugs. *J Mycol Med*. 2020; 30(1): 100908. https://doi.org/10.1016/j.mycmed.2019.100908
34. Schubach TM, Valle AC, Gutierrez-Galhardo MC, et al. Isolation of *Sporothrix schenckii* from the nails of domestic cats (*Felis catus*). *Med Mycol*. 2001; 39(1): 147–149. https://doi.org/10.1080/mmy.39.1.147.149
35. Schubach TM, de Oliveira Schubach A, dos Reis RS, et al. *Sporothrix schenckii* isolated from domestic cats with and without sporotrichosis in Rio de Janeiro, Brazil. *Mycopathologia*. 2002; 153(2): 83–86. https://doi.org/10.1023/a:1014449621732
36. Silva JN, Passos SRL, Menezes RC, et al. Diagnostic accuracy assessment of cytopathological examination of feline sporotrichosis. *Med Mycol*. 2015; 53(8): 880–884. https://doi.org/10.1093/mmy/myv038
37. Pereira SA, Menezes RC, Gremião ID, et al. Sensitivity of cytopathological examination in the diagnosis of feline sporotrichosis. *J Feline Med Surg*. 2011; 13(4): 220–223. https://doi.org/10.1016/j.jfms.2010.10.007
38. de Miranda LHM, Silva JN, Gremião IDF, et al. Monitoring fungal burden and viability of *Sporothrix* spp. in skin lesions of cats for predicting antifungal treatment response. *J Fungi (Basel)*. 2018;4(3): 92. https://doi.org/10.3390/jof4030092
39. Gremião IDF, Miranda LHM, Pereira-Oliveira GR, et al. Advances and challenges in the management of feline sporotrichosis. *Rev Iberoam Micol*. 2022; 39(3-4): 61–67. https://doi.org/10.1016/j.riam.2022.05.002
40. Rodrigues AM, de Hoog G, Zhang Y, de Camargo ZP. Emerging sporotrichosis is driven by clonal and recombinant *Sporothrix* species. *Emerg Microbes Infect*. 2014;3(5): e32. https://doi.org/10.1038/emi.2014.33
41. Spruijtenburg B, Bombassaro A, Meijer EF, et al. *Sporothrix brasiliensis* genotyping reveals numerous independent zoonotic introductions in Brazil. *J Infect*. 2023; 86(6): 610–613. https://doi.org/10.1016/j.jinf.2023.02.034
42. Grise MM, Biondi D, Araki H. Distribuição espacial e cobertura de vegetação das tipologias de áreas verdes de Curitiba, PR. *Floresta E Ambiente*. 2016; 23(4): 498–510. https://doi.org/10.1590/2179-8087.127715

Received: March 14, 2025. **Revised:** May 2, 2025. **Accepted:** June 6, 2025