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Feline Sporotrichosis in Brazil: Clinical, Epidemiological and Diagnostic Patterns from a Systematic Review

Esporotricose Felina no Brasil: Padrões Clínicos, Epidemiológicos e Diagnósticos a Partir de Revisão Sistemática

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Milena Campos Ferreira de Almeida: Universidade de Cuiabá. MT, Brazil.

Gabriel Deon Tramontin: Universidade Unopar. PR, Brazil.

Thaianne de Cássia Cardozo: Universidade Unopar. PR, Brazil.

Gabriela de Oliveira Deritti: Universidade Unopar, Programa de Pós-Graduação em Saúde e Produção Animal. PR, Brazil. E-mail: gd.deritti@gmail.com,

Fabíola Cristine de Almeida Rego: Universidade Unopar, Programa de Pós-Graduação em Saúde e Produção Animal. PR, Brazil.

Jamile Haddad Neta: Universidade Unopar, Programa de Pós-Graduação em Saúde e Produção Animal. PR, Brazil.

Flávio Antônio Barca Júnior: Universidade Unopar, Programa de Pós-Graduação em Saúde e Produção Animal. PR, Brazil.

Andrea Marisol Novoa Castillo Oliveira: Universidade de Cuiabá, Programa de Pós-Graduação em Biociência Animal. MT, Brazil.

Ricardo Cesar Tavares Carvalho: Universidade de Cuiabá, Programa de Pós-Graduação em Biociência Animal. MT, Brazil.

Luiz Fernando Coelho da Cunha Filho: Universidade Unopar, Programa de Pós-Graduação em Saúde e Produção Animal. PR, Brazil. Universidade de Cuiabá, Programa de Pós-Graduação em Biociência Animal. MT, Brazil.

Abstract

Feline sporotrichosis, primarily caused by Sporothrix brasiliensis, is the most relevant subcutaneous zoonotic mycosis in Brazil and has shown significant geographic expansion. This study aimed to characterize clinical, epidemiological, and diagnostic patterns in infected cats. A systematic review was conducted following Cochrane and CRD guidelines, including studies published between 2016

and 2025 in major scientific databases. The analysis highlights that most affected cats are young, non-neutered males with outdoor access. Lesions are predominantly located on the face and limbs, while disseminated and respiratory forms are associated with worse prognosis. The disease has expanded beyond the Southeast to other Brazilian regions, reinforcing its emerging character. Molecular methods such as PCR demonstrated higher diagnostic sensitivity. The findings emphasize the need for surveillance, early diagnosis, and integrated One Health strategies.

Keywords: Cats. Fungi. Sporothrix Brasiliensis. Ulcerated lesion.

Resumo

A esporotricose felina, causada principalmente por *Sporothrix brasiliensis*, é a micose subcutânea zoonótica mais relevante no Brasil e tem apresentado significativa expansão geográfica. Este estudo teve como objetivo caracterizar os padrões clínicos, epidemiológicos e diagnósticos em gatos infectados. Foi realizada uma revisão sistemática seguindo as diretrizes Cochrane e CRD, incluindo estudos publicados entre 2016 e 2025 em bases de dados científicas relevantes. A análise destaca que a maioria dos animais acometidos são machos jovens, não castrados e com acesso à rua. As lesões localizam-se predominantemente na face e nos membros, enquanto formas disseminadas e respiratórias estão associadas a pior prognóstico. A doença expandiu-se além da Região Sudeste para outras regiões do Brasil, reforçando seu caráter emergente. Métodos moleculares, como a PCR, demonstraram maior sensibilidade diagnóstica. Os achados enfatizam a necessidade de vigilância, diagnóstico precoce e estratégias integradas baseadas no conceito de One Health.

Palavras-chave: Fungo. Gatos. Lesão Ulcerativa. Sporothrix brasiliensis.

1 Introduction

Feline sporotrichosis is an emerging subcutaneous mycosis in Brazil, caused by fungi of the *Sporothrix* complex, particularly *Sporothrix brasiliensis*, the species with the highest virulence and zoonotic relevance in the country. Transmission occurs mainly through scratches, bites, or direct contact with exudates from ulcerated lesions of infected cats, which act as important amplifiers of infection in urban environments.

Over the past decades, the disease has expanded beyond the Southeast region and is now reported in multiple states across the North, Northeast, Midwest, and South of Brazil, characterizing a scenario of territorial expansion and national epidemiological concern.

Recent studies emphasize that sporotrichosis remains a neglected disease, despite its growing impact and the severity of outbreaks associated with *S. brasiliensis*. However, there is still a lack of comprehensive syntheses that systematically integrate the clinical, epidemiological, and diagnostic patterns of feline sporotrichosis in Brazil, particularly incorporating recent evidence (2022–2025), such as the emergence of atypical clinical forms, advances in molecular epidemiology, and the identification of new geographic foci.

This spread has occurred in parallel with an increase in human cases, reinforcing the close interface between animal and public health, particularly considering the zoonotic relevance of feline transmission (Rodrigues *et al.,* 2025).

Therefore, this systematic review aimed to characterize and synthesize the clinical profile, lesion distribution, epidemiological patterns, and diagnostic approaches of feline sporotrichosis in Brazil, based on studies published between 2016 and 2025.

2 Material and Methods

This systematic review was conducted in accordance with the recommendations of the Cochrane Handbook and the CRD – *Systematic Reviews: CRD's Guidance for Undertaking Reviews in Health Care*, adapted to the veterinary context. The methodological strategy followed the steps described below.

2.1 Information sources and search strategy

The following databases were searched: PubMed, SciELO, ScienceDirect, MEDLINE, and Google Scholar, including publications from January 2016 to November 2025, without language restrictions.

The main descriptors and search combinations included:

- "sporotrichosis AND cats AND Brazil"
- "Sporothrix brasiliensis AND felines"
- "ulcerated lesions AND felines AND Brazil"

The complete search strategy was structured using Boolean operators and database-specific fields (e.g., title/abstract search in PubMed) to maximize sensitivity for studies on feline sporotrichosis in Brazil.

2.2 Eligibility criteria

Studies were included if they met the following criteria:

- Population: domestic cats diagnosed with sporotrichosis in Brazil;
- Study design: case reports, case series, observational or epidemiological studies involving felines;
- Outcomes: description of clinical features, lesion distribution, epidemiological profile, diagnostic methods, and/or clinical outcomes;
- Setting: studies conducted in any region of Brazil.

The following were excluded: narrative reviews without original data, exclusively in vitro experimental studies or studies involving non-feline animal models, and publications lacking specific information on Brazilian feline cases.

2.3 Study selection and data extraction

The selection process was carried out in three sequential steps:

1. Screening of titles and abstracts to identify potentially relevant studies;
2. Removal of duplicates and exclusion of clearly irrelevant articles;
3. Full-text assessment of eligible studies, applying the predefined inclusion and exclusion criteria.

From each included study, the following data were extracted: identification data (year, location, study design), animal characteristics (age, sex, reproductive status, management conditions), clinical presentation and lesion distribution, diagnostic methods (cytology, culture, histopathology, PCR), and clinical outcomes (cure, recurrence, death).

2.4 Data synthesis

Due to heterogeneity among studies regarding design, sample characteristics, and outcomes, no quantitative meta-analysis was performed. Data were synthesized descriptively and thematically, organized into four main domains:

(1) epidemiological profile
(2) clinical manifestations and lesion distribution;
(3) diagnostic methods; and
(4) prognosis and public health implications.

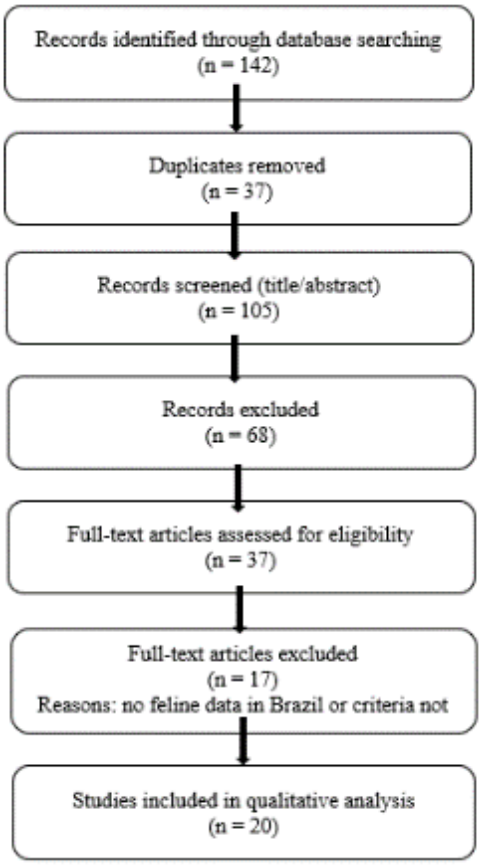
2.5 Study selection flow

The study selection process resulted in the identification of 142 records. After the removal of 37 duplicates, 105 articles were screened based on titles and abstracts, of which 68 were excluded for not meeting the eligibility criteria.

A total of 37 studies were assessed for full-text eligibility, and 17 were subsequently excluded due to the absence of specific data on felines in Brazil or failure to meet the predefined methodological criteria.

Finally, 20 studies were included in the qualitative analysis of this review (Figure 1).

Figure 1 - PRISMA flow diagram of study selection process



Source: the authors.

3 Results and Discussion

The analysis of the included studies demonstrates that the epidemiological profile of feline sporotrichosis in Brazil is strongly associated with behavioral and environmental factors. The higher prevalence in young, non-neutered male cats is related to territorial behavior, fighting, and increased mobility, which elevate the risk of exposure and transmission (Almeida *et al*., 2018; Schubach *et al*., 2012). This pattern suggests that disease dynamics are closely linked to feline social behavior, indicating that interventions such as neutering and restricting outdoor access may significantly reduce transmission. Cats with outdoor or semi-domiciled lifestyles present a higher risk of infection compared to strictly indoor animals, reinforcing population management as a key control strategy.

In Brazil, sporotrichosis has been historically concentrated in the Southeast region, particularly in the state of Rio de Janeiro, considered the epicenter of hyperendemicity since the 1990s (*Maia et al.,* 2023). However, a progressive expansion to other regions, including the North, Northeast, and South, has been observed, with increasing reports and disease interiorization (Mesquita *et al.,* 2024; Diniz *et al*., 2025). This scenario not only reflects geographic spread but also suggests shortcomings in control and surveillance measures, allowing sustained transmission in different regional contexts.

The interpretation of epidemiological data is directly affected by heterogeneity in notification

systems. Until 2025, the absence of mandatory national notification for human sporotrichosis contributed to underreporting (Brasil, 2025). Although its recent inclusion represents an important step forward, the lack of compulsory notification for animal cases continues to limit accurate estimation of disease burden. This gap highlights structural weaknesses in epidemiological surveillance, further compounded by the concentration of diagnoses in referral centers and limited infrastructure in underserved regions (Araújo *et al*., 2025; Diniz *et al*., 2025; Santa Catarina, 2025). Additionally, socioeconomic factors such as high population density and restricted access to healthcare services suggest that sporotrichosis is also influenced by social inequalities, complicating its control (Bittencourt *et al*., 2022).

Transmission occurs mainly through scratches and bites due to the high fungal load present in feline lesions, positioning cats as central elements in the zoonotic transmission chain (Alvarez *et al.,* 2022). This highlights that feline sporotrichosis should not be viewed solely as a veterinary issue but as a significant public health concern. Uncontrolled urban expansion and close interaction with stray cat populations further intensify this cycle, indicating that isolated interventions are insufficient and that integrated strategies are required (Mesquita *et al*., 2024).

Clinically, ulcerated and nodular lesions predominantly affect the face, limbs, and tail. However, the increasing frequency of atypical and disseminated forms, including respiratory and extracutaneous involvement, suggests a possible shift in the clinical pattern of the disease (Poester *et al.,* 2024). This finding may indicate pathogen adaptation or delayed diagnosis, both of which contribute to disease severity.

The greater clinical aggressiveness observed in Brazil is associated with molecular characteristics of *Sporothrix brasiliensis*, particularly its high fungal burden and virulence factors. Melanin production plays a key role in immune evasion, conferring resistance to oxidative stress and reduced susceptibility to antifungal agents (Almeida-Paes *et al.,* 2016; Alvarez *et al.,* 2022). This mechanism suggests an adaptive advantage of the pathogen within the host, which may explain persistence of infection and therapeutic challenges observed in Brazilian outbreaks. Furthermore, genetic diversity among isolates indicates variability in virulence and treatment response (Barros *et al.*, 2025; Spanamberg, 2024), reinforcing the need for continuous molecular surveillance.

The host immune response also plays a central role in disease pathophysiology. Kischkel *et al.* (2024) demonstrated that interleukin-36γ (IL-36γ) is involved in the induction of pro-inflammatory cytokines during *Sporothrix* infection, contributing to intense inflammatory responses. This suggests that, although essential for pathogen control, an exaggerated immune response may promote tissue damage and lesion progression.

Coinfection with feline immunodeficiency virus (FIV) and feline leukemia virus (FeLV) represents an aggravating factor, being associated with more extensive disease, prolonged treatment,

and higher recurrence rates (Gremião *et al.,* 2022). This reinforces the role of immunosuppression in disease progression. However, the occurrence of severe cases in immunocompetent animals indicates that pathogen-related factors are also determinant (Alvarez *et al.,* 2022), highlighting the multifactorial nature of the disease.

Regarding diagnosis, cytology remains widely used due to its practicality; however, it presents limitations in early-stage lesions or after prior treatment. This suggests that reliance on cytology alone may lead to underdiagnosis. In this context, fungal culture and molecular methods such as PCR provide greater diagnostic accuracy and allow species identification, contributing to epidemiological surveillance (Almeida *et al*., 2018; Silva *et al*., 2020).

Differential diagnosis is essential and includes infectious and neoplastic conditions such as cryptococcosis, cutaneous leishmaniasis, atypical mycobacteriosis, and squamous cell carcinoma (Ginn *et al.,* 2007; Silva *et al*., 2025). The clinical similarity among these conditions suggests a risk of misdiagnosis, which may delay appropriate treatment and facilitate disease spread.

Although treatment is not the primary focus of this review, therapeutic adherence remains a major challenge. The prolonged duration of treatment and socioeconomic limitations of animal owners suggest that external factors significantly influence clinical outcomes (Fagundes *et al.,* 2022; Sméra; Sméra, 2024).

Finally, sporotrichosis remains a neglected zoonosis in Brazil, mainly transmitted through contact with infected cats (Fagundes *et al.,* 2022). Its territorial expansion, combined with surveillance gaps and complex transmission dynamics, indicates that effective control depends on integrated strategies. In this context, a One Health approach is essential, involving coordinated actions in epidemiological surveillance, public health education, and population management (Alvarez *et al*., 2022; Mesquita *et al.,* 2024).

4 Conclusion

Feline sporotrichosis in Brazil has expanded beyond traditionally endemic regions, demonstrating increasing epidemiological complexity and reinforcing its status as a relevant zoonosis. The predominance of young, non-neutered cats with outdoor access highlights the role of behavioral and environmental factors in disease transmission. Limitations in surveillance systems and underreporting suggest that the true burden of the disease remains underestimated. Advances in molecular diagnostics have improved detection, while the emergence of more severe and atypical clinical forms indicates the influence of pathogen virulence and host-related factors. Overall, these findings reinforce the need for integrated control strategies based on the One Health approach, including surveillance, early diagnosis, and population management.

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