

Feline sporotrichosis: occurrence in the Metropolitan Region of the municipality of Recife and anatomical distribution of lesions on cats' body

Esporotricose felina: ocorrência na Região Metropolitana do município do Recife e distribuição anatômica das lesões no corpo dos gatos

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Abstract

Sporotrichosis is a fungal infection of worldwide importance caused by a saprophyte fungus of the genus *Sporothrix*. The objective of this study was to report the occurrence of feline sporotrichosis in the Metropolitan Region of the city of Recife and the anatomical distribution of lesions on the bodies of cats. Stray cats (n=100) with suggestive sporotrichosis lesions were examined. Material from the lesion was collected from all patients using an imprint and/or sterile swab for cytology. The material was placed on a glass slide and stained using rapid panoptic staining. Data on the localization of each skin lesion were recorded, and cigar-shaped yeast structures were searched at the microscopical examination. A heat map graphically represented the anatomical distribution of each lesion. In 70% (70/100) of samples were visualized fungal structure compatible with *Sporothrix* spp. There was a predominance of positive males ($\chi^2=6.691$; $p=0.0097$). Skin lesions related to *Sporothrix* spp. infections were unevenly distributed throughout the animal's body. Based on the interpolation of data, the chance for detecting lesions was higher on the nose, anterior paw, and ears than on other body sites ($H=40.0043$; $p=0.0000$). Because of the high positivity in these cats, measures of health vigilance are imperative to reduce the risk of animal and human infection.

Resumo

Esporotricose é uma infecção fúngica de importância mundial ocasionada por fungos do gênero *Sporothrix*. O objetivo deste estudo foi relatar a ocorrência da esporotricose felina na Região Metropolitana do município do Recife e a distribuição anatômica das lesões no corpo dos gatos. Gatos não-domiciliados (n=100) com lesões sugestivas de esporotricose foram examinados. Material biológico foi coletado da lesão por meio de *imprint* e/ou swab estéril para a realização de citologia. O material coletado foi posto em lâminas de microscopia e coradas utilizando o Panótico rápido. A localização de cada lesão foi reportada, e estruturas de leveduras em forma de charuto foram pesquisadas ao microscópio óptico. A distribuição anatômica de cada lesão foi graficamente representada através de um mapa de calor. Em 70% (70/100) das amostras foram visualizadas estruturas fúngicas compatíveis com *Sporothrix* spp. Houve predominância de animais machos positivos ($\chi^2=6.691$; $p=0.0097$). Lesões cutâneas relacionadas a infecção por *Sporothrix* spp. foram desigualmente distribuídas no corpo animal. Com base na interpolação de dados, a chance de detectar lesões foi maior no focinho, patas anteriores e orelhas, quando comparado com as outras localizações anatômicas ($H=40.0043$; $p=0.0000$). Devido à alta positividade observada

nestes animais, medidas de vigilância em saúde são essenciais para reduzir o risco de infecção humana e animal na área estudada.

Palavras-chave: Sporothrix; zoonose; lesões cutâneas; Brasil.

Sporotrichosis is a zoonotic infection of worldwide distribution caused by a thermally dimorphic fungus (Rodrigues et al., 2020). For a long time, this infection was associated mainly with *Sporothrix schenckii*. Still, after an extensive analysis, four new species were proposed, known as *S. globosa*, *S. brasiliensis*, *S. mexicana* and *S. lurie* (Marimon et al., 2007). In Brazil, *S. brasiliensis* has been considered the most important species, responsible for most human and feline cases. It is known that cats are susceptible to this pathogen and may play an essential role in the transmission of human hosts (Oliveira Bento et al., 2021). The classical transmission route relies on the traumatic inoculation of contaminated plant material in the environment. Still, an alternative type of transmission by bites and scratches of infected cats has been more frequently reported. The Brazilian health service has detected a spreading of feline and associated human cases of sporotrichosis, especially from the Southeast to North and Northeast regions (Gremião et al., 2021).

In cats, sporotrichosis is clinically characterized by skin lesions (e.g., nodules and ulcers) with mucosal involvement (Han and Kano, 2021). However, clinical signs related to the respiratory system are frequently associated with treatment failure and animal deaths (Pereira et al., 2010). The early diagnosis of feline infection has been considered an important measure of prevention for humans because the prompt treatment in animals may reduce the fungal load and, consequently, the transmission risk (Pereira et al., 2010).

Despite cutaneous ulcers being considered critical clinical signs, pathogenic aspects related to the anatomical localization of these lesions are poorly documented. It is known that melanin plays an important role in the development of ulcers since its presence during the parasitic phase may reduce the sensitivity of the fungus during the treatment (Waller et al., 2021). From a biological perspective, the distribution of skin lesions on the animal's body cannot be attributed only to the aggressive behavior presented by some individuals (Han and Kano, 2021). Therefore, this study aimed to report the occurrence of feline sporotrichosis in the Metropolitan Region of

the municipality of Recife and to describe the anatomical distribution of the lesions on the cat's body.

The study was conducted in the Metropolitan region of the municipality of Recife (8°04'03"S and 34°55'00"W), state of Pernambuco, Northeast region of Brazil. This region is located 7m above sea level. It has an average temperature of 28°C, with a mean maximum of 31°C (from November to April), a mean minimum of 26°C (from June to September), rainfall mean of 2457mm (from 48mm to 390mm) and an average relative humidity of 84%. The humid tropical climate (As) is predominant in the study area (INMET, 2024).

The metropolitan area of Recife encompasses 15 municipalities (Abreu e Lima, Araçoiaba, Cabo de Santo Agostinho, Camaragibe, Goiana, Igarassu, Ilha de Itamaracá, Ipojuca, Itapissuma, Jaboatão dos Guararapes, Moreno, Olinda, Paulista, Recife, and São Lourenço da Mata), endowed with potentials arising from its economic and logistical foundation, as well as the richness of its human resources and cultural diversity. However, it faces serious and persistent challenges such as poverty, social inequalities, population concentration in precarious settlements, and the degradation of natural resources and the built environment (PDUI, 2018). Due to the uncontrolled growth of the canine and feline population in the streets, it is estimated that there are over 100,000 stray dogs and cats in Recife (Silva, 2019), constituting a significant problem for public health and animal welfare.

From January to December 2021, a longitudinal research study was conducted in several neighbourhoods of the metropolitan region of Recife, in which 100 stray cats whose clinical manifestations suggested the presence of sporotrichosis were analysed. For clarification purposes, when we use the term 'stray cats', we refer to those that are unowned, characterized by the absence of regular assistance and the lack of submission to neutering procedures (Ruyver et al., 2021). These felines, found in a situation of neglect, were rescued and referred for treatment at a private veterinary clinic. Each cat was clinically examined, and the anatomical localization of each lesion was recorded (Figure 1).

Biological samples were obtained from each lesion by exfoliative cytology (impression and/or sterile swab) (Larsson, 2011). The material was placed onto a microscopical slide, stained with rapid panoptic to visualize cigar-shaped yeast structures and analyzed at an optical microscope at different magnifications (40x and 100x) (Barros et al., 2011).

We analyzed data to determine absolute and relative frequencies. In addition, the Lilliefors test was used to verify the normality of the data. The Chi-square (χ^2) with Yates correction was used to compare the frequency of positivity in male and female cats. In addition, the Kruskal-Wallis' test was used to compare the anatomical localization of lesions in infected animals. The significance level was set up at 5%. The R software version 3.4.3 and BioEstat version 5.3 were used to perform the statistical analyses.

The anatomical distribution of each lesion was graphically represented by a heat map indicating the

frequency based on the interpolation of data. The QGIS software version 3.10.3-A Coruña was used.

Among the individuals analyzed, 78% (78/100) were males and 22% (22/100) were females. Overall in 70% (70/100) of the samples examined were visualized fungal structures compatible with *Sporothrix* spp. (Lacaz, 2002). Of the positive samples, 74.35% (58/78) and 28.20% (12/22) were males and females, respectively. The statistical analysis revealed a predominance of positive males ($\chi^2=6.691$; $p=0.0097$).

Skin lesions related to *Sporothrix* spp. infection were unevenly distributed on the animal's body, being detected in six anatomical sites (i.e., head, neck, shoulder, belly, paws and tail). Based on the interpolation of data, the chance for detecting lesions was higher on the nose, anterior paw and ears than on other body sites (Figure 2), these areas statistically differed from the other anatomical regions ($H=40.0043$; $p=0.0000$).

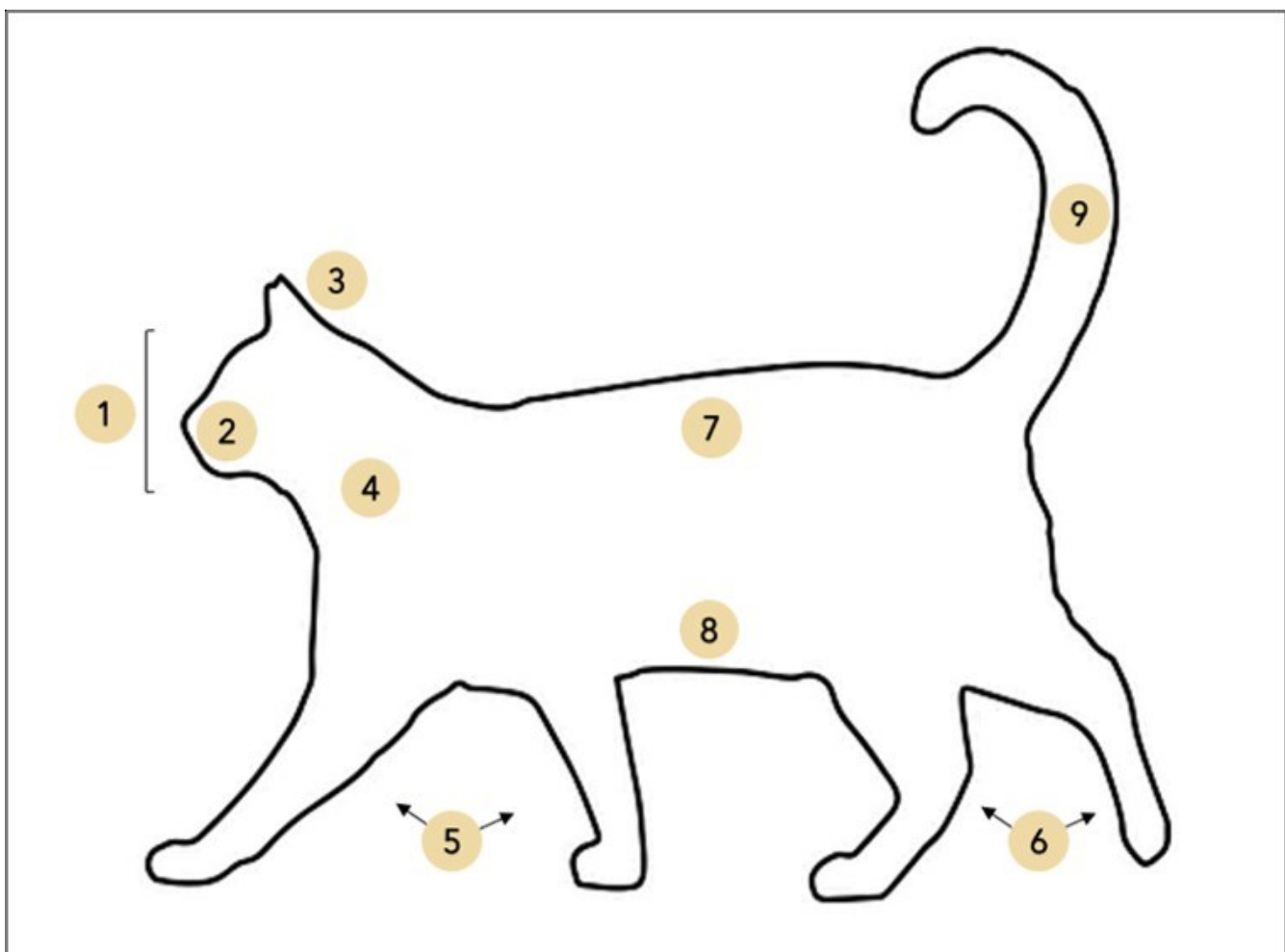


Figure 1. Body sites of cats examined for the presence of *Sporothrix* spp. Head (1); Nose (2); Ears (3); Neck (4); Anterior paws (5); Posterior paws (6); Dorso (7); Belly (8); Tail (9).

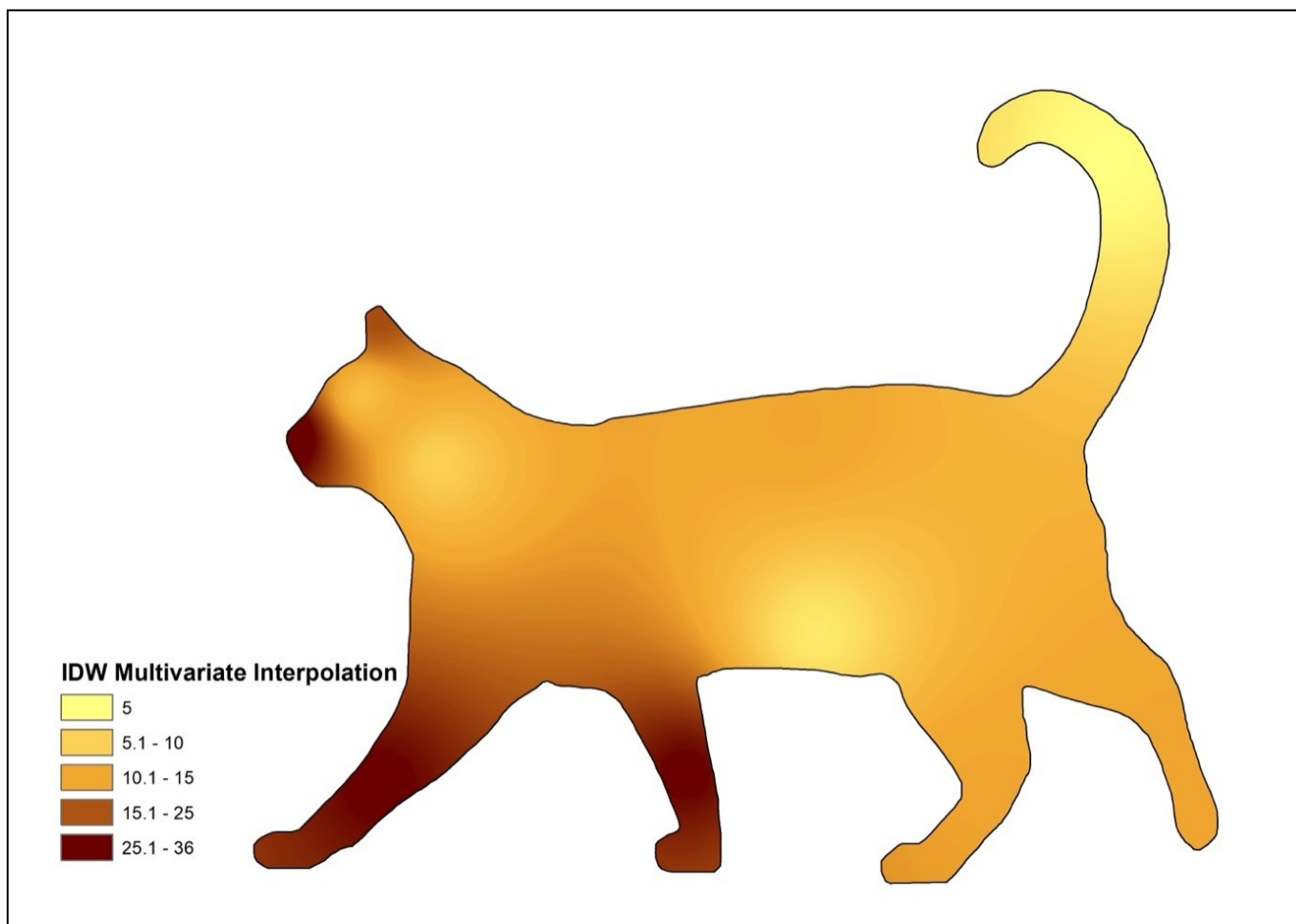


Figure 2. Absolute frequency of anatomical sites with skin lesions in cats with sporotrichosis obtained based on the interpolation of data.

This study reports the occurrence of feline sporotrichosis in several neighborhoods belonging to the municipality of Recife in an urban area, indicating the lesions caused by this infection are unevenly distributed on the animal's body but predominating in the nose, ears and anterior paws.

A total of cats 78% (78/100) of stray animals rescued and attended in a private clinical veterinary with skin lesions were infected by *Sporothrix* spp. Despite this data does not indicate the prevalence of this infection in the feline population, since only animals with skin lesions were included in the research, the high positivity observed in these animals are worthy of note. For a long time, feline sporotrichosis was considered a disease of minor importance in the area of the study. Recently, it has been observed that there is an emergence of cases in cats and humans in which the transmission is attributed to cats (Oliveira Bento et al., 2021). Previous research conducted in the metropolitan region of Recife revealed a high frequency (51.3%; 59/115) of animals diagnosed from 2014 to 2016

(Silva et al., 2018). Many aspects of the rise of sporotrichosis in the Northeast of Brazil have been poorly understood, but the emergence of this disease in cats and humans infected due to close contact with cats has been considered a threat to public health. If we look at the history of the disease in Brazil, where in areas endemic for feline sporotrichosis, initial episodes of outbreaks were followed by massive transmission, suggesting the neglected aspect of the disease.

Most of the positive animals were males ($\chi^2=6.691$; $p=0.0097$), and this finding may be related to the aggressive behavior observed during a territorial dispute or by females. These events favor the inoculation and dissemination of *Sporothrix* spp. in the skin (Ramírez-Soto et al., 2018). Although we detected cutaneous lesions in different anatomical sites, the graphical assessment revealed that the nose, anterior paws and ears are the regions of preference, differing statistically from the other anatomical regions ($H=40.0043$; $p=0.0000$). Usually, the infection may occur through contact with soil by

digging or by bites and scratches between the infected host and susceptible ones (Ramírez-Soto et al., 2018). In both cases, anatomical regions such as the nose, anterior paws and ears are more exposed, being the first area in contact with the fungus (Han and Kano, 2021). In addition, it can be speculated that the higher frequency of lesions in these regions (nose, ears and anterior paws) may also be related to the thermotolerance presented by some isolates of *Sporothrix* spp., since it has been demonstrated that the fungus is incapable of growing at 37°C, producing fixed cutaneous lesions (Rodrigues et al., 2020). The high fungal load in cutaneous lesions may be responsible for the success of horizontal animal transmission and zoonotic transmission of *Sporothrix* species (Rodrigues et al., 2020).

Data from this study are critical from an epidemiological perspective since a high positivity was observed in stray cats. The natural habitat of the fungus is the environment (e.g., soil, woods, organic matter); therefore, these stray animals may act as an important source of contamination for the environment and a source of infection to other susceptible hosts (Duangkaew et al., 2018). The absence of veterinary care and appropriate nutritional management contributes to the immunosuppression of these animals, making them susceptible to several pathogens, including *Sporothrix* spp. (Miranda et al., 2018).

The culture has been considered the gold-standard method for the diagnosis of sporotrichosis. Nonetheless, we must recognize that the importance of the direct examination of skin material in microscopical slides may not be ignored. This kind of diagnosis has been widely employed everywhere due to its low cost, practicality and sensitivity (Redigueri et al., 2022). On the other hand, the method of diagnosis herein employed does not allow the identification of the fungus at the species level, which is considered an important limitation of the present research.

This study detected a high positivity of feline sporotrichosis in stray cats living in an urban area of Northeast Brazil. Data presented here indicated that lesions caused by this infection are unevenly distributed on the animal's body but predominating in the nose, ears and anterior paws. Based on the origin of cats herein assessed, it is strongly encouraged the adoption of measures of health vigilance in order to reduce the risk to which animals and humans are exposed when in contact with these

infected cats. Animal sterilization is a measure of public health importance since it inhibits these animals' aggressive behavior, reducing fights and territorial female disputes.

Competing interest

The authors declare no competing interests.

Ethics Committee

The execution of this research dispensed with the need to obtain ethical licenses, since we work with samples from routine clinical care veterinary establishments used for diagnostic purposes.

References

- Barros, M.B.L.; Paes R.A.; Schubach A.O. *Sporothrix schenckii* and sporotrichosis. **Clinical Microbiology Reviews**, 24(4): 633-654, 2011.
- Duangkaew, L. et al. Cutaneous sporotrichosis in a stray cat from Thailand. **Medical Mycology**, 21(s.n): 46-49, 2018.
- Gremião, I.D.F. et al. Guideline for the treatment of feline sporotrichosis caused by *Sporothrix brasiliensis* and literature revision. **Brazilian Journal of Microbiology**, 52 (1): 107-124, 2021.
- Han, H.S.; Kano, R. Feline sporotrichosis in Asia. **Brazilian Journal of Microbiology**, 52 (1): 125-134, 2021.
- INMET - Instituto Nacional de Meteorologia. **Normais climatológicas**. Available at: <<http://www.inmet.gov.br/portal/index.php?r=clima/normaisClimatologicas>>. Accessed on: 6 Feb. 2024.
- Lacaz, C.S. Esporotricose e outras Micoses Gomosas. In: Lacaz, C.S. et al. **Tratado de micologia médica**, 9ª ed. Savier, São Paulo. 2002. p.479-487.
- Larsson, C.E. Esporotricose. **Brazilian Journal of Veterinary Research and Animal Science**, 48(3): 250-259, 2011.
- Oliveira Bento, A. et al. The spread of cat transmitted sporotrichosis due to *Sporothrix brasiliensis* in Brazil towards the Northeast region. **PLOS Neglected Tropical Diseases**, 15(8): 1-20, 2021.
- Marimon, R. et al. *Sporothrix brasiliensis*, *S. globosa*, and *S. mexicana*, three new *Sporothrix* species of clinical interest. **Journal of Clinical Microbiology**, 45(10): 3198-3206, 2007.
- Miranda, L.H.M. et al. Co-infection with feline retrovirus is related to changes in immunological parameters of cats with sporotrichosis. **PLoSOne**, 13(11): 1-16, 2018.

PDUI - Plano de Desenvolvimento Urbano Integrado. A Região Metropolitana do Recife. Governo de Pernambuco, 2018. Available at: <<https://www.pdui-rmr.pe.gov.br/RMR>>. Accessed on: 15 May 2024.

Pereira, S.A. et al. Response to azolic antifungal agents for treating feline sporotrichosis. **Veterinary Record**, 166(10): 290-294, 2010.

Ramírez-Soto, M.C. et al. Ecological determinants of sporotrichosis etiological agents. **Journal of Fungi**, 4(3): 1-11, 2018.

Redigueri, B.C. et al. Clinical, epidemiological, and epizootic features of *Sporothrix brasiliensis* in Espírito Santo, Brazil. **EcoHealth**, 19(1): 124-134, 2022.

Rodrigues, A.M. et al. The threat of emerging and re-emerging pathogenic *Sporothrix* species. **Mycopathologia**, 185(5): 813-842, 2020.

Ruyver, C., et al. Public opinions on seven different stray cat population management scenarios in Flanders, Belgium. **Research in Veterinary Science**, 136: 209-219, 2021.

Silva, G.M. et al. Surto de esporotricose felina na região metropolitana do Recife. **Pesquisa Veterinária Brasileira**, 38(8): 1767-1771, 2018.

Silva, W. ONGs e poder público se unem contra o drama de abandono de animais. Folha de Pernambuco, 2019. Available at: <https://www.folhape.com.br/noticias/ongs-e-poder-publico-se-unem-contra-o-drama-de-abandono-de-animais/116808/>. Accessed on: 15 May 2024.

Waller, S.B. et al. Antifungal resistance on *Sporothrix* species: an overview. **Brazilian Journal of Microbiology**, 52(1): 73-80, 2021.