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Risk factors, incidence and clinical aspects of sporotrichosis in dogs and cats in Campos dos Goytacazes, RJ

Fatores de risco, incidência e aspectos clínicos da esporotricose em cães e gatos em Campos dos Goytacazes, RJ

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ABSTRACT: The sporotrichosis is an endemic disease with cosmopolitan distribution, caused by the fungi *Sporothrix schenckii* complex, which affects animals and humans. In Brazil, sporotrichosis is an emerging zoonosis, recently included in the National List of Compulsory Notification of diseases, injuries and events in public health issued by the Ministry of Health. The present study aimed to analyze clinical and epidemiological aspects of sporotrichosis in cats and dogs in the municipality of Campos dos Goytacazes, RJ. For this study, 805 animal patients with suspected lesions of sporotrichosis were included, i.e., 749 cats and 56 dogs, and they were attended at the Veterinary Hospital/Universidade Estadual do Norte Fluminense Darcy Ribeiro (UENF). The results showed that 76.37% of the cats were positive for sporotrichosis, with a higher proportion of males. Regarding the dogs, 41.07% were positive for the disease, and among these animals, 45.45% of the females and 34.78% of the males were positive for sporotrichosis. It was observed that 77.40% of the cats could roam freely in the peridomestic area and 72.20% were not neutered. The results showed that both cats and dogs that were not neutered and could roam freely in the peridomestic area were more susceptible to be affected by sporotrichosis.

KEYWORDS: public health; zoonosis; transmission.

RESUMO: A esporotricose é uma doença endêmica de distribuição cosmopolita, causada por fungos do complexo *Sporothrix schenckii,* que afeta animais e humanos. No Brasil, a esporotricose apresenta-se como uma zoonose emergente, recentemente incluída na Lista Nacional de Notificação Compulsória de doenças, agravos e eventos de saúde pública emitida pelo Ministério da Saúde. O objetivo do presente trabalho foi analisar aspectos da doença, como a espécie, o sexo, a idade e as condições de criação, relacionando a predisposição destes a esporotricose, no Município de Campos dos Goytacazes, Rio de Janeiro. Para este estudo, foram incluídos 805 pacientes com lesões suspeitas de esporotricose, sendo 749 felinos e 56 caninos, atendidos no Hospital Veterinário/UENF. Os resultados mostraram que 76,37% dos felinos eram positivos para a esporotricose, sendo a maior proporção de machos. Entre os pacientes caninos, 41,07% eram positivos para a doença, e destes 45,45% das fêmeas e 34,78% dos machos foram positivos para esporotricose. Foi observado que 77,40% dos felinos possuíam acesso ao peridomicílio e 72,20% não eram castrados. Os resultados mostraram que tanto felinos quanto caninos não castrados e com livre acesso ao peridomicílio são mais propensos a contaminação por esporotricose.

PALAVRAS-CHAVE: saúde pública; zoonose; transmissão.

INTRODUCTION

The sporotrichosis is a subcutaneous mycosis caused by the dimorphic fungus of the *Sporothrix schenckii* complex and affects animals and humans. Some species present significant medical relevance such as *S. schenckii, S. brasiliensis*, *S. globosa*, *S. luriei* and *S. mexicana*, however, *S. schenckii* and *S. brasiliensis* are the most described species in Brazil. The *S. brasiliensis* species showed relevant prominence and is considered the most virulent of the genus *Sporothrix* (MONTENEGRO et al., 2014; RODRIGUES et al., 2013; RODRIGUES et al., 2014).

Indeed, the sporotrichosis is considered an endemic disease of global distribution, with prevalence in tropical and subtropical climatic zones, commonly found in soil, vegetation and organic matter decomposition. The fungal colonies are composed of mycelium in cultivation or can be found at environmental temperature (25°C), whereas at body temperature or in

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cultivation at 37°C, they are found in yeast form (BARROS; PAES; SCHUBACH, 2011; CHAKRABARTI et al., 2015; RODRIGUES et al., 2013).

Infection develops after traumatic inoculation of the etiologic agent on the skin or mucosa during the handling of contaminated soil, plants and organic matter. Alternatively, the infection may occur through contact with previously infected animals as well as zoonotic transmission, which has been reported as the most common fungal infection, i.e., by direct inoculation of the fungus via bites and/or scratches (GREMIÃO et al., 2017).

The cats are the most affected and have become the main transmitters of sporotrichosis, which can be explained by the inherent habits of the species, such as scratching tree trunks, fights over territories and for access to females, and socialization with licking. In fact, the disease may be potentiated when the animals roam freely in the peridomestic area, thus, carrying high infection fungal load (BARROS; PAES; SCHUBACH, 2011; SCHUBACH et al., 2004). According to Barros et al. (2004), dogs are probably not directly involved in the transmission of sporotrichosis due to the scarcity of infection fungal load in lesions and oral cavity.

In Brazil, sporotrichosis is an emerging zoonosis, recently included in the National List of Compulsory Notification of diseases, injuries and events in public health issued by the Ministry of Health (MINISTÉRIO DA SAÚDE, 2020).

The epidemic scenario in the state of Rio de Janeiro (RJ) is already known, however, the disease has been described in animals from other states as following: Goiás (GO) (SOBREIRA et al., 2016); Mato Grosso (MT) (FERNANDES et al., 2004); Paraíba (PB) (COSTA, 2019; NUNES et al., 2011); Pernambuco (PE) (ARAÚJO; LEAL, 2016); and Rio Grande do Sul (RS) (XAVIER et al., 2004). In addition to the metropolitan region of Rio de Janeiro, studies have reported a high frequency of positive cases of sporotrichosis in the municipality of Campos dos Goytacazes (RJ), i.e., mainly cats that roam freely in the peridomestic area (ALMEIDA et al., 2018).

According to Falcão et al (2019), the authors could collect some data regarding this disease in humans from 1992 to 2015, and it could be noted the occurrence of 782 hospitalisations and 65 deaths owing to sporotrichosis. Despite the critical number of cases of human sporotrichosis in Rio de Janeiro, with 250 hospitalizations and 36 deaths, other states such as São Paulo and Goiás also had significant numbers of cases in humans.

This study aimed to evaluate clinical and epidemiological aspects of sporotrichosis in cats and dogs in the city of Campos dos Goytacazes, in the state of Rio de Janeiro.

MATERIAL AND METHODS

The research was developed at the Veterinary Hospital (VH) of the *Universidade Estadual do Norte Fluminense Darcy Ribeiro* (UENF), and it was approved by the Ethics Committee on Animal Use of UENF, protocol number 334.

Animal patients of the study

For this study, 805 animal patients were included, 749 cats and 56 dogs, as carriers of cutaneous and/or mucosal lesions with suspected sporotrichosis. The animal patients were attended at the VH from June 2016 to March 2020.

General clinical assessment

In the clinical consultation, an anamnesis form for the animal patients were included, in addition to information on the general clinical condition of the animal, i.e., data concerning species, sex, age, and also questions to the pet owner about the history taking, whether the animal could roam freely in the peridomestic area and whether it was neutered. The animal patients were submitted to clinical examination and specific evaluation regarding the lesions for subsequent collection of material.

Sample collection

Samples of ulcerated skin lesions and/or mucous membranes were collected by swabbing with only one swab in a sterile tube with Stuart medium; in cases of multiple lesions, the less infected lesion was the alternative for isolating the fungus, without the presence of secondary contaminants, such as bacteria. After sample collection, the samples were sent to the Animal Health Laboratory (*Laboratório de Sanidade Animal* (LSA)) of the Center for Technological and Agricultural Sciences (*Centro de Ciências Tecnológicas e Agropecuárias* (CCTA)) of UENF for laboratory analysis.

Laboratory analysis

The laboratory analysis was based on cytological evaluation and mycological culture. For cytology, swabbing was conducted under a laminar flow hood. The samples were transferred from the swabs to sterile microscopy slides, fixed heat to the slide and stained using Gram-staining procedure. The slides were analyzed under an optical microscope with 100x magnification for yeast identification.

Fungal culture was based on the inoculation of material collected by sterile swab into petri dishes containing 4% Sabouraud Dextrose agar culture medium (Himedia®) plus chloramphenicol (50mg/l, Sigma-Aldrich®, USA) and cycloheximide (400mg/l, Sigma-Aldrich®, USA), then incubating the material kept at a temperature between 25°C and 29°C for 15 days until reporting the fungal growth in its mycelial form. The positivite results could be confirmed by the presence of colonies with filamentous, membranous aspect, with white borders and dark centre.

The criteria for inclusion of the animal paitents in the study were associated to cytology and fungal culture that showed the presence of the fungus.

Treatment of positive animals

For the animals positive for sporotrichosis, it was precribed the treatment according to the clinical signs. For animals only with cutaneus lesions the administration of itraconazol 100 mg/cat and 10 mg/kg for dogs was prescribed, every 24 hours and for animals with cutaneus lesions, respiratory signs and relapse cases the association of itraconazol 100 mg/day/cat and 10 mg/kg for dogs and potassium iodide 2-5 mg/kg/day for cats and dogs.

RESULTS

The results showed that 572 (76.37%) cats were positive for sporotrichosis, whereas 177 (23.63%) were negative. According to the 749 cats evaluated, 260 of them (34.71%) were females, of which 185 (71.15%) were positive for sporotrichosis and 75 (28.85%) were negative, whereas 489 animal patients (65.29%) were males, seeing that 387 of them (79.14%) were positive for sporotrichosis and 102 (20.85%) were negative.

For dogs, 23 out of 56 animals evaluated were positive for sporotrichosis (41.07%), whereas 33 (58,92%) dogs were negative. Among these dogs, 33 (58,92%) were females and 15 (45,45%) were positive for sporotrichosis and 18 (54,54%) negative, whereas 23 (41,07%) were males and 8 (34,78%) were positive and 15 (65,21%) negative.

Regarding the characteristics of access to the peridomestic area, the results showed that 572 animal patients (76.37%) were positive for sporotrichosis, and 443 (77.40%) of the positive animals could roam freely in the peridomestic area (Figures 1a and 1b), 94 (16.43%) could not roam freely in the peridomestic area, while the pet owners of 35 animal patients (6.12%) did not know to answer this question (Figure 2).

The neutered cats that could roam freely in the peridomestic area had focal (Figure 3a) and/or disseminated (Figure 3b) lesions with an ulcerated and exudative aspect, and animal patients with lesions on the face also presented respiratory involvement, including frequent sneezing and nasal edema.

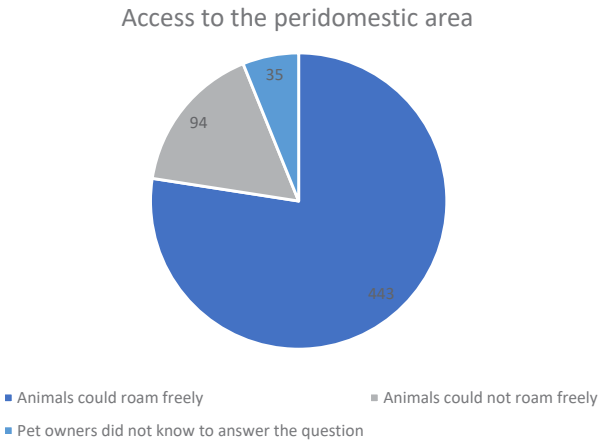

Figure 2. Cats were positive for sporotrichosis and attended in Campos dos Goytacazes/RJ. Distribution according to peridomestic access.

Figure 1. Non-neutered cats were positive for sporotrichosis. The cats could roam freely in the peridomestic area and had multiple ulcerated and exudative lesions on the face. Campos dos Goytacazes/RJ.

Regarding the reproductive status of the 572 cats positive for sporotrichosis, 116 animal patients (20.28%) were neutered, whereas 413 animal patients (72.20%) were not. The pet owners of 43 animal patients (7.52%) did not know to answer this question (Figure 4).

With respect to dogs, the results showed that of the 23 animal patients, 12 (52.17%) could roam freely on the street, whereas 9 (39.13%) of them could not roam freely. The pet owners of two dogs (8.70%) did not know whether the dogs could roam freely in the peridomestic area. Regarding the characteristic of reproductive status, 20 animal patients (86.96%) were not neutered, and three (13.04%) were neutered.

Concerning age, it could be noted that 145 animal patients were less than one year old, among them seven (4.82%) dogs and 138 (95.17%) cats, 556 animal patients were between one and seven years, 35 (6.29%) dogs and 521 (93.70%) cats, 38 animal patients between eight and 12 years, 10 (26.32%) dogs and 28 (73.68%) cats, 10 animal patients over 12 years, one (10%) dog and nine (90%) cats. In relation to the animal patients evaluated, 56 of their pet owners were unable to inform the age of their animals, comprising three (5.36%) dogs and 53 (94.64%) cats.

Among the 572 cats that were positive for sporotrichosis, 285 (49.82%) had single lesion and 287 (50.17%) had disseminated lesions. Regarding the 23 dogs that were positive for sporotrichosis, 19 (82.60%) had single lesions and four (17.39%) had disseminated lesions.

Among the 285 cats with single lesions, 98 (34.38%) had lesions in the nasal region, 67 (23.50%) in the limbs, 42 (14.73%) in the dorsal region, 30 (10.52%) in face region, 19 (6.66%) in auricular region, 9 (3.15%) in tail, 8 (2.80%) in ocular region, 7 (2.45%) in cervical region, 3 (1.05%) in oral region and 2 (0.70%) in abdominal region. Among the 19 dogs that had single lesion, 11 (57.89%) had lesion in nasal

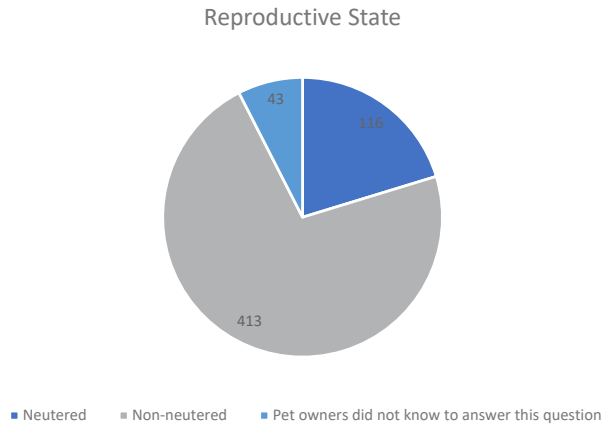

Figure 4. Cats were positive for sporotrichosis and attended in Campos dos Goytacazes/RJ. Distribution according to pet reproductive status.

Figure 3. Cats were positive for sporotrichosis in Campos dos Goytacazes/RJ. (A) Neutered animal that could roam freely in a contaminated environment, presenting a single lesion in the right thoracic limb; (B) Non-neutered cat that could roam freely in the peridomestic area, and had disseminated lesions throughout the body.

region, 4 (21.05%) in dorsal region, 2 (10.52%) in limbs, 1 (5.26%) in the testicle and 1 (5.26%) in cervical region.

When evaluating the 287 cats with disseminated lesions, 201 (70.03%) animals had lesions in the limbs, 104 (36.23%) in the nasal region, 69 (24.04%) on the face, 61 (21.25%) in the auricular region, 55 (19.16%) in the dorsal region, 27 (9.40%) in the ocular region, 23 (8.01%) in the cervical region, 6 (2.09%) in the oral region, 5 (1.74%) had lesions spread throughout the body and 2 (0.69%) in the testicle. Only 4 dogs had disseminated lesions, seeing that 1 dog had lesion in the extremity of the front limb and nasal region, another one (25%) with dispersed lesions in the body, 1 dog with lesions in the front limb and oral region and another one with lesions in the back limb and on the face.

DISCUSSION

In this study, there was a higher number of cases regarding cats with suspected sporotrichosis lesions confirmed after the diagnostic exam, and most of them were male cats. The frequency of cases was in accordance with the research conducted by Schubach et al. (2004) and Barros, Paes and Schubach (2011), who described that there was a high frequency of cats positive for sporotrichosis, owing to the characteristic habits of the species, such as sharpening the nails on tree trunks, disputes over territories and females, socialization through licking, thus transmitting the disease for animals and humans. According to Barros et al. (2004), dogs were probably not directly involved in the transmission of sporotrichosis, which explains why they were a minority in the total number of cases treated.

Regarding cats, it was observed that both males and females were predisposed to contamination by sporotrichosis when they could roam freely in the peridomestic area, and males were more frequently affected than females. The same was observed for the pet reproductive status, in which there was a significant frequency of females and non-neutered males which were positive for sporotrichosis, being the number of non-neutered males higher than females. Almeida et al. (2018), Schubach et al. (2001) and Larsson (2011) observed a higher prevalence of positivity in male cats that could roam freely in the extra-domiciliary environment and were sexually intact male cats, and this fact may be related to the inherent habits of the species, such as fights over territories and for access to females, being caused by permissive pet owners regarding the access to the extra-domiciliary area.

With respect to the dogs, a higher number of female positive patients for sporotrichosis was observed, which demonstrated that sex was not as relevant as determinant as in cats. It may be possible that this data was not relevant for dogs, since they were animals that usually travel from one habitat to other accompanied by their pet owners. However, regarding reproductive status, it could be observed a prevalence of non-neutered animals among the positive ones. According to Schubach et al. (2006), there were isolated reports of cases regarding canine sporotrichosis, most of which were attributed to transmission by cats. In a study conducted by Papa et al (2018), 100 residents of the Vila Joaniza community in the Galeão neighborhood located in the municipality of Rio de Janeiro answered questions about sporotrichosis and 83% reported that they had already seen cats contaminated with the disease, but there were no responses about dogs, demonstrating that the number of infected dogs was reduced compared to cats. Despite the significant number of suspected dogs for the disease, the species did not seem to have relevant zoonotic potential (BARROS; PAES; SCHUBACH, 2011).

Cats between one and seven years of age, from young to adult animals, were more frequently affected by the disease, possibly because they were animals of reproductive age and, therefore, more likely to roam outside the domestic area. According to Schubach; Schubach (2000) and Pereira et al. (2014), male cats of reproductive age tend to be more contaminated by sporotrichosis, probably because they are involved in territorial disputes and access to females. However, Ettinger; Feldman (2000) reported that cats under four years of age were more affected, which differs from what was found in the present study, and may indicate an increase in the age range affected by the disease.

The minority of neutered and positive animals attended at the VH was possibly related to the maintenance of cats in the home environment, thus, neutering becomes an auxiliary measure to control the disease. Non-neutered animals that roam freely in the peridomestic area are important transmitters of the disease among humans (SILVA et al., 2012). Therefore, it can be stated that the most important form of infection in humans is the zoonotic transmission from cats to humans. In a study conducted by Pereira et al. (2020) with 20 human patients that were positive for sporotrichosis, 95% reported the presence of cats in the home environment, and 65% of these cats were not neutered.

Currently, not only in the state of Rio de Janeiro, but in states such as São Paulo, Goiás, Amazônia and Paraná, it could be seen that hospitalizations of humans due to sporotrichosis have been reported in the same period of disease outbreaks in cats near the peridomestic areas (GUTIERREZ-GALHARDO et al., 2015; SOBREIRA et al., 2016).

The disseminated lesions were found in cats positive for sporotrichosis, which could be explained by the pet owner's delay in seeking veterinary care as well as the cat's habit of licking itself for hygiene, which facilitates the dissemination of the fungus to other parts of the body (SCHUBACH; SCHUBACH, 2000). The licking habit is less frequent in dogs. For most of the dogs positive for sporotrichosis, it could be observed a single lesion during clinical examination.

The regions most affected by lesions caused by the fungus in cats were the nasal region, limbs, face and dorsal region of the trunk, which corresponds to what was

described by Ettinger; Feldman (1997) and Souza (2003), who reported the prevalence of lesions in the head, distal part of limbs and trunk of the animal. However, the lesions were not limited to these regions, also being relevant in the nasal region, which can cause sneezing and breathing difficultes as clinical symptoms. According to Carvalho (2016), it is important to extend the treatment and make decisions about requiring multiple medications. The most affected regions in dogs were the nasal region, limbs and dorsal region of the trunk, which agrees with the findings in literature regarding the cutaneous form of the disease (SCHUBACH; SCHUBACH, 2000), although the reports of the disease concerning the species are scarce (SCHUBACH et al., 2006).

The lack of information regarding sporotrichosis in some regions hinders the development of control and prevention measures in the various states. Therefore, understanding the clinical and epidemiological aspects of the disease is essential for early diagnosis and the development of effective prevention and control measures.

CONCLUSION

A high frequency of animals positive for sporotrichosis was observed in Campos dos Goytacazes/RJ, mostly non-neutered male cats, between one and seven years of age and that could roam freely in the peridomestic area.

The most frequently species diagnosed with the disease was the feline so, the high number of non-neutered animals affected has revealed that neutering may be an important measure for the prevention and control of the disease.

Disseminated ulcerated and exsudative lesions were predominant in cats, whereas in dogs single lesions were more frequently observed, probably owing to the higher fungal load in cats' lesions and the species' habit of licking for hygiene. The most affected places were the limbs and nasal region, with high frequency of clinical alterations such as sneezes and edema.

The municipality of Campos dos Goytacazes faces a serious public health issue related to sporotrichosis and the knowledge gained with the present study indicated that it is still necessary to adopt population awareness strategies aimed at controlling and preventing the disease.

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