Dermatophytes and saprobe fungi isolated from dogs and cats 
in the city of Fortaleza, Brazil

[Dermatófitos e fungos sapróbios isolados de cães e gatos na cidade de Fortaleza]

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ABSTRACT

The possible involvement of saprobe fungi in dermatomycoses, as well as the determination of the incidence of dermatophytes in dogs and cats were studied. During a period of one year, 74 dogs and 18 cats, with cutaneous lesions suggesting mycoses were included in this study. The mycological analyses were conducted by direct microscopy and by fungal culture on Sabouraud agar, chloramphenicol Sabouraud agar and mycosel agar. Of the 92 samples, 21 resulted in positive cultures for dermatophytes. Dermatophyte fungi pure cultures were obtained from 13 samples. A simultaneous growth of dermatophytes plus saprobe fungi was observed in 8 of the samples. Of the remaining 71 samples, no fungal growth was observed in 10 samples, and at minimum the growth of one saprobe fungi in 61. One, two and three genera of saprobe fungi were isolated in 29, 30 and 2 samples, respectively. Microsporum canis was isolated in 6 (28.6%) and 10 samples (47.6%) from cats and dogs, respectively, and Trichophyton mentagrophytes in 2 (9.5%) and 3 samples (14.3%) from cats and dogs, respectively. The following genera of saprobe fungi were also isolated: Alternaria sp (1.9%), Chaetomium sp (1.9%), Rhizopus sp (2.9%), Curvularia sp (3.9%), Candida sp (6.8%), Trichoderma sp (6.8%), Fusarium sp (7.8%), Cladosporium sp (8.7%), Penicillium sp (21.4%) and Aspergillus sp (37.9%).

Keywords: Dog, cat, dermatophyte, saprobe fungi, mycosis

RESUMO

Os objetivos desta pesquisa foram investigar o possível envolvimento de fungos sapróbios nas dermatomícos e determinar a incidência de dermatófitos em cães e gatos. Durante um ano, 74 cães e 18 gatos com lesões cutâneas sugestivas de micoses foram incluídos neste estudo. As análises micológicas foram realizadas por microscopia direta e cultivo do fungo em ágar Sabouraud, ágar Sabouraud com cloranfenicol e ágar mycosel. A partir dos 92 espécimes clínicos, 21 resultaram em culturas positivas para dermatófitos, observando-se crescimento exclusivo desses fungos somente em 13. Em oito espécimes, observou-se crescimento simultâneo de dermatófitos e fungos sapróbios. Dentre os 71 espécimes restantes, 10 não apresentaram crescimento fungico, e pelo menos um fungo sapróbio foi observado em 61 deles. Foram isolados um, dois e três gêneros de fungos sapróbios em 29, 30 e 2 espécimes, respectivamente. Microsporum canis foi encontrado em 6 (28,6%) e 10 espécimes (47,6%) e Trichophyton mentagrophytes em 2 (9,5%) e 3 espécimes (14,3%) de gatos e cães, respectivamente. Os seguintes gêneros de fungos sapróbios foram isolados: Alternaria sp (1,9%), Chaetomium sp (1,9%),
Rhizopus sp (2,9%), Curvularia sp (3,9%), Candida sp (6,8%), Trichoderma sp (6,8%), Fusarium sp (7,8%), Cladosporium sp (8,7%), Penicillium sp (21,4%) e Aspergillus sp (37,9%).

Palavras-chave: Cão, gato, dermatófito, fungo sapróbio e micose

INTRODUCTION

Dermatophytoses is a disease characterized by superficial cutaneous lesions, caused by dermatophytes fungi on the keratinised tissues (skin, hair and nails). This mycotic infection is reported throughout the world, and it is extremely contagious (Faggi et al., 1987; González, 1990; Sparkes et al., 1993).

Infections by dermatophytes may be transmitted from animal to animal, animal to human, human to human, and human to animal in a cyclic manner (Radentz, 1991; Bassanesi et al., 1993; Cabañas et al., 1997). These fungi share the ability to utilize keratin as a nutrient substrate, which provoke multiple cutaneous consequences for domestic animals as well as humans (Severo et al., 1985; Dubugras et al., 1992; Costa et al., 1994; Marchisio et al., 1995).

The main dermatophytes which occur in cats and dogs belong to the genera Microsporum and Trichophyton (Gambale et al., 1987; Caretta et al., 1989; Connole, 1990; Ranganathan et al., 1997; Pinheiro et al., 1997). Several previous studies on canine and feline dermatophytoses have shown that 95 to 98 % of the incidence of these mycoses are due to dermatophytes belonging to these genera (Faggi et al., 1987; González, 1990; Sparkes et al., 1993).

Animals younger than one year-old appear to be susceptible to dermatophytoses, but there is no apparent sex predisposition and no conclusive evidence of any seasonal variation in the incidence of the disease (Gambale et al., 1987; González, 1990; Sparkes et al., 1993; Cabañas et al., 1997; Cabañas, 2000).

The epidemiology of the dermatophytes is closely connected to its environment. These fungi are classified according to their habitat in anthropophilic, geophilic and zoophilic (Connole, 1990; Radentz, 1991; Costa et al., 1994). On the basis of this classification, animals may be largely responsible for the progressive increase of zoophilic over anthropophilic dermatophytes in the etiology of human dermatophytoses (Radentz, 1991; Romano et al., 1997).

In previous studies, it has been suggested that cats and dogs may act as important infection sources of dermatophytes for humans (Londero et al., 1961; Moreira, 1970; Marchisio et al., 1995; Romano et al., 1997). However, Pinheiro et al. (1997) did not observe epidemiological evidence to support this hypothesis.

Besides dermatophytoses, other mycoses have been prominent in veterinary medicine (Mancianti & Pajini, 1996). Among these diseases are the mycoses resulting from saprobe fungi, which classically belong to skin microbiota (Silva et al., 1983; Ali-Shtayeh et al., 1988; Moriello & Deboer, 1991; Khorasvi, 1996; Ishikawa & Papini, 1996). Nevertheless, when the host is debilitated by a chronic disease, anticancer therapy, prolonged antibiotic treatment, steroids therapy, or immune depressing conditions, saprobe fungi can proliferate and elicit an infection. Therefore, this situation associated with the improvement of diagnostic techniques, could explain, at least in part, the role of these fungi as primary pathogens (Mancianti & Papini, 1996).

The aims of this research were to investigate the possible involvement of saprobe fungi in canine and feline dermatomycoses, as well as to determine the incidence of dermatophytes in these species.

MATERIALS AND METHODS
During a period of one year, clinical specimens were examined from skin of 74 dogs and 18 cats, with cutaneous lesions suggesting mycoses. This study evaluated cats and dogs referred to the veterinary clinic of the State University of Ceará, Brazil. Cats and dogs were from various parts of the metropolitan region of the city of Fortaleza. Animals were from both sexes, different breeds and from two months to seven years of age.

Cats and dogs with suspected dermatomycoses were submitted to a general clinical examination. The clinical specimens were collected by a standard protocol, in which the animals were initially submitted to skin wash with coconut soap. Samples of skin and fur were collected from active lesions throughout the body. Then, the clinical materials were placed in labeled Petri plates, and sent immediately to the Medical Mycology Specialized Center of Federal University of Ceará.

The mycological analysis was undertaken by means of the visualization of fungal structures, after suspending representative material in 30% potassium hydroxide, and by macro and microscopic characteristics of the colonies, which were obtained from inoculation of the clinical specimens onto simple Sabouraud agar, chloramphenicol Sabouraud agar and Mycosel agar. The tubes were incubated at room temperature (25°C) and observed for 30 days. When the fungal morphology, as determined in the primary medium, was not possible to be identified, it was relocated onto rice agar to induce the growth of the characteristic fructification structures. The slide culture was made simultaneously, for a better visualization of typical structures of each fungi species. In addition, the identification of *T. mentagrophytes* was confirmed by hair perforation test *in vitro*, test on the positive urease and by analysis of vitamin requirement. The identification of saprobe fungi species was possible only for this genus, by following micro and macroscopic evaluations of the primary cultures.

**RESULTS**

Of the 92 examined samples 21 (23%) resulted in positive cultures of dermatophytes. It was seen that there was an exclusive growth of these fungi in 13 samples, and a simultaneous growth of dermatophytes plus saprobe fungi in 8 of them. Of the remaining 71 clinical samples, no fungal growth was found in 10 and at least the growth of one saprobe fungi colony was observed in 61. One, two and three genera of saprobe fungi were isolated in 29, 30 and 2 samples, respectively (Fig.1).
The isolated dermatophytes were classified into two species: *M. canis*, isolated in 6 samples (28.6 %) and 10 samples (47.6 %) from cats and dogs, respectively, and *T. mentagrophytes* in 2 samples (9.5 %) and 3 samples (14.3 %) from cats and dogs, respectively. It was also seen that only 11 samples (52%) had confirmed microscopic detection and positive cultures coincident for dermatophytes (data not shown).

The following genera of saprobe fungi were isolated, from cats and dogs with cutaneous lesions suggesting dermatomycoses: *Alternaria sp* (1.9%), *Chaetomium sp* (1.9%), *Rhizopus sp* (2.9%), *Curvularia sp* (3.9%), *Candida sp* (6.8%), *Trichoderma sp* (6.8%), *Fusarium sp* (7.8%), *Cladosporium sp* (8.7%), *Penicillium sp* (21.4%) and *Aspergillus sp* (37.9%) (Fig.2).
DISCUSSION

The present study consisted of a clinical and a laboratory investigation of dermatomycoses in cats and dogs, referred to the veterinary hospital of the State University of Ceará, Brazil, during a 12-month period. All clinical specimens from cats and dogs with skin disease, suggesting dermatomycoses were included. The information recorded included breed, sex, age and the results of microscopic examinations and fungal culture.

During the last few years, some studies have been published showing the prevalence of dermatophytes in the skin of cats and dogs (Gambale et al., 1987; Marchisio et al., 1995; Simpanya & Baxter, 1996; Ranganathan et al., 1997; Cabañes, 2000). The occurrence of these fungi ranged from 4 to 10%, but rarely exceeded 20%. However, the present research showed a particularly high proportion of positive results (23.0%). This finding is probably due to a more accurate technique of clinical specimens collection, which was always preceded by a rigorous washing with coconut soap.

The prevalence of dermatophytes was shown to be higher in cats (44.4%) than in dogs (17.6%). These results are similar to findings described in the literature which report the predilection of dermatophytic...
fungi for cats (Sparkes et al., 1993; Romano et al., 1997; Cabañes, 2000). These observations suggest that the higher incidence of dermatophytoses in cats is a worldwide phenomenon.

As in most other studies of canine and feline dermatophytoses (Gambale et al., 1987; Caretta et al., 1989; Dubugras et al., 1992; Sparkes et al., 1993; Romano et al., 1997), this research showed that *M. canis* was the most frequently dermatophyte isolated, followed by *T. mentagrophytes*. *M. canis* accounted for a significantly higher proportion of infections in cats (33.3%) than in dogs (13.5%). So, these data are in agreement with other studies of the literature which show the tendency of cats to be a natural reservoir for this dermatophyte (Sparkes et al., 1993; Cabañes, 2000).

The positiveness of dermatophytes, as determined by microscopic examinations, was in accordance with other authors (Sparkes et al., 1993), but was low when compared with the result of fungal positive cultures. In the present study, the structures of dermatophytes were observed by direct microscopy only in 52.0% of the specimens, which showed positive cultures. Therefore, it is suggested that fungal culture may be regarded as the definitive diagnosis for dermatophytoses in cats and dogs.

The isolation of dermatophytes was shown to be independent of breed and sex. However, in agreement with other previous studies (Gambale et al., 1987; Sparkes et al., 1993; Cabañes et al., 1997), which strongly suggested that young cats and dogs are more susceptible to the development of dermatophytoses, our findings showed that the infection by dermatophytes is directly dependent on age. It was found that the prevalence of this infection in cats and dogs less than a year old was more than twice that in older animals (data not shown).

The most common fungi isolated from skin of cats and dogs with mycoses were saprobe, especially *Aspergillus sp* and *Penicillium sp*. This finding may be explained by the fact that these fungi are commonly found in soil, air, plants and on other materials, which are in a constant contact with animals (Mancianti & Papini, 1996).

Saprobe fungi are often found in clinical materials and are common in the environment of laboratory and veterinary clinics (Silva et al., 1983; Gambale et al., 1987; Mancianti & Papini, 1996; Cabañes et al., 1996; Ishikawa et al., 1996). Nevertheless, in certain circumstances, such as chronic disease, anticancer therapy, prolonged antibiotic treatment, steroids therapy, some fungi commonly considered saprobe may actually assume pathogenic properties and invade tissues. Therefore, it is very important for the veterinarian to be able to distinguish the pathogenic fungi from these organisms. The involvement of saprobe fungi as pathogenic agents of mycoses in cats and dogs, must be carefully analyzed by an experienced mycologist and veterinarian. In such cases, it is important that fungi be correctly identified. These results suggest saprobe fungi, such as *Alternaria sp*, *Chaetomium sp*, *Rhizopus sp*, *Cladosporium sp*, *Trichoderma sp*, *Penicillium sp*, *Aspergillus sp*, *Candida sp*, *Fusarium sp* and *Curvularia sp*, as possible etiologic agents of dermatomyces in cats and dogs. Nevertheless, the confirmation of these fungi pathogenicity was not demonstrated in this study.

Our data showed *M. canis* as the main dermatophyte detected. This study further showed the presence of a great variety of saprobe fungi in dogs and cats with superficial lesions. Nevertheless, the participation of these fungi as the primary etiology of the lesions is inconclusive. These data also pointed to the importance of fungal culture as the definitive diagnostic test for dermatomycoses, considering that the results of direct microscopy examinations alone did not enable a safe diagnosis, owing to the occurrence of false negative results.

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