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Microsporum canis and other dermatophytes isolated from humans, dogs and cats in mexico city

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Abstract

Introduction: Tineas or ringworm are infections caused by dermatophytes, a group of keratinophilic fungi.

According to origin and tropism can be classified as anthropophilics, zoophilics and geophilics.

Objectives: To obtain current data in zoophilic dermatophytes in humans and animals in Mexico City.

Material and methods: We performed an observational, descriptive and retrospective study, in two different Departments of Mycology. In a General Hospital we studied dermatophytic infections in 8,684 patients, (human cases), and in 480 animals (377 dogs and 103 cats) at the Faculty of Medical Veterinary, University of Mexico.

Results: 57 of the 8,684 human patients (0.65%), had zoophilic dermatophytes: *M. canis* 43 (75.5%), *T. mentagrophytes var. mentagrophytes* 13 (22.9%) and *M. nanum* 1 (1.6%); 40.8% were men and 59.2% females.

At the Veterinary Faculty, 377 samples from dogs and 103 from cats were studied, with 33 (8.73 %) and 36 (34.95%) positive cultures respectively. In dogs *M. canis* 72.70% *Trichophytonterrestre* 12.15%, *M. gypseum* 9.10% and *T. mentagrophytes* 6.10%, and in cats only *M. canis* was isolated.

Conclusions: In humans and in animals *M. canis* is still the main causal zoophilic agent. In children tineacapitis is the most frequent dermatopytosis.Tineacorporis is the second one, and usually related to close contact with infected pets.

Introduction

Tineas or ringworm are infections caused by keratinophilic fungi called dermatophytes that can also invade the skin and its appendages [1]. There are three anamorphic genders: *Trichophyton, Epidermophyton* and *Microsporum,* none of which form part of the cutaneous flora. They can be classified according to its origin and tropism in anthropophilics, zoophilics and geophilics. These infections constitute 70 to 80% of all the mycoses and represent 5% of the dermatological consults [2,3].

Infection is by direct contact with the causal agent and it can appear in any race, sex, socioeconomic level or occupation [3]. The animals act as reservoirs and can be symptomatic or just be carriers.

Among the zoophilic dermatophytes, *Microsporumcanis* and *Trichophytonmentagrophytes,* are of main medical relevance in Mexico.

The tineas are frequent in domestic and savage animals; they are found in bovine, pigs and equine as well as in poultry, the most affected ones, are the small species, such as dogs, cats and rodents. To acquire infection, a direct contact with the contaminated source is needed, soil or animal or it can also be transmitted from person to person or by fomites [3].

Our aim is to obtain the current frequency of the zoophilic dermatophytes in samples collected from patients and animals with a clinical diagnosis of tinea in a general hospital and in a veterinary clinic respectively.

Material and methods

We performed an observational, descriptive and retrospective study, in two departments of mycology, at "Dr. Manuel Gea Gonzalez" General Hospital, and at the Faculty of Medical Veterinary, Autonomous National University of Mexico (UNAM).

During a 10 year-period, a mycological study was performed, in 8684 patients with cutaneous lesions suggestive of tinea in the hospital and in the same period, 480 animals at the Faculty of Medical Veterinary, 377 dogs and 103 cats with suspected dermatophytes. All of them were included.

A direct exam with 20% potassium hydroxyde (KOH) and a culture in Sabouraud dextrose agar with cycloheximide and chloramphenicol at 30°C were performed in samples from humans and animals. Identification was performed based in the morphologic criteria by the microscopic observation with lactophenol cotton blue.

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Results

From the 8,684 human patients, zoophilic dermatophytes were isolated only in 57(0.65%) patients: *M. canis* 43 (75.5%), *T. mentagrophytes* (0.65%) *var. mentagrophytes* 13 (22.9%)and *M. nanum*1 (1.6%) (Graph 1), 40.8% were men and 59.2% females.

The most affected age groups were 0 to 10 (46.89%); and the group 21 to 30 (12.5%) (Graph 2). Clinical features are shown in Graph 3.

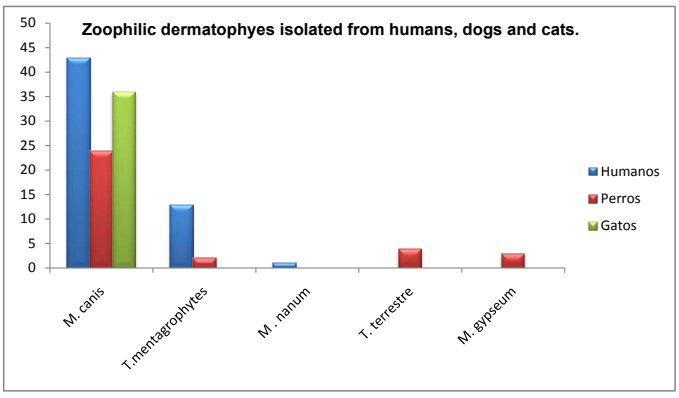
At the Veterinary Faculty, 480 samples from dogs and cats were studied: 377 from dogs and 103 from cats, with 33 (8.73%) and 36 (34.95%) positive cultures respectively. In dogs *M. canis* (72.70%), *TrJichophytonterrestre* (12.15%), *M. gypseum* (9.10%) and *T. mentagrophytes* (6.10%), were isolated, while in cats the only dermatophyte was *M. canis* (Graph 1).

Discussion

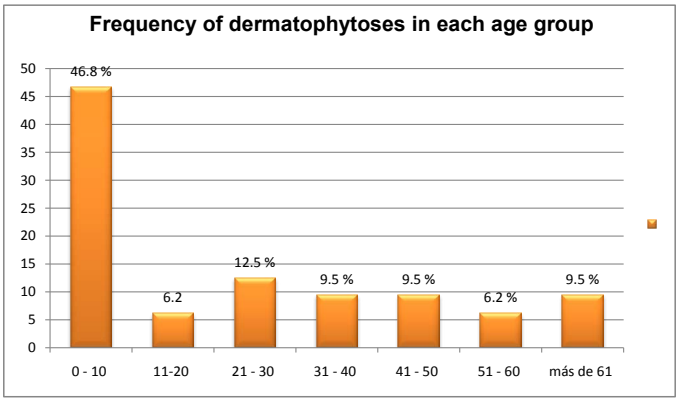
According with 4th National Consensus of Superficial Mycoses in Mexico (2008), 70 to 80% of mycoses in outpatients were caused by dermatophytes [4]: 2% tineamannus, 4% tineacruris, 4-10% tineacapitis, 15% tineacorporis, 30% tineaungium and 45% tineapedis [4]. These data are considered on the basis of a general population, but only tineacapitis is almost always present just in children. [5]

In the current study, the majority of the cases in humans correspond to tineacapitis (46.89%) followed by tineacorporis (27.86%) because the highest percentage of patients was found from 0-10 years of age (46.89%).This data is congruent, as tineacapitis was the most frequent affected was the pediatric group, with an exceptional case in a 97 year-old female [5].

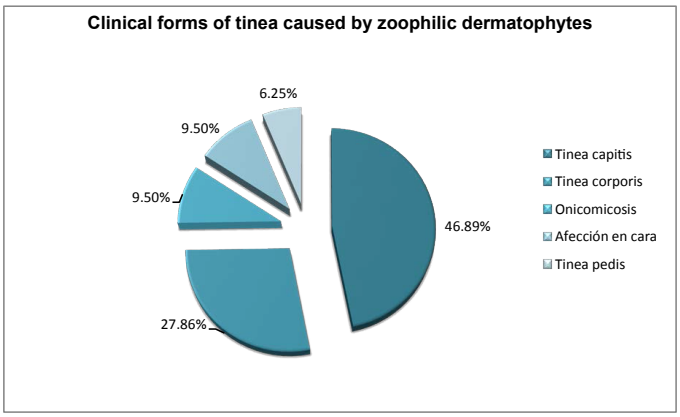
M. canis was the most frequent dermatophyte. It is present in 4.1% among general statistics and is the causal agent in 60 to 89% of tineacapitis in Mexican children [3,6]. The contact with domestic animals represents the main source of infection in up to 83%. [3,6] Similar results by Monteagudo [7], after his study conducted in Santiago de Compostela with 196 cases of tineacapitis, observed *M. canis* in 70-95%, and *T. mentagrophytes var. mentagrophytes* in 14.8%, and a low frequency of other non-zoophilic species. These data are different from USA reports, where the main causal agent of tineacapitis is *T. tonsurans* (90%), the increase incidence of this agent is related to migrations of Afro-Americans and Latin American [3,8]. Also in Madrid, *T. tonsurans*' incidence has increased in the last years, and *M canis* is now in the second place. In Puerto Rico about two thirds of tineacapitis are caused by *T. tonsurans* and the other third by *M. canis* [9].



Graph 1. Zoophilic dermatophytes isolated from humans, dogs and cats.



Graph 2. Frequency of dermatohytoses according to age group.



Graph 3. Clinical human dermatophytic infections caused by zoophylic dermatophytes.

In Jordan after conducting a 6 years epidemiological study, Shagra [10] found *T. violaceum* as the main causal agent in *tineacapitis*, and in second place, *M. canis*. Mseddi and Makni in Tunez, separately reported 83 and 68% tineacapitis caused by *T. violaceum,* and *M. canis* in 29.2% [11,12]. Also Ouidaina, in Morocco, after finishing a study with 1299 patients from 1993 to 2007, identified 76.4% of *tineacapitis* due to *T. mentagrophytes,* while *M. canis* 13.4% [13]. In the same country, Boumhil, studied 162 patients from 2002 to 2008, finding 63.58% of infections due to *T. violaceum* and 33.33% to *M. canis* [14]. Arenas *et al.*, reported in an epidemiological study conducted in the urban and rural zones of Dominican Republic, a resurging of *M. audouinii* and *T. tonsurans* respectively, probably due to the migratory movements from Haiti, while *M. canis* was found in 19.04% and 11.65% respectively [15].

Tineacorporis, ranked second in frequency of the clinical forms observed in our study (27.86%). According to the National Consensus of Superficial Mycoses [4], *T. rubrum* was the main causal agent, followed by *M. canis,* however it must be considered that tineacorporis caused by *M. canis* is more typical of pediatric patients, as we are reporting in this paper. In a retrospective study in Mexico 357 cases oftineacorporis were reported in 21 years, and *M. canis* was found in 16.7% [16]. Meanwhile, Cafarchia *et al.* [17], in 2005, performed in Bari, Italy, a dermatophitic search in dogs and cats, which owner had or had not tinea and found *M. canis* in 53.6% of cats and 36.4% in dogs whose owners had tinea, and in only 14.6% of cats and non in the dogs which owners did not have tinea, concluding that one must be aware that the animals are a source of infection.

Concerning tineafaciei (20% of tineacorporis) and onychomycosis, in this study each one was present in 9.5%. In Italy, Monod performed a study of facial tinea caused by *M. canis*, reporting 91.3% of the children infected by their pets. [18] According to Romano *et al.*, the medium age in tineafaciei is close to 27 years of age, while in Aste *et al.*, paper, it is more common between 36 and 45 years of age. [19] Our facial cases were found in the age group of 20 to 50 years.

We found a lower frequency of *M. canis* in other dermatophytic infections, 9.5% in onychomycoses and 6.25% in tineapedis. Kazemi, in Iran, studied 590 patients from 1996 till 2004, found zoophiticdermatophytes such as *T. mentagrophytes* and *M. canis,* with a frequency of 65.5% of cases with onychomycosis; Sei in Japan, identified *M. canis* in just 5 cases in 36,052 ambulatory patients. In feet and nails, *M. canis* is uncommon but *Trichophyton* sppare more contagious and responsible of outbreaks in endemic countries, and zoophilic fungi are just related to small familiar epidemics [20-22].

From the veterinary point of view, *Microsporumcanis* is the most common dermatophyte in pets [18]. Worldwide 90-100% of dermatophytoses in cats are caused by *M. canis* [23] and usually its isolation in asymptomatic animals indicates subclinical infection or carrier [24].

In the laboratory of the faculty of veterinary medicine at the UNAM, 100% of *M. canis* was reported in the hair of cats and 72.70% in dogs, similar to Lorio in Italy, who showed that the stray cats are an important source of dermatomycosis, because he isolated fungi in 100% of the hair samples [25]. Boumhil in Moroco reported that 56.7% of the cases with tineacapitis have been originated from direct contact with animals [14]. Cafarchia in Italy and Seker in Turkey [26,27], described that in animals one of the main risks to acquire dematophytoses was the age. Moriello, found that cats with the immunodeficiency Felline virus, the dermatophytosis are three times more prevalent [28].

In this study *M. gypseum* was isolated in a 9.10% of dogs' samples, which differs from the reported percentage by Álvarez *et al.*, in Colombia, who isolated *M. gypseum* in 55.9% in stray dogs and owned dogs in a study in 2001 [29]; Madrid *et al.*, in Brazil, from 7 dogs, 20 day-old, *M gypseum* was isolated [30].

The isolation of *M. gypseum* in animals, occurs less frequently and its presence is in general attributed to its geophilic character, besides external and internal factors that can alter the normal microbiota of normal animal's skin and this way the infection process is favor, as has been proven in previous studies by Levy *et al.*. Those who determined the presence of dermatophytes in the hair of cats in cautivity, found *M. gypseum* in 1.6% of animals and they attributed this finding to the humid conditions, pH and fecal contamination of the place where they are housed [31].

As mentioned before *T. mentagrophytes,* is isolated in different inflammatory entities in the head and nails, but in animals this dermatophyte was isolated just in dogs (6.10%). This dermatophyte has been reported in rodents and less frequently in dogs and other mammals. Murmu *et al.* in a previous study isolated in 16.7% from dogs' hair, skin and nails with suggestive lesions of dematophytoses [32]. In India Gangil *et al.*, isolated *T. mentagrophytes* in 18.3% from dogs with skin lesions [33], while in Baghdad, Jasim isolated 30.95% in dogs, from samples taken from various body sites [34].These data contrast with our findings as we found a lower frequency that the previously cited authors, but this finding becomes relevant as it can be a source of infection or re-infection in human and animals, so better hygienic conditions are recommended to dogs´ owners as well as in places where animals are too close to each other (aesthetic canines and veterinary clinics).

T. terrestre was isolated just in dogs (12.15%), similar to *M. gypseum,* though its presence can be attributed to its geophilic character, but different form the last one, it is considered as a causal agent of dematophytoses in animals. *T. terrestre* doesnot count with conclusive evidence to confirm its role in dematophytoses in dogs, attributing their presence to the rather natural behavior of the animal, as when they smell, their snout is in direct contact with the soil, the source of dermatophyte infection [35].

Conclusions

M. canis is the most frequent zoophilic dermatophyte isolated from humans and animals. It is still the main causal dermatophyte for tineacapitis in children and tineacorporis in young adults. This group is the most frequently affected, because afterward in puberty long-chain fat acids are in the scalp and have a protective role.

Also, children are more often in direct contact with pets. Infections may be related with poor hygiene especially when animals are too close to each other (esthetics and veterinary clinics) and can become a focus of infection. Zoophilic or geophilicdermatophytes could also be the cause of family epidemics.

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