Dermatophytes isolated from asymptomatic dogs in Adana, Turkey: A preliminary study

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Abstract Recent studies demonstrate that zoophilic dermatophyte fungi, e.g., Trichophyton mentagrophytes and Microsporum canis, where emergent, are responsible for human scalp infections and the carrier state in Adana, Turkey. The aim of this study was to determine which fungi predominated the carrier state of dermatophytes and their prevalence among dogs without lesions. The fungal flora of the coats of 154 asymptomatic dogs were examined. Four (2.6%) dermatophyte strains were isolated; three T. mentagrophytes var. mentagrophytes (75%) and one M. gypseum (25%). M. canis was not isolated from any dog during the study. A detailed survey of this keratinophilic fungus, with a particular emphasis on cats, is needed to determine the exact dermatophyte flora.

MOTS CLÉS
Portage asymptomatique ; Dermatophyte ; Chien ; Turquie

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Dermatophytoses in asymptomatic dogs

Introduction

Dermatophytoses are common skin infections in domestic animals, especially dogs and cats [4,7,20,28]. Zoophilic dermatophytes, namely *Microsporum canis*, *M. persicolor*, *Trichophyton mentagrophytes* and geophilic *M. gypseum*, are the prominent etiological agents [7,15,20]. The transmission of dermatophytes to humans from dogs and cats usually occurs through direct contact or indirectly through fungus-bearing hair and scales from infected animals [7]. Whether there is a gender-dependent predisposition for mycotic infections is not known; however, animals younger than one year of age are infected more frequently than are animals over one year of age [4,20,27].

In recent years, both the number of domestic pets fed inside their owners’ homes and the interest in having animals as pets at one’s home have increased markedly. Considering the close contact between pets and their owners, especially between children and cats and dogs, these animals that are often asymptomatic carriers of dermatophytes can be important sources of infection [25] and/or carriers of infection [1,12]. The understanding of ringworm epidemiology in pets is very important for reducing the spread of zoophilic fungal infections in humans [20].

Therefore, mapping of the natural foci of zoophilic dermatophytes in each province or country may be important for understanding the epidemiology of human dermatophytoses and for planning preventive measures [22]. Several studies have reported symptomatic dermatophyte infections, predominantly by *M. canis* in cats and dogs in Turkey [2,8,24]. However, there is little data concerning the carrier state of dermatophyte fungi which limits our ability to identify or prevent infections. Therefore, we aimed to identify the fungi associated with the carrier state of dermatophytes and determine their prevalence among dogs without lesions in Adana, Turkey.

Material and method

Study population

The study, performed between July 2003 and September 2003, comprised 154 dogs living under the custody of the Society for Protection of Natural Life. The 154 dogs consisted of 82 crossbreed dogs, 24 West Highland White Terriers, 14 German Shepherds, 12 Pointers, 14 Sheepdogs, three Cocker Spaniels, two Boxers, two Setters, and one Dane. Seventy-four (48.1%) were male and 80 (51.9%) were female. Twenty-five dogs (16.2%) were younger than one year of age and 129 (83.8%) were between one and five years of age. These dogs were domesticated and were housed indoors or in cages.

Mycologic examination

A veterinarian carefully examined the dogs on all body surfaces suggestive of dermatophytosis; a Wood’s light examination was also conducted. Animals that were free of cutaneous lesions and had no history of dermatophytoses or antifungal or antibacterial therapy in the previous months were included in the study. After cleaning the dogs with 70% alcohol, samples were taken from the head, neck, dorsum, trunk, ventrum, limbs and tail by using cotton swabs. The swabs were then used to inoculate Sabouraud agar plates (SGA, Acumedia, Baltimore, Maryland, USA) containing 100 µg/ml cycloheximide (Sigma, Steinheim, Germany), 100 µg/ml chloramphenicol (Fluka, China), and 50 µg/ml gentamicin (Sigma), by rotating the swab head while streaking the surface of the medium. All plates were transported to the Mycology Laboratory at the Faculty of Medicine, University of Çukurova, Adana, Turkey. The cultures were incubated at 25°C in air and were examined after 7, 14, and 21 days for evidence of growth.

Fungal identification

Any dermatophyte isolates were subcultured on SGA and potato dextrose agar (Merck, Darmstadt, Germany) in Petri dishes. These species were identified by colony morphology and microscopic examination with lactophenol cotton blue preparation. To confirm the identity of *T. mentagrophytes* var. *mentagrophytes* strains, urease testing was also performed [30].

Results

None of the dogs showed clinical signs of dermatophytosis or fluorescence under the Wood’s light. Only four of the 154 cultures were positive for dermatophytes (2.6%). *T. mentagrophytes* var. *mentagrophytes* was isolated from two Pointers and one German Shepherd, while *M. gypseum* was isolated from one crossbreed dog. One of the Pointers was female; the other three dogs were male. The German Shepherd and the crossbreed dog were younger than one year of age and both Pointers were older than one year.

Discussion

The asymptomatic carriage and ringworm rate in dogs has been reported from 3.8 to 42.2% [7,9,17–20,26,28,29]. However, few of these studies addressed dermatophytoses in cats and dogs in Turkey. It has been reported that *Microsporum* spp., *Trichophyton* spp., *M. canis*, *T. mentagrophytes* and *M. nanum* have been isolated from 21.1–21.9% of symptomatic cats and 19.6–24.4% of dogs [2,8,24]. In our investigation, the frequency of the carrier state was 2.6%, much lower than that reported in the literature. Among four asymptomatic carrier dogs, the dermatophytes isolated were *T. mentagrophytes* in three (75%) and *M. gypseum* in one (25%). Our study indicated that *M. canis* is an uncommon inhabitant of the healthy dogs, coinciding with the report by Ranganathan et al. [26].

It is well known that some infected animals appear to be clinically normal [16,18,23,27]. The results of different mycological studies of dogs and cats with and without lesions are presented in Table 1 [4–6,18,20,26]. As shown in Table 1, dermatophyte infections in dogs are less common than in cats and are generally caused by *M. canis* and *T. mentagrophytes*. The prevalence of dermatophytes in cats is usually higher than in dogs, by over 20% [4,20]. Interestingly, *M. canis* was isolated from 36.4% of dogs cohabiting with owners diagnosed with tinea corporis, yet it was never isolated from dogs. In contrast, *M. canis* was
isolated from 53.6% of cats cohabiting with owners who had been diagnosed with tinea corporis and from 14.6% of cats whose owners had no sign of the disease [6].

Animals are often sources of human dermatophytic infections [17]. Recently, we reported familial cases of *M. canis* tinea among children in a family living in Adana and Mersin provinces, with clinical pictures varying from mild hair loss to a severe inflammatory lesions and tinea faciei. We suggested that the transmission could have originated from a cat that the children had contact with sometime in the past [13]. Indeed, cats are accepted as the principal reservoirs of *M. canis* [4,6,16,28]. Maraki and Tselentis [21] analyzed 111 cases of human dermatophytosis due to *M. canis* according to the origin of infection; in 15 cases (13.5%) the infection was transmitted by humans, in 91 cases (82%) the infection transmitted by cats and in only five cases (4.5%) was the infection was transmitted by dogs. In another study, *M. canis* was reportedly transmitted from a dog without lesions to a 19-year-old girl [14]. Katoh et al. [15] examined the scalps of patients with dermatophytosis due to *M. canis* yet without scalp lesions and the scalps of their family members without dermatophytoses. Dermatophyte fungi were detected in 93.8% of the scalps of those who lived in homes where cats were kept and in only 25% of homes without cats.

Zoophilic and geophilic dermatophyte infections are generally observed on the scalp and glabrous skin. Hence, *M. canis* is the major dermatophyte that causes tinea capitis in humans in most of Europe, South America, Australia and parts of Africa [3]. In Europe, among tinea capitis cases diagnosed between 1978 and 1987, *M. canis* was the causative agent in 74.2%; between 1988 and 1997, 74.5% of cases were attributed to *M. canis*. During the same periods, the isolation rate of *T. mentagrophytes* changed from 16.6% to 7.8%, and for *M. gypseum* the rate changed from 0 to 0.4% [3,11]. However, in human infections in Adana province and surroundings, no zoophilic species were isolated from cases of tinea unguium; few zoophilic species were isolated from cases tinea glabrosa. The second and third most common causes of symptomatic tinea capitis were *T. mentagrophytes* and *M. canis*. In this investigation, the most frequently isolated species among dogs was *T. mentagrophytes*, explaining its high frequency and importance in human dermatophytosis, particularly in tinea capitis superficialis cases and carriers in and around Adana province [1,12]. More recently, we reported that the most common dermatophyte species isolated from asymptomatic scalp carriers (> 90% of isolates) was the zoophilic *T. mentagrophytes*, which might reflect the role of close contact with cats and dogs, as well as stockbreeding (cows), for asymptomatic carriers. The predominance of zoophilic fungi might also derive from inadequate veterinary control in the region, emphasizing the need for more veterinary practice [1]. A case of Kerion Celsi caused by *M. gypseum* was also observed in this region [10].

These preliminary data underscore the role of dogs as non-carriers of *M. canis* and define risk factors related to the presence of *T. mentagrophytes* for human infection. Animals, such as cats and dogs, in close contact with humans are important factors regarding human dermatophyte infections. Having pets at home is becoming more common bringing an important public health issue to the forefront. Pet owners need to be informed about potential dermatophyte infections as well as the risks associated with the carrier state. Increased education in this regard would raise awareness of the importance of regular veterinary examination of pets and domestic animals using reliable mycological methods.

**Table 1** Review of mycological results from dogs and cats with and without lesions. *Revue des résultats mycologiques chez les chiens et les chats avec et sans lésions.*

<table>
<thead>
<tr>
<th>Author (Reference)</th>
<th>Dogs</th>
<th>Cats</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>Dermatophyte (%)</td>
<td>Predominant species</td>
</tr>
<tr>
<td>---</td>
<td>-----------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Without lesion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Komarek and Wurst [18]</td>
<td>268</td>
<td>12 (4.5)</td>
</tr>
<tr>
<td>Cabanes et al. [5]</td>
<td>172</td>
<td>14 (8.1)</td>
</tr>
<tr>
<td>Cafarchia et al. [6]</td>
<td>136</td>
<td>28 (20.5)</td>
</tr>
<tr>
<td>Present study</td>
<td>154</td>
<td>4 (2.6)</td>
</tr>
<tr>
<td>With lesion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranganathan et al. [24]</td>
<td>211</td>
<td>89 (42.2)</td>
</tr>
<tr>
<td>Mancianti et al. [20]</td>
<td>3028</td>
<td>566 (18.7)</td>
</tr>
<tr>
<td>Cafarchia et al. [4]</td>
<td>105</td>
<td>15 (14.3)</td>
</tr>
</tbody>
</table>

**References**

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