Occurrence of Animals Dermatophytosis in Tehran, Iran


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Abstract: Dermatophytosis is one of the most frequent skin diseases of animals. This retrospective study was performed at Mycology Research Center of the Faculty of Veterinary Medicine of Tehran to survey the causative agents of animals with dermatophytosis and other related factors. Over a four-year period from 2006 to 2009, a total of 487 different animals (292 dogs, 124 cats, 28 cows, 15 sheep, 6 goats, 5 horses, 5 rabbits, 11 chickens and 1 fox) were examined. The samples were collected from suspected lesions by scraping and hair brush sampling methods. Direct microscopic examination and culture were carried out. The most frequent dermatophytes isolated were Microsporum canis (53.5%), Trichophyton mentagrophytes (20.2%), T. verrucosum (17.5%), M. gallinae (4.4%), M. equinum (1.8%) and M. gypseum (2.7%). Microsporum canis was the most common species isolated from dogs (88.8%) and cats (94.7%). There were high proportion of positive cultures from both dogs and cats less than 1 year of age (P<0.05), but there was no significant difference between the sexes and races. Trichophyton verrucosum was the most prevalent dermatophyte in cows, T. mentagrophytes in sheep and goats, M. equinum in horses, M. gypseum and T. mentagrophytes in rabbits, M. canis in fox and M. gallinae in chickens. Periodic screening of domestic animals suspected to dermatophytosis and necessary treatments could help in the management of their public health problem.

Key words: Dermatophytosis • Animal • Microsporum canis

INTRODUCTION

Dermatophytosis is an infectious disease of animals caused by Microsporum and Trichophyton agents that affect the hair shafts, claws and the keratin of the epidermis [1]. It is a major public and veterinary health problem reported from different parts of the world and causes great economic loss [2]. In a previous study of human dermatophytosis in Iran, zoophilic dermatophytes were isolated from 37.9% of the patients with different tinea and M. canis was the commonest etiologic agent [3].

Although approximately 30 dermatophyte species cause skin infections in various mammals and birds, relatively few species are of importance in small and large animal medicine. Trichophyton verrucosum, T. mentagrophytes and Microsporum species are the most common fungi isolated from cases of animal dermatophytosis [4]. The disease appears to be more common in tropical than temperate climates as well as in winter than other seasons [5].

Animals acquire dermatophyte infection following contact with arthropores derived from infected animals or soil. Following adherence of the arthropores to cells of the stratum corneum, germination occurs with production of hyphae, which invade the stratum corneum aided by the secretion of keratinases. Invasion provokes an inflammatory response and, under normal circumstances, this leads to resolution of the disease within 1-3 months. Following infection with a dermatophyte, the animal responds with both a cell-mediated and humoral responses. The immune response, particularly the cell-mediated response, results in clearing of the infection, whereas chronic infection occurs when the host is unable to generate a curative immune response [6]. Older animals are less susceptible and, if previously exposed to dermatophytes, may have developed immunity [7]. In addition, reactions to a dermatophyte infection may range from mild to severe as a consequence of the host’s reactions to the metabolic products of the fungus, the virulence of the infecting strain or species, the anatomic location of the infection and local environmental factors [8].

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The prevalence of dermatophytosis varies in different geographical locations. The etiologic agents of animal dermatophytoposes have been reported in other countries [7, 9-11]. The goal of this study was to identify the causative agents of dermatophytosis in animals and other related factors in Tehran, Iran.

MATERIALS AND METHODS

A total of 487 different animals (292 dogs, 124 cats, 28 cows, 15 sheep, 6 goats, 5 horses, 5 rabbits, 11 chickens and 1 fox) were screened for the presence of dermatophytopses in this study. The animals subjected for clinical examination between 2006 and 2009 in Animal Hospital of University of Tehran, Iran. All the above animals had dermatological lesions including scaling, annular plaques, hair loss and crusts.

The surface of the affected area was first rubbed with a cotton swab impregnated with 70% ethyl alcohol to remove surface adhering organisms. Skin scales were collected by scrapings and/or brushings of the margin of the lesions using a sterile scalpel blade into sterile Petri dish. Hairs and feathers were collected by removing dull broken hairs from the margin of the lesion using sterile tweezers. The samples were transferred to Mycology Research Center of the Faculty of Veterinary Medicine of Tehran, Iran. Each sample collected was divided into two portions. One portion was used for direct microscopic examination with 10% KOH/DMSO. The second portion was cultured on Sabouraud dextrose agar (Merck Co., Darmstadt, Germany) containing chloramphenicol (0.05 mg/ml) and cycloheximide (0.5 mg/ml) and incubated at 28 °C for 2-5 weeks. The isolated dermatophytopses were identified on the basis of their colony morphology and microscopic examination with lactophenol cotton blue preparation. Pigment production on corn meal agar, urease activity and hair perforation test were also performed. The animals suspected to dermatophytosis were considered as positive in positive direct microscopy and/or culture.

Statistics: The chi-square (χ²) test was used to assess statistical differences between the groups. A P value less than 0.05 was statistically considered significant.

RESULTS

The frequency of dermatophyte isolates in different animals was illustrated in Table 1. Of 487 samples examined, 174 (35.7%) were presented as positive results (114 in culture and 60 in direct microscopy). A wide variety of dermatophytopses were obtained from different animals, but a few zoophilic species are responsible for the majority of the cases, viz. *M. canis* (53.5%), *T. mentagrophytes* (20.2%), *T. verrucosum* (17.5%), *M. gallinae* (4.4%) and *M. equinum* (1.8%), as also the geophilic species *M. gypseum* (2.7%).

Dermatophytosis in Dogs: A total of 292 dogs were examined in this study. Sixty-three (21.6%) dogs yielded dermatophytopses in fungal examinations. Out of 63 strains of dermatophytopses isolated, 88.8% were identified as *M. canis* and 7.4% were identified as *T. mentagrophytes*. 3.7% strains of *M. gypseum* were also isolated. There was significant difference between *M. canis* and other dermatophyte genera (P<0.05). The positive dogs were between 2 weeks and 11 years old, in which 35 (55.5%) and 28 cases (44.4%) were male and female, respectively. No significant difference regarding the sex and race was observed in dogs with dermatophytosis.

Dermatophytosis in Cats: Dermatophytopses were isolated from 54 (43.5%) of the 124 cats. Dermatophyte isolates belonged to 3 genera: *M. canis* (94.7%), *M. gypseum* (2.6%) and *T. verrucosum* (2.6%), representing significant difference between *M. canis* and other dermatophytopses (P<0.05). The positive cats were between 1 to 48 months years old, in which 31 cases (57.4%) were male and 23 (42.6%) were female. Both dogs and cats less than 1 year old were significantly suffered with dermatophytosis (P<0.05).

Table 1: Frequency of dermatophyte species isolated from different animals with dermatophytosis in culture method

<table>
<thead>
<tr>
<th>Dermatophyte</th>
<th>Dog No. (%)</th>
<th>Cat No. (%)</th>
<th>Cow No. (%)</th>
<th>Sheep No. (%)</th>
<th>Goat No. (%)</th>
<th>Horse No. (%)</th>
<th>Rabbit No. (%)</th>
<th>Chicken No. (%)</th>
<th>Fox No. (%)</th>
<th>Total No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>T. verrucosum</em></td>
<td>0 (1.0)</td>
<td>1 (0.9)</td>
<td>18 (15.8)</td>
<td>1 (0.9)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20 (17.5)</td>
</tr>
<tr>
<td><em>T. mentagrophytes</em></td>
<td>2 (1.8)</td>
<td>0</td>
<td>7 (6.1)</td>
<td>7 (6.1)</td>
<td>6 (5.3)</td>
<td>0</td>
<td>1 (0.9)</td>
<td>0</td>
<td>0</td>
<td>35 (31.6)</td>
</tr>
<tr>
<td><em>M. canis</em></td>
<td>24 (21.1)</td>
<td>36 (31.6)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>61 (53.5)</td>
</tr>
<tr>
<td><em>M. gallinae</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2 (1.8)</td>
<td>0</td>
<td>0</td>
<td>2 (1.8)</td>
</tr>
<tr>
<td><em>M. gypseum</em></td>
<td>10 (9.9)</td>
<td>10 (9.9)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (0.9)</td>
<td>0</td>
<td>0</td>
<td>32 (27)</td>
</tr>
<tr>
<td>Total</td>
<td>27 (23.7)</td>
<td>38 (33.3)</td>
<td>25 (21.9)</td>
<td>8 (7)</td>
<td>6 (5.3)</td>
<td>2 (1.8)</td>
<td>2 (1.8)</td>
<td>5 (4.4)</td>
<td>1 (0.9)</td>
<td>114 (100)</td>
</tr>
</tbody>
</table>
Dermatophytosis in Cows: Fungi isolated from cases of dermatophytosis in cows were shown in Table 1. All animals were positive for dermatophytosis. Trichophyton species were the most frequent genus isolated, representing 21.9% of the total dermatophytes identified in this study. Among Trichophyton species, T. verrucosum was the most commonly identified (72%) of the total fungi isolated.

Dermatophytosis in Sheep and Goats: Nine sheep (60%) and 6 goats (100%) were positive dermatophytosis in culture and/or direct microscopy. T. mentagrophytes was the most predominant isolate from both animals.

Dermatophytosis in Horses: Dermatophyte agents were isolated from 2 (40%) of the 5 horses under study and M. equinum was the sole fungal isolate from all animals.

Dermatophytosis in Other Animals: In other animals examined, the isolated dermatophytes were M. gypseum and T. mentagrophytes (2 positive of 5 cases, 40%) in rabbits, M. canis (1 positive of 1 case, 100%) in fox and M. gallinae (8 positive of 11 cases, 72.2%) in chickens.

DISCUSSION

Dermatophytosis is a common skin infection of different animals in all over the world [12]. In the present study, a range of different dermatophytes were isolated from animals under study including M. canis, T. mentagrophytes, T. verrucosum, M. gypseum, M. gallinae and M. equinum. According to the results of other investigations, only a few species belonging to the genera Microsporum and Trichophyton are usually the cause of dermatophytosis in domestic animals. Animals serve as reservoirs of the zoophilic dermatophytes and their infections have considerable zoonotic importance. Zoophilic dermatophytes such as M. canis, T. mentagrophytes var. mentagrophytes and T. verrucosum are significant causal agents of animal dermatophytosis in many areas of the world, which is in agreement with our study [7, 12-14]. Since the incidence of dermatophytosis varies according to climate and natural reservoirs, the pattern of the species of dermatophytes involved in dermatophytosis may be to some extent different in different geographical conditions, both in humans and animals [1]. Epidemiological studies on the isolation of dermatophytes from dogs and cats with suspected lesions of dermatophytosis have been reported by different authors [9-11, 15-17]. The proportion of positive samples in relation to the number of samples examined from cases of dermatophytosis varies considerably from one study to another. In the present study, 21.6% and 43.5% of the suspected dogs and cats presented positive results. The relatively low prevalence of dermatophytes in dogs with suspected lesions of dermatophytosis is well documented in other studies ranging from 4% to 10% and few studies showed higher prevalence [7, 18]. The most predominant isolated dermatophyte was M. canis with frequency of 88.8% in dogs and 94.7% in cats in our study. With few exceptions, M. canis was the most common species isolated in the other studies [10, 15], showing a high variability in its percentages of isolation (40%-90%). Other dermatophytes less commonly isolated from dogs and cats were T. mentagrophytes (7.4% in dogs), M. gypseum (2.6% in cats and 3.7% in dogs) and T. verrucosum (2.6% in cats). Microsporum canis, T. mentagrophytes and M. gypseum comprised approximately 96% of the isolated dermatophytes from dogs in the epidemiological studies [10]. The cats, which referred to our lab, were suspected clinically to dermatophytosis and showed obvious clinical signs. For this reason, the younger cats showed more positive results than adults because the old cats act as normal carriers for M. canis without any clinical signs [19]. In our study M. equinum was the causative agent of 2 suspected horses. In previous study conducted in Iran, M. equinum was reported as the most predominant isolate in horses with dermatophytosis [12]. Most authors reported that dermatophytosis in horses was mainly produced by T. equinum, although other species such as M. canis, M. equinum, M. gypseum, T. mentagrophytes and T. verrucosum can usually be found in equine dermatophytosis [11, 20, 21].

Trichophyton verrucosum has been cited as the major agent encountered in cases of cows, sheep and goats dermatophytosis [22]. Other species such as M. canis, M. gypseum, T. mentagrophytes and T. equinum have been isolated from some of these ruminants as well [1, 11]. According to other investigators findings in Iran, dermatophytosis in cattle and sheep due to T. verrucosum had a high prevalence and in rural area, people who had close contact with infected animals, were affected by this organism [12, 23]. Interestingly, in this study some ruminants like sheep and goat showed higher prevalence of T. mentagrophytes (87.5% and 100%, respectively) and of 25 cattle examined, 18 (72%) and 7 (28%) cases affected by T. verrucosum and T. mentagrophytes, respectively. The reason of the highest prevalence of
T. mentagrophytes in some ruminants in Iran is not fully understood but it is approved that prevalence of some dermatophytes is changed in different geographical regions because of climate and animal reservoir variations. In our study, 5 isolates of M. gatlinea were isolated from chickens, domestic native Iranian rooster (Lari). In general, dermatophytosis in poultry is rare and it is seen in backyard flocks and those kept under poor husbandry and management conditions. Microsporum gatlinea is the main cause of ringworm in chickens and other fowl, which is in agreement with our study [24]. In conclusion, our study clearly highlights the epidemiological importance of animal dermatophytosis. Therefore, routine regular inspection of animal especially young animals should be recommended and could help in the management of their public health problem.

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REFERENCES

