The etiological structure of dermatophytoses in pets (dogs and cats) was analyzed using routine mycological techniques. For this purpose, 268 specimens obtained from both dogs and cats with suspected dermatophytoses were investigated. The specimens included crusts, hairs and injured tissues of skin lesions.

The mycological study comprised a native microscopy and inoculation on specific nutrient media followed by isolation and species identification.

A retrospective analysis was performed on the basis of history, clinical symptoms and the mycological studies. It was found that the presence of positive samples in dogs and cats was 18.6% and 13.2%, respectively.

Most commonly, Microsporum canis was isolated in 92.3% of canine and 100% of feline specimens. It was also found that animals aged under 1 year were more susceptible to the examined mycological infections. No significant gender-dependent differences have been observed.

Key words: Dermatophytoses, M. canis, susceptibility, dogs, cats

Introduction

Dermatophytoses are superficial fungal infections, affecting the keratin tissues (nails, hair) and the horny layer (Stratum corneum) of the skin. The
fungi, causing these infections in animals, are known as dermatophytes and belong to the *Microsporum* and *Trichophyton* genera. Depending on the main hosts and the natural areal, the various species of both genera are classified as zoophilic, anthropophilic and geophilic. Zoophilic species are always pathogenic for animals, but a large part of them affect people as well. Anthropophilic species infect humans and, more rarely, animals. Geophilic species inhabit the soil and serve as a reservoir of infection for both humans and animals. More than 20 dermatophyte species are described as causing dermatophytosis in cats and dogs \[13\]. The principal agents are *M. canis*, *M. gypseum* and *T. mentagrophytes* \[5, 14\]. In over 95% of cases in cats, *M. canis* was found to cause dermatophytosis \[10\]. Although this organism is not a natural resident of the feline hair coat \[8\], it is believed that cats are a natural reservoir for it \[10, 14\]. In dogs, the percentage of dermatophytoses varies from 4 to 10% \[14\], but some studies report a higher prevalence \[2, 11\]. In cats, dermatophytosis is encountered almost twice as many times \[14\]. The prevalence of dermatophytosis varies according to the climate, the temperature, the humidity, the rearing, the presence of natural reservoirs of infection \[6\].

Young animals and especially those under 1 year of age are more frequently affected \[6, 3\].

The aim of the present study was to determine the etiological structure and some epidemiological parameters of dermatophytosis among dogs and cats in the region of Stara Zagora.

### Materials and methods / Materijal i metode ispitivanja

#### Animals / Životinje

For a 2-year period (March 2004 – April 2006) clinical samples were obtained from 268 animals (224 from dogs and 44 from cats) with tentative diagnosis of dermatophytosis and analyzed in our laboratory. The samples were obtained from animals referred to the Clinic of Infectious Diseases or sent by private veterinarians. For each case, the history, clinical signs, age, gender, breed and way of rearing were recorded.

#### Specimen collection / Sakupljanje uzoraka

The specimens were collected by obtaining epidermal skin scrapes and hairs at the boundary of skin lesions. The sampling areas were previously treated with 70% ethanol. The specimens sent by private veterinary clinics were placed in individual sterile plastic containers.

#### Laboratory methods / Laboratorijske metode

1. *microscopic examination*

All samples were studied for the presence of fungi by direct microscopy in 20% NaOH solution. Taking into consideration that the arthrospores of

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Vet. glasnik 61 (3-4) 211 - 218 (2007) G. Michaylov et al.: Etiological, clinical and epidemiological investigations of dermatophytosis among pets in the region of ...
zoophilic dermatophytes were from the ectothrix type, a part of specimens were studied in paraffin.

2. cultural investigations
For cultivation, 3 types of nutrient media were used: Sabouraud’s dextrose agar (Difco), Mycosel agar (Difco) and DTM (Difco). All three media contained cycloheximide (0.5 mg/ml) and chloramphenicol (0.05 mg/ml). The specimens were inoculated in standard Petri’s dishes at 27°C for 3 weeks.

The species identification of isolates was done on the basis of macro- and micromorphological traits according to Tilton and McGinnis (1987); Rippon (1988).

Statistical analysis / Statističke analize
The data were statistically processed using the $\chi^2$ test. Values of $P<0.05$ were considered as statistically significant.

Results / Rezultati
The investigation included 224 dogs and 44 cats with clinical signs, specific for dermatophytosis. Forty eight animals (17.9%) were positive for dermatophytosis. Dermatophytes were isolated in 42 out of the 224 canine (18.6%) and 6 out of the 44 (13.6%) feline samples (Table 1).

Table 1. Results from microscopy and microbial culturing of samples / Tabela 1. Rezultati mikroskopske analize i mikrobialne kultivacije uzoraka

<table>
<thead>
<tr>
<th></th>
<th>Male / Mužjaci</th>
<th>Female / Ženke</th>
<th>Total / Ukupno</th>
<th>Microscopy / Mikroskopska</th>
<th>Microbial culturing / Mikrobialna kultivacija</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of samples / Broj uzoraka</td>
<td>%</td>
<td>Number of samples / Broj uzoraka</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Dogs / Psi</td>
<td>108</td>
<td>116</td>
<td>224</td>
<td>48</td>
<td>21.4</td>
</tr>
<tr>
<td>&lt;1 year / &lt;1 godine</td>
<td>47</td>
<td>37</td>
<td>84</td>
<td>31</td>
<td>26.0</td>
</tr>
<tr>
<td>&gt;1 year / &gt;1 godine</td>
<td>65</td>
<td>77</td>
<td>142</td>
<td>9</td>
<td>12.7</td>
</tr>
<tr>
<td>Cats / Mačke</td>
<td>18</td>
<td>26</td>
<td>44</td>
<td>8</td>
<td>18.2</td>
</tr>
<tr>
<td>&lt;1 year / &lt;1 godine</td>
<td>8</td>
<td>10</td>
<td>18</td>
<td>3</td>
<td>16.6</td>
</tr>
<tr>
<td>&gt;1 year / &gt;1 godine</td>
<td>11</td>
<td>15</td>
<td>26</td>
<td>2</td>
<td>7.6</td>
</tr>
</tbody>
</table>

The table shows that the prevalence of dermatophytes in animals younger than 1 year of age was higher ($P<0.001$). Table 2 presents the seasonal distribution of studied specimens.
Table 2. Seasonal distribution of studied specimens
Tabela 2. Rasprod i pitivanih uzoraka po godišnjim dobima

<table>
<thead>
<tr>
<th></th>
<th>Spring / Proleće</th>
<th>Summer / Leto</th>
<th>Autumn / Jesen</th>
<th>Winter / Zima</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of samples</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dogs / Psi</td>
<td>56</td>
<td>45</td>
<td>62</td>
<td>61</td>
</tr>
<tr>
<td>Positive after culturing / Pozitivni posle kultivacije</td>
<td>9</td>
<td>8</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Cats / Mačke</td>
<td>9</td>
<td>8</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Total number of samples / Ukupan broj uzoraka</td>
<td>20.4</td>
<td>18,1</td>
<td>29,5</td>
<td>32</td>
</tr>
<tr>
<td>Positive after culturing / Pozitivni posle kultivacije</td>
<td>1</td>
<td>12,5</td>
<td>2</td>
<td>14,2</td>
</tr>
</tbody>
</table>

No statistically significant differences were observed with regard to positive results, but the highest percentage of positive samples was established in October and November. *M. canis* was present in 92.3% of canine and 100% of feline samples. In the other canine samples, *T. mentagrophytes* was recovered.

**Discussion / Diskusija**

Investigations on dermatophytosis have been performed in many countries all over the world: *I. canis, O. mentagrophytes* and *M. gypseum* are reported as principal etiological agents in dogs and cats [8, 7, 14]. In our studies, we observed *M. canis* and *Tr. mentagrophytes* in dogs and only *M. canis* in cats. These data are in accordance with results obtained in the United Kingdom, where *M. canis* and *Tr. mentagrophytes* together account for about 95% if isolates [14].

In the present study, the percentage of positive results for all studied patients with tentative diagnosis of dermatophytosis, was 17.9%. similar results are reported in the UK [14], Brazil [2]. The percentage of positive samples among dogs was 18.6%. This is in disagreement with available literature data, where this percentage ranged between 4 and 10%. In dogs, compared to cats, the prevalence of dermatophytosis is lower [4, 12]. This could be explained by the fact that cats are kept individually as pets. Only in one case, where 3 cats shared the same house, the disease was observed in all three after contact with stray cats. Moreover, the infection was also discovered in the owner (Fig.1).

All these observations point out that stray cats are a natural reservoir of the infection [9] and that *M. canis* is a highly contagious and infectious agent.
There are no statistically significant data about the gender- and breed-related susceptibility, but the incipience of the diseases in animals younger than 1 year is indicative. The high sensitivity of adolescent animals to the infection could be probably due to immune-related factors.

There were no statistically significant data about the seasonal incidence of these infections, but the percentage of positive samples was higher in October and November. This was probably related to recent climatic changes in our country.

The clinical signs are various and include the typical circular skin lesions with erythema, desquamation, hair loss with a marked demarcation line (Fig. 2), as well as the involvement of diffuse areas with signs of squamous dermatitis and partial hair loss. That is why, laboratory methods are essential for the
proper diagnosis. The analysis of data from the microscopy and the microbial culturing showed more positive results in the first method– 48 vs 42 in dogs and 8 vs 6 in cats, respectively.

Various artifacts could yield false positive results throughout the microscopic investigation, and that is why, by now, the microbial culturing is a "gold standard". On the other hand, some saprophytic fungi such as Alternaria, Aspergillus, Penicillium etc. (Fig. 3) grow faster and could be responsible for false negative results. Therefore, an exact diagnosis necessitates their combined use.

References / Literatura


ETIOLÔSHKE I KLINIÇKE-EPIDEMIOLOGIÇKE ISTRAZIVANJA PRISUSTVA DERMATOFITA KOD KUÇÈNIH LJUBIMACA U REGIONU STARÁ ZAGORA U PERIODU 2004-2006 GODINE

G. Michaylov G, I. Tsachev, V. Petrov

Istraživanje je obuhvatilo analizu prisustva dermatofita kod kućnih ljubimaca (pasa i mačaka) korišćenjem standardnih mikoloških tehnika. Ispitano je ukupno 268 uzoraka pasa i mačaka sa sumnjom na prisustvo dermatofita. Korišćeni su uzorci dlake životinja, krate, kao i promenjena mesta na koži. Urađen je nativan mikroskopski pregled, a korišćene su i hranljive podloge u cilju identifikacije i izolacije uzročnika. Uzeti su u obzir kliničke simptome, istoriju bolesti kao i pomenuta mikološka ispitivanja, utvrđeno je da su 18,6% ispitivanih pasa i mačaka bili pozitivni i 13,2% sumnjivi. Microsporum canis je izoliran iz 92,3% pseva i 100% uzoraka mačaka. Ustanovljeno je da su životinje mlađe od godinu dana bile prijemljive na infekciju, dok razlike u polovima nisu imale značaj za istraživanje.

Ključne reči: dermatofitoza, M.canis, psi, mačke
92,3% собак и 100% образцов кошек. Нами установлено, что животные молодежи одного года были более приемлемы на инфекцию, пока разницы в полах не имели значения для исследования.

Ключевые слова: дерматофитоз, M. canis, собаки, кошки