



## COMPARATIVE INVESTIGATION ON SEVERAL PROTOCOLS FOR TREATMENT OF DERMATOPHYTOSES IN PETS

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### ABSTRACT

For a 2-year period, samples obtained from 248 dogs and 104 cats with clinical signs of dermatophytosis were examined using routine mycological methods. The results were positive for dermatophytes in 32 (12.9%) dogs and 14 (13.5%) cats. The animals with confirmed dermatophyte infection were treated according to one out of 4 protocols: oral administration of ketoconazole at a daily dose of 10 mg/kg (n=10); local treatment with 2% Imaverol solution (n=9); vaccinal therapy with Vacderm (n=13) and combination of Vacderm/enilconazole (n=10). The obtained results allowed us to recommend the combination of local treatment with Imaverol and two vaccinations at 14-day intervals for dogs and cats with dermatophytosis.

**Key words:** Dermatophytoses, dogs, cats, *M. canis*, treatment

### INTRODUCTION

Dermatophytoses are superficial fungal infections in animals and humans, caused by representatives of the *Microsporum*, *Trichophyton* and *Epidermophyton* genera. Depending on the principal hosts and the natural habitat, they are characterized as zoophilic, anthropophilic and geophilic. More than 20 dermatophyte species are reported to cause diseases in dogs and cats (1). The most common agents are *Microsporum canis*, *Microsporum gypseum*, *Trichophyton mentagrophytes* (2, 3). *M. canis* is shown to be responsible for more than 95% of feline dermatophytoses (4). Despite this organism is not a part of the normal skin microflora of cats (5), they are thought to be a natural reservoir of this fungal species (3, 4).

In dogs, the prevalence of infections with dermatophytes varies from 4 до 10% (3), but some studies report a higher prevalence (6). The frequency of feline dermatophytosis is twice higher than that in dogs (3). The incidence of clinical manifestations of dermatophytosis differs in relation to the climate, temperature, humidity, rearing conditions and the presence of natural reservoirs of the infections (7). Animals from all ages, genders and breeds are susceptible.

Adolescent pets, especially these younger than 1 year, are more commonly affected (7, 8). The clinical signs are variable and include both the typical round lesions with erythema, desquamation, hair loss with a distinct demarcation line and involvement of diffuse areas with signs of squamous and pustular dermatitis.

The routine diagnostics of dermatophytoses includes the history, clinical signs, Wood's lamp examination, native microscopy and culturing.

In affected animals, a therapy is necessary. It is also indicated by the facts that dermatophytoses are zoonoses (1), by the possibility of infection of other animals, to reduce the environmental contamination with arthrospores and to enhance the healing of affected pets. The clinical healing of dermatophytosis requires an effective cellular immune response. The immune reactivity of the host is a very important factor in the protection against the dermatophyte infection.

The purpose of this study was to test several therapeutic approaches in dogs and cats with dermatophytosis and their efficacy with regard to the optimization of its treatment and control.

## MATERIALS AND METHODS

**Animals:** For a 2-year period (March 2005 – April 2007), samples obtained from 248 dogs and 104 cats with suspected dermatophytoses, were examined by routine mycological methods. The specimens included crusts and affected hairs taken from the margins of skin lesions. All samples were investigated for fungal elements (hyphae and arthrospores) by direct microscopy in 20% NaOH.

For culturing, 3 types of media were used – Sabouraud dextrose agar (Difco), Mycosel agar (Difco) and DTM (Difco). The samples were cultivated aerobically, at temperature of 27 °C and humidity of 30% for 21 days.

The species identification of isolates was performed according to their macro- and micromorphological traits (1).

The animals with confirmed dermatophyte infections were submitted to one of the following therapeutic procedures.

### Therapeutic protocols:

**Group A.** This group included 7 dogs and 3 cats. In 2 dogs and 1 cat, the lesions were single and in the rest, a generalized chronic infection was observed. Ketoconazole tablets (Nizoral, Janssen Pharmaceutica) were administered orally, prior to food intake at a daily dose of 10 mg/kg for 6 weeks.

**Group B.** This protocol was used for treatment of 5 dogs and 4 cats, all of them with single skin lesions. Aqueous 2% solution of Imaverol™ (10% enilconazole, Janssen) was used.

Previously, the hair around skin lesions was shaved. The treatment was done at 3-day intervals for 4 weeks.

**Group C.** In this group (9 dogs and 4 cats), vaccinal therapy was performed. A killed vaccine - Vacderm (Vetzerocentr) containing spores of *M. canis*, *M. gypseum*, *T. mentagrophytes*, was applied in the gluteal muscles at doses recommended by the manufacturer twice at 14-day intervals. In 2 dogs and one cat from this group, the vaccine was administered three times.

**Group D.** This group of 7 dogs and 3 cats with signs of generalized dermatophytosis was vaccinated with Vacderm, twice at 14-day intervals. Also, whole-body bathing with 2% Imaverol solution was done twice per week for 4 weeks.

The treatments according the 4

protocols were monitored once weekly by clinical examination.

The mycological examination for the presence of dermatophyte arthrospores in animals, treated according to described protocols, was performed 10 days after the clinical healing in some of the patients by the MacKenzie method (4).

## RESULTS

From the 248 tested canine samples, 32 (12.9%) were positive for dermatophytes. *M. canis* was isolated in 28 cases, and *T. mentagrophytes* – in 4. In cats, only *M. canis* was detected in 14 samples (13.5%).

In the group submitted to the first treatment (group A), two of the dogs with local dermatophyte infection showed depression, diarrhoea and vomiting after 2-week course of treatment. Despite that the daily dose in these animals was divided into 2, the signs persisted. This necessitated treating the patients locally with 2% Imaverol solution at 3-day intervals for 4 weeks that resulted in clinical healing. In one cat with generalized *M. canis* infection, there were still single skin lesions after a 6-week therapy.

Clinical healing with restoration of the hair coat in the other animals from the group was observed by the end of the 5<sup>th</sup> week.

In 3 animals treated by this protocol (2 dogs and 1 cat), the culturing of samples was positive.

In all animals treated only locally with Imaverol (group B), a good therapeutic effect was exhibited. The restoration of the hair coat began as early as the third week of the treatment. One of treated cats was cured by the end of the second week of the therapy, but one month after the end of the treatment, dermatophyte infection was present again.

The culturing results in all animals were negative.

Two dogs and 1 cat submitted to the third protocol of treatment (group C), despite the triple vaccination, did not heal clinically. These animals were in poor physiological condition and advanced age. That is why, a local treatment with Imaverol, as already described, was performed.

In the other animals from this group, a positive effect of the vaccinal therapy was observed by the end of the third week. Culturing was performed in 3 dogs and 2 cats and the result was negative only in one dog.

The group treated by vaccinations and local application of Imaverol (group D),

showed that by the end of the third week there were no skin lesions in all animals. The culturing results were negative.

The results from the four different therapeutic protocols are summarized in Table 1

**Table 1.** Results from performed treatments in dogs and cats from groups submitted to different therapeutic protocols.

	Group A			Group B			Group C			Group D		
	n	L	G	n	L	G	n	L	G	n	L	G
<b>D</b>	7	2	5	5	5	0	9	3	6	7	4	3
H	5	2	3	5	5	0	7	3	4	7	4	3
S	2	0	2	0	0	0	2	0	2	0	0	0
<b>C</b>	3	1	2	4	4	0	4	2	2	3	2	1
H	2	1	1	3	3	0	3	2	1	3	2	1
S	1	0	1	1	1	0	1	0	1	0	0	0

Legend: D – dogs; C – cats; n – number of treated animals; L – animals with localized lesions; G – animals with generalized dermatophytosis; H – healed; S – no clinical effect.

## DISCUSSION

The choice of a therapeutic procedure with regard to dermatophytosis in pets depends on the clinical signs (single lesions or generalized infection), the rearing conditions, the side effects of applied medications and the possibility to kill fungal arthrospores on animal hair coats.

Ketoconazole (Nizoral, Janssen) is an imidazole effective against various fungal and yeast species, including dermatophytes (9, 10). Applied orally at a dose of 10 mg/kg per 24 hours, it is effective for treatment of generalized dermatophytosis in dogs and cats (11). The duration of treatment varies from 2 to 10 weeks (6 weeks on the average) (12). In our study, the administration of ketoconazole at a daily dose of 10 mg/kg for 24 hours, resulted in clinical healing by the end of the 5<sup>th</sup> week in 7 animals.

About 10% of the dogs and 25% of cats, treated orally with ketoconazole, some side effects were observed (1, 10), manifested by anorexia, vomiting, diarrhoea and suppression of liver enzymes.

In this group, in one Dachshund and in one Poodle, the observed side effects were probably due to the more difficult dosage, because 200 mg tablets were used. Ketoconazole is better absorbed in acid medium (1) and its intake together with food results in reduced absorption (12). In one cat, despite the 6-week therapeutic course, no clinical effect occurred because of the simultaneous intake of ketoconazole with food.

By now, Imaverol is the only azole

preparation that is allowed for veterinary use. It is not certified for application in cats, but both our studies and the results of Keith and Medleau (2002) (13), showed that it is effective against fungal arthrospores thus ensuring a mycological healing.

The utilization of vaccines as a method of treatment of dermatophytoses was initially introduced with the application of the live Russian vaccine LTF-130 for control of trichophytia in cattle. At present, several types of vaccines are offered for prevention and control of dermatophytoses in pets: Vacderm, Polyvac, Microderm, BiocanM (Micanfin).

Our studies showed that in three patients, despite the triple vaccination with Vacderm, clinical healing was not observed.

A cell-mediated immune response is necessary for protection against dermatophyte infection (1). Various immunosuppressive factors (FeLV, FIV in cats, continuous application of glucocorticoids, neoplasms, advanced age) have an impact on immune reactivity. According to the manufacturers, the vaccines applied with a therapeutic purpose, create an effective immunity with duration of one year.

On the basis of the results of our studies, we recommend a therapeutic protocol with of two Vacderm vaccinations combined with local treatment with enilconazole. This combination results in clinical and mycological sanitation and creates an prolonged immunity

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