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USE OF ANTIFUNGAL DRUGS AND IMMUNOMODULATOR FOR CAT MICROSPORAIS

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Abstract

This article describes the treatment methods and research results for feline microsporia. Microsporia in cats is an extremely common disease. The causative agent is a fungus of the genus Microsporum. Microdiagnostics was carried out according to the generally accepted methodology, by collecting an anamnesis of life, complaints about the condition, as well as a visual general examination, external data at the sites of lesions, and a general biochemical blood test. The fastest method for diagnosing microsporia in cats is the use of Wood's ultraviolet lamp. Mushrooms of the genus Microsporum have the property of fluorescence in ultraviolet light, therefore, when the lesions are illuminated with a lamp, they will glow in a bright green or yellow-green color. Cats with obvious signs of lichen were used as material. The treatment was carried out with antifungal drugs dermicocide and imaverol and immunomodulator forvet. The purpose of the research is to study and apply different methods of treating cats with microsporia. We divided the animals into 3 groups, each group had 5 cats. We treated the first group as suggested by the veterinarians of the branch of the State Budgetary Institution "RVS" in Grozny. We treated the second group with our own method. The control group included healthy cats.

Keywords: Clotrimazole, cats, microsporia, microsporum fungi, wood's lamp

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1. Introduction

Relevance. Domestic cats are one of the most popular and widespread pets, which have a wide variety of breeds and character traits, are highly valued by humans and recognized as an integral part of human life. In modern society, it is difficult to imagine at least one family in the house, which would not have a pet. The role of keeping felines in homes in modern society is constantly changing, if literally recently they were kept mainly to get rid of uninvited representatives of the rodent order, now cats are not only rodent hunters, but also practically full-fledged family members (Darsih et al., 2015; Gerke, 2012; Makarov et al., 2012).

However, the increasing spread of the pet population contributes to a more intensive spread of infections, which is partly due to the lack of awareness of pet owners about the measures to combat and prevent diseases of their pets (Gordienko et al., 2007).

The above is one of the segments in the epizootic process of the spread of a large number of various types of infections and non-contagious diseases of domestic cats in our republic, which include such types of diseases as: viral; bacterial; parasitic; fungal; internal non-communicable diseases (Danilova, 2006; Tuppurainen & Oura, 2012).

One of the common fungal infections of cats in our republic is microsporia of cats, accompanied by a weakening and damage to the immune system, which can lead to death (Glotova & Tugunova, 2011).

Microsporia in the common people is called lichen and is caused by pathogenic fungi Microsporum, the spores of which are extremely resistant to environmental influences. The fungus is located inside the affected hairs of the animal's coat, affecting the skin of the cat, wool, and sometimes claws. In addition, such a disease is dangerous for humans and other animals (especially if the body is weakened) upon contact with a sick cat or objects that may contain its hair and skin flakes from diseased areas. The incubation period of the disease can be prolonged in cats for quite a long time, but is approximately equal to 3–6 weeks (Blundell et al., 2006; Danilova, 2006; Gordienko et al., 2007; Kenzhina, 2013).

2. Problem Statement

In order to study the distribution and characteristics of the course of feline microsporia on the territory of the Chechen Republic, we carried out observations of infected animals with a laboratory-confirmed diagnosis of feline microsporia, as well as symptomatically suitable animals. The infection spread especially intensively during the spring season, during the period of sexual heat, when representatives of the species show more pronounced aggressiveness compared to other seasons; during this period, a large number of cats are admitted to the clinic with abscesses (purulent inflammation of the soft tissues, followed by their melting and formation cavities with purulent contents), which are formed after bites and wounds inflicted by other cats, which is one of the main reasons for the spread of this infection.

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3. Research Questions

Tasks:

1. Study morphological, biochemical and immunological blood parameters in clinically healthy cats and patients with microsporia.

2. To evaluate the effectiveness of the antifungal drug Dermikotsid in combination with the imaverol emulsion and the immunomodulator Forvet.

Microsporia in cats is a common and highly contagious disease that requires mandatory treatment, so you can't let it take its course. Comprehensive treatment and processing of household items will allow the pet to live for a long time without discomfort and delight its owners.

Folk remedies for microsporia do not exist. This infection poses a threat to both other pets and humans, as well as regular labor costs to decontaminate the habitat of a sick pet, and therefore requires effective treatment. Do not waste time and rely on folk remedies.

4. Purpose of the Study

The aim of the work is to use various methods of treating cats with microsporia, using an antifungal drug with an emulsion and an immunomodulator.

5. Research Methods

As a material, we used cats with microsporia, to make a Wood's lamp diagnosis, we studied the blood. Fungi of the genus Microsporum have the property of fluorescence in ultraviolet light, therefore, when the lesions are illuminated with a lamp, they glow in a bright green or yellow-green color. Analyzes used: - general blood analysis; - blood chemistry; - microscopy of wool; - skin scraping at the affected area; - sowing a fungal culture on a nutrient medium.

All animals from the control group were healthy and were not given drugs and were not smeared with ointment.

The first group was given terbinafine tablets for 28 days, once a day, along with the treatment, clotrimazole was smeared. The second group was injected intramuscularly with dermicocide 1.0 ml per animal, twice with an interval of 5 days, the affected areas were treated with imaverol emulsion four times with an interval of three days. To increase immunity subcutaneously forvet - 7 days.

One of the factors contributing to the significant spread of feline microsporia is the presence of a large number of neglected, stray cats. A large percentage of their prevalence, in particular in the city of Grozny, and the increased aggressiveness of some stray felines also serve as one of the factors contributing to a more intense spread of the infection.

The prevalence of microsporia depends on age, health status, environment and lifestyle. Kittens under 4 months of age are much more susceptible to infection than adults. Immunity or resistance to disease develops with age, however, even healthy adult cats can become infected (Samuylenko et al., 2006)

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Transmission of the fungus of the genus Microsporum usually occurs by direct contact, and the outcome after exposure depends on several factors. Most infections are self-limiting in domestic cats, clearing up soon after exposure (regressive infection) or progressing to latent infections.

The frequency of fungal shedding from healthy cats is variable and probably reflects differences in environment and treatment. Dermatophytes are most likely to be isolated in groups of cats, but they are rarely found in cats that have never been exposed to this infection. It is possible that culture-positive cats are more likely to be transiently contaminated than to be true carriers.The infection is transmitted by contact with sick animals or a contaminated environment, and the incubation period varies from 1 to 3 weeks. Dermatophytes infect growing hair and living skin. Factors that influence the outcome of infection include young or old age, immunosuppression, high temperature, humidity, and skin trauma (Vatsaev et al., 2021)

M. canis is more common in Persians and Yorkshire Terriers (possibly due to ineffective grooming or impaired cell-mediated immunity), and Jack Russell Terriers are predisposed to T. mentagrophytes and T. erinacei (possibly due to their behaviour). Most cats infected with spores do not develop dermatophytosis because their grooming effectively removes the spores.

M. canis tends to cause a mild self-limiting infection and a mild immune response. Antifungal antibodies are not protective and recovery is associated with cell-mediated immunity, which is nevertheless short-lived and results in relative and not absolute immunity. Lesions usually disappear after 2-3 months, although animals remain infected for several more weeks. The spores of the infection are easily spread into the environment and can remain viable for up to 18 months. Contamination control is of great importance in the treatment of dermatophytosis.

Sick cats and dogs should be placed in separate rooms in the house or specialized places for overexposure of animals should be used. These include a hotel for animals, a special infectious disease hospital, which is equipped with a round-the-clock veterinary clinic. A veterinary dermatologist, upon detection of microsporia (lichen), will prescribe local and systemic treatment, give advice on safety measures for this infection.

It is impossible to interrupt the course of treatment with antifungal agents without good reasons, for example, when an allergy appears, since this may result in the formation of drug resistance in the pathogen (Pant et al., 2022; Prieto-Martínez et al., 2019).

6. Results

In the first group, after 14 days, if there is no improvement, the treatment was continued according to the original scheme.

In the second group, with intensive use of dermicocide, imaverol and forvet, the signs disappeared on the 12-14th day. stab neutrophils increased

1.5 and 2 times, respectively, and, on the contrary, segmented neutrophils decreased by 4% and 20%. Lymphocytes decreased by 5% and 4%, monocytes increased by 3 and 4 times (table 1).

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Table 1. Hematological parameters of cats with microsporia (M±m; n=10)

Indicators	Animal groups				
	Clinically healthy	Before O1 treatment	After O1 treatment	Before O2 treatment	After O2 treatment
Erythrocytes, 1012/l	6,42±0,31	6,34±0,24	6,56±0,05	6,46±0,09	6,98±0,06
Hemoglobin, g/l	105,00±0,15	90,45±0,30	110,00±0,23*	98,00±0,67	112,00±0,58**
Leukocytes, 109/l	6,00±0,37	10,00±0,54	7,00±0,40 **	11,00±0,52	6,84±0,24 ***
Leukocyte formula, %	0,00±0,00	0,00±0,00	0,00±0,00	0,00±0,00	0,00±0,00
Basophils					
Eosinophils	3,70±0,36	4,00±0,50	3,00±0,43	6,20±0,52	4,22±0,48 **
Neutrophils:					
young	0,00±0,00	0,00±0,00	0,00±0,00	0,00±0,00	0,00±0,00
stab	4,10±0,07	6,50±0,02	4,60±0,45 *	8,34±0,08	2,00±0,62 ***
segmented	43,76±0,43	42,00±0,85	44,24±0,72	35,00±0,78	45,00±0,65 **
Lymphocytes	44,00±0,83	41,50±0,64	45,00±0,56 **	42,00±0,46	46,78±0,24 *
Monocytes	2,84±0,56	6,00±0,80	3,16±0,69 **	8,46±0,82	2,00±0,34 ***

**P<0.05; **P>0.001; ***P>0.001. O1 - the first experimental; O2 - the second experimental*

Data after treatment: a decrease in the number of leukocytes by 30% and 37%, decrease in eosinophils by 1.3 and 1.5 times. Segmented neutrophils in the first group increased by 5%, and in the second by 28%.

An increase in the amount of total protein, albumin, ALT indicates that there are still diseases in the animal body (Table 2).

Table 2. Biochemical parameters of blood serum of cats with microsporia (M±m; n=10)

Indicators	Animal groups				
	Clinically healthy	Before O1 treatment	After O1 treatment	Before O2 treatment	After O2 treatment
Total protein, g/l	68,03±0,52	74,04±0,39	71,52±0,46	71,46±0,76	73,87±0,63
ALT, units/l	56,24±0,06	65,42±0,26*	64,63±0,48*	72,08±0,72**	70,69±0,81*
AST, units/l	30,76±0,83	31,63±0,74	28,57±0,35	29,72±0,68	27,91±0,27
Albumin, g/l	25,87±0,61	27,82±0,52	26,43±0,61	29,35±0,23	27,03±0,73
Glucose mmol/l	5,53±0,34	5,64±0,43	5,48±0,27	6,01±0,57	5,97±0,61
Total bilirubin, µmol/l	3,91±0,05	3,86±0,02	4,01±0,04	3,95±0,03	3,87±0,06
Urea, mmol/l	1,79±0,12	1,85±0,29	1,94±0,56	2,48±0,65*	2,69±0,21*
Calcium, mmol/l	2,67±0,24	2,84±0,71	2,46±0,74	2,34±0,93	2,55±0,19
Phosphorus, mmol/l	2,19±0,33	2,08±0,56	2,21±0,63	1,89±0,45*	1,96±0,48
ron µmol/l	18,11±0,76	17,94±0,62	19,04±0,41	20,01±0,56	21,47±0,34
Magnesium, mol/l	0,89±0,57	0,86±0,02	0,91±0,03	1,05±0,02	1,12±0,27
Sodium, mol/l	145,28±0,75	144,49±0,98	149,07±0,84	151,20±0,76	153,51±0,64
Potassium, mmol/l	5,62±0,68	5,72±0,24	5,48±0,47	5,56±0,14	5,89±0,59

**P<0.05; **P>0.001; O1 - the first experimental; O2 - the second experienced.*

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In the first experimental group, there was one case of recurrence of the disease in a cat 3.5 months after the completion of treatment, and in the second group, no such cases were recorded (Table 3).

Table 3. The effectiveness of the treatment of cats with microsporia

Index	Group	
	O1	O2
Number of animals treated	5	5
Recovered	5	5
Course of treatment, days	28	14
Number of relapses after recovery	1	0

As we can see from Table 3, in the first and second groups there were 5 cats with microsporia. In the second group, we administered decmicocid to sick animals intramuscularly at a dose of 1.0 ml per animal twice with an interval of 5 days. The affected areas were treated with imaverol emulsion, to increase the resistance of the animal organism, the immunomodulator Forvet was administered 0.2 ml/kg for 7 days. The scheme developed by us for the treatment of cats gave good results and after 14 days all animals from the second group recovered. No relapses after recovery were recorded.

7. Conclusion

1. Vaccination of pets, which can be carried out as early as 6 weeks of age with the Polivak-TM vaccine, protects the animal from microprosporia. Vaccination is carried out both for the purpose of prevention and for the treatment of microsporia. 14 days after the introduction of the vaccine, the animal develops immunity, which protects it from infection for 1 year.

2. For the treatment of feline microsporia, it is necessary to use dermicocide as a systemic fungistatic drug at a dose of 1.0 ml per animal twice with an interval of five days, conduct local treatments with imaverol emulsion four times with an interval of three days. To activate cellular immunity and increase the body's resistance, use the immunomodulator Forvet for 7 days.

3. It was revealed that in sick cats there is a decrease in band and segmented neutrophils, monocytes and, on the contrary, an increase in leukocytes and NK-lymphocytes.

4. To assess the effectiveness of therapy, it is necessary to examine the blood parameters of sick animals before the start of treatment and after its completion, and periodically conduct microscopy of the hair of the affected areas for the presence of Microsporum canis spores.

References

Blundell, T. L., Sibanda, B. L., Montalvão, R. W., Brewerton, S., Chelliah, V., Worth, C. L., Harmer, N. J., Davies, O., & Burke, D. (2006). Structural biology and bioinformatics in drug design: opportunities and challenges for target identification and lead discovery. *Philosophical Transactions of the Royal Society B: Biological Sciences, 361*(1467), 413-423. https://doi.org/10.1098/rstb.2005.1800

Danilova, Y. (2006). *Modern methods of diagnosis and treatment of animal dermatophytosis asymptomatic mycocarriage*, 12-14. https://studylib.ru/doc/2380731

Darsih, C., Prachyawarakorn, V., Wiyakrutta, S., Mahidol, C., Ruchirawat, S., & Kittakoop, P. (2015). Cytotoxic metabolites from the endophytic fungus Penicillium chermesinum: discovery of a cysteine-targeted Michael acceptor as a pharmacophore for fragment-based drug discovery, bioconjugation and click reactions. *RSC Advances*, *5*(86), 70595-70603. https://doi.org/10.1039/c5ra13735g

Gerke, A. N. (2012). Differential diagnosis and treatment tactics in puppy dermatology. *VetPharma*, *6*(11), 28-34.

Glotova, T. I., & Tugunova, T. B. (2011). Modern trends in the spread, diagnosis and treatment of dermatomycosis of small domestic animals. *Infectious pathology of animals : materials of the International Scientific and Practical conference dedicated to the 90th anniversary of SibNIVI-VNIIBTZH* (pp. 162-163). Amfora.

Gordienko, L. N., Nikitushkina, N. A., Selivanova, D. M., & Vazhenina, E. G. (2007). Superficial mycoses of small domestic animals: Their etiology and distribution. *Veterinary pathology*, *2*, 143-145.

Kenzhina, A. B. (2013). ELISA in the diagnosis of microsporia. *Collection of scientific papers of the Stavropol Scientific Research Institute of Animal Husbandry and Feed Production, 3(4)*, 118-120.

Makarov, V. V., Gruby, V. A., Gruzdev, K. N., & Sukharev, O. I. (2012). *The OIE list and cross-border animal infections: monograph, 79*. Federal State Budgetary Institution "Federal Center For Animal Health Protection".

Pant, S., Verma, S., Pathak, R. K., & Singh, D. B. (2022). Structure-based drug designing. *Bioinformatics*, 219-231. https://doi.org/10.1016/b978-0-323-89775-4.00027-4

Prieto-Martínez, F. D., López-López, E., Eurídice Juárez-Mercado, K., & Medina-Franco, J. L. (2019). Computational Drug Design Methods—Current and Future Perspectives. *In Silico Drug Design*, 19-44. https://doi.org/10.1016/b978-0-12-816125-8.00002-x

Samuylenko, A. Y., Soloviev, B. V., Nepoklonov, E. A., Voronin, E. S., Fomina, N. V., Grin, S. A., Belousov, V. I., Melnik, N. V., Ruban, E. A., Eremets, V. I., Sapegina, E. P., Yamnikova, S. S., & Tsybanov, S. Z. (2006). Nodular dermatitis. *Infectious pathology of animals*, 1-786. Akademkniga.

Tuppurainen, E. S. M., & Oura, C. A. L. (2012). Review: Lumpy Skin Disease: An Emerging Threat to Europe, the Middle East and Asia: Emerging Lumpy Skin Disease. *Transboundary and Emerging Diseases*, *59*(1), 40-48. https://doi.org/10.1111/j.1865-1682.2011.01242.x

Vatsaev, S. V., Plieva, A. M., & Abdulkhazhieva, A. S. (2021). The role of medicinal substances that restore acid-base balance in the body of animals with nodular dermatitis of cattle. In *AIP Conference Proceedings* (Vol. 2442, No. 1). AIP Publishing. https://doi.org/10.1063/5.0075861