

Dermatophytosis in Cats

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Introduction

Dermatophytosis is an infection of skin, hair, or claws caused by a type of fungus known as dermatophyte (ringworm). In cats, about 98% of ringworm cases are caused by the fungus *Microsporum canis*. The fungus spreads easily and also cause zoonotic infections. Dermatophytes are keratin-loving organisms that invade skin and hair shafts, leading to clinical signs of folliculitis. Rapid diagnosis and treatment can prevent spread of disease and propagation within the environment, which is especially important in multi-cat households, catteries and shelters. (Frymus et al., 2013)

Etiology

The most important pathogens of veterinary importance are:

- *Microsporum canis* (80% of the cases in cats)
- *Trichophyton mentagrophytes*, *T. verrucosum*, and *T. erinacei*
- *M. gypseum*

Pathogenesis

Most fungi are opportunistic pathogens that invade the body if there is failure of the host's innate immune defense system. This can be defined as the non-specific, naturally present component of the immune system which is not dependent on prior antigen sensitization – e.g., the physical skin barrier, temperature, pH, and antimicrobial peptides (Frymus *et al.*, 2013).

Once in contact with the skin, the spores create germ tubes to penetrate the stratum corneum and hair follicles, excreting toxins or allergens where the vascular components are capable of responding to toxins through an inflammatory reaction. Exudation from invaded epithelial layers produce dry crust which are characteristic of the disease

The spores (microsporum) released from the skin, hair, and claws of infected cats into the environment form the infectious stage of the lifecycle. These infective spores develop when fungal hyphae fragments, and directly or indirectly (via clippers, brushes, bedding, etc.) make contact with a new host. Infected cats shed infectious spores before signs appear. The spores remain viable in the environment for 12-18 months.

Clinical Signs and Symptoms

- Clinical signs of infection develop 2-4 weeks after exposure.
- Kittens are most likely to be infected.
- The appearance of ringworm varies in cats. Lesions often develop on the face, ears and muzzle and then progress to the paws and tail
- Folliculitis is the hallmark of infection.
- Clinical signs can include any combination of alopecia, scaling, crusting, erythema, papules, hyperpigmentation, and variable pruritus.
- Persian cats can develop nodular lesions (Pseudomycetomas).
- Cats also develop exudative paronychia (Paronychia is an infection of the tissue adjacent to a nail, most often a fingernail.)
- Infected claws will become prone to fracture

Diagnosis

- Clients may be able to provide information confirming multiple in-contact with animals or people with suspicious skin lesions. While this information certainly increases the suspicion of dermatophytosis.
- The gold standard test for detection of fungus is culture of sample collected from hairs and scales on Sabouraud dextrose agar.
- MacKenzie's hair brush technique: With this technique, a new toothbrush is removed from its package and is rubbed gently over the suspected area, including the skin and hair margins of alopecic or scaly lesions. Then gently embed the toothbrush bristles into the fungal culture media.
- Wood's lamp Examination: A Wood's lamp emits ultraviolet light of a 320 to 400 nm wavelength. During infection with *M canis* an apple-green color fluoresce under Wood's lamp illumination is produced but the ability to fluoresce develops after the first week of infection and can persist at the tip of the hairs after resolution of the infection. This can be a quick and easy test to see if *M canis* infection is likely, however Only around 50% of cases of *M canis* infection show fluorescence. (Wolf et al)
- A dermo scope can be used to find abnormal hairs for direct examination. This is a handheld noninvasive tool used to examine the skin that can locate hairs for culture.



- Skin scrapings, plucked suspected hairs can be collected for examination under microscope, Fungal hyphae can often be seen along with spores surrounding infected hairs.
- In recent years, use of polymerase chain reaction (PCR) to diagnose dermatophytosis has drawn attention but PCR alone is not a confirmatory test since it simply measures the presence of Fungal DNA, so paired positive PCR results along with culture are required for confirmation of living organisms.

Differential Diagnosis

- The prime differential diagnosis in cats is superficial folliculitis, which occurs secondary to *Staphylococcus* spp. and *Demodex* spp. Infections.
- allergic dermatitis and eosinophilic granuloma complex.
- Less common considerations would include psychogenic alopecia, anagen/telogen defluxion, pemphigus foliaceus, , thymoma-associated exfoliative dermatitis, and cutaneous lymphoma.
- Nodular forms of the disease may appear similar to other opportunistic bacterial (e.g., *Mycobacteria* spp., *Nocardia* spp.) or fungal (e.g., phaeohyphomycosis, hyalohyphomycosis, zygomycosis) infections, neoplasia, or sterile nodular panniculitis.

Treatment

- Dermatophytosis is a self-curing disease in most animals
- Clipping of hairs has been a necessary part of dermatophytosis treatment; however, clipping is currently being reconsidered because whole-body clipping is stressful and the common microtrauma of the skin can worsen the infection. Thus, whether to clip should be decided on a case-by-case basis; clipping is not necessary for short-coated animals.
- Treatment may be topical, systemic or both, but isolation of the affected animal during treatment is generally recommended. (Moriello et al.,2021)

Topical Therapy

Topical therapy is the most important way of minimizing disease transmission and environmental contamination. Infection is transmitted via contact with infective materials on the hair coat making it critical to disinfect the hair coat.

Topical therapy involves

- A whole-body rinse with lime sulfur (1:16), which should be done twice a week.
- Shampoo containing 2% chlorhexidine and 2% miconazole is effective
- focal topical therapy can be used for lesions in hard-to-treat locations such as the ears and face. A 1%–2% vaginal miconazole cream can safely be used on the face. For the ears, otic products that contain clotrimazole or miconazole/chlorhexidine or ketoconazole/chlorhexidine combinations are available.
- Whitfield's ointment- 3:6 salicylic acid and Benzoic acid is also effective.



Systemic Therapy

- Cats can be treated with itraconazole (5 mg/kg, PO, once daily on a week on/week off schedule). Most infections are resolved after 3 or 4 cycles. Itraconazole is considered fungistatic at low doses and fungicidal at high doses.
- Alternatives like terbinafine (10–30mg/kg) and griseofulvin (10–30mg/kg) can also be given depending upon the availability.

Points to keep in mind while choosing drugs for the therapy:

- Ketoconazole should not be used in cats because it causes anorexia.
- Fluconazole should not be used because this is the least effective drug for dermatophytes.
- Griseofulvin is no longer recommended because itraconazole and terbinafine are superior drugs.

Prognosis

- Dermatophytosis carries a good prognosis for cure; however, treatment can be frustrating in multi-animal households where environmental contamination is prevalent. It is important to look for underlying causes of infection and initiate treatment if the disease is ongoing (e.g., allergies, stress, immunocompromise, etc.).
- Although Clinical cure does not always equate to mycological cure. Thus, hair regrowth and the clinical appearance of the patient may not be sufficient criteria for decisions about duration of treatment. It is currently recommended that monitoring therapy and establishing whether a patient is completely cured should be based on a combination of resolution of clinical signs and a negative fungal culture. Extent of infection can be monitored by performing weekly cultures.

Public Health Significance

Dermatophytosis is a zoonotic disease and we as veterinarians have a responsibility to inform clients of this risk. Following things should be cleared to the clients once the infection is confirmed.

- Dermatophytosis is a low-level zoonotic disease as it is treatable and not life threatening.
- Dermatophytosis is a common skin disease in humans, commonly referred to as ‘toe nail fungus’ or ‘athlete’s foot fungus’.
- Transmission from animals to people is via direct contact with lesions.
- In animals, dermatophytosis is treatable and curable thus, euthanasia is not necessary.



Prevention

Prevention includes environmental elimination of the fungal spores. Spores do not multiply in the environment as they are normal dormant life stage of dermatophytes and other microorganisms which can easily be eliminated from the environment. Removal of organic material and hair followed by washing of the surface (bed sheets, sofas, cat beds, etc) with a detergent until visibly clear is the most important step for environmental cleaning/disinfection. Thorough cleaning once or twice a week is adequate.

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