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Popular Article

Dermatophytosis in Canines and Felines

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Abstract

In dogs and cats, dermatophytosis is one of the most prevalent superficial fungal diseases. A group of keratinolytic fungi known as dermatophytes consists of seven different genera: Microsporum, Trichophyton, Epidermophyton, Nannizzia, Arthroderma, Paraphyton, and Lophophyton. Microsporum canis (zoophile), Nannizzia gypsea (geophile), and Trichophyton mentagrophytes are the principal etiological agents in canines and felines. The most frequent method of transmission is direct contact with infected people, animals, or other organisms.Clinical history, physical examination, and diagnostic procedures like Wood's light, direct microscopic examination of infected hairs and/or crusts, fungal culture, and biopsy are used to diagnose dermatophytosis. For dermatophytosis in dogs and cats to be properly treated, a mix of topical, systemic, and environmental disinfection is needed.

Introduction

Dermatophytes are filamentous fungal organisms causing superficial mycoses called dermatophytosis in humans and animals. They have distinct ability to utilize keratin of skin, nail and hair compared to other pathogenic filamentous fungi causing superficial infections (Gnat *et al*., 2020). They are widespread throughout the world, but are particularly frequent in hot, humid conditions. They are viewed as a severe problem for both domestic pets and animals in shelters. According to the geographic region and epidemiological parameters like age, sex, seasons, etc., the prevalence and clinical pattern of various fungus differ dramatically (Chermette *et al*., 2008; Begum, and Kumar, R., 2021; Iorio et al., 2007).

Dermatophytosis is commonly called as ringworm, with characteristic scaly patches, alopecia and crusty deposits on the skin of affected area (Haggag et al., 2017). M. canis is the primary cause of most feline infections, yet with the right care, the majority of sick cats make a mycological recovery within three weeks (Moriello & Coyner, 2021). The prevalence of dermatophytosis in dogs ranges from 4 to 10%, however it might change depending on regional variations and other epidemiological factors (Cabanes et al., 2000). Young dogs, those between the ages of 6 and 18 months, are more prone to infection than those between the ages of one and a half and three years (Singathia et al., 2014). Male dogs are more susceptible to contracting the disease than female canines (Singathia et al., 2014; Bhardwaj et al., 2012).

The clinical findings of the dermatophytosis may vary based on the host and species involved (Indarjulianto et al., 2017). In general, alopecia, erythema, flakes or crusty lesions with or without pruritus are the common manifestations. The typical ring worm lesion can be visible as a region of hair loss with erythematous margin and thin scales with healed central area. (Dalis et al., 2019). Majority of animal infections are attributed to the members of the genus Microsporum and Trichophyton. Based on the habitat they are further classified as anthropophilic (humans), zoophilic (animals) and geophilic (soil) dermatophytes (de Hoog et al. 2017; Hayette, and Sacheli, 2015; Moriello et al., 2017).

Predisposing factors to dermatophyte infection

- Young age (first two years of life)
- Immunosuppression (immunosuppressive medication)
- Nutritional deficienes (especially vitamin A)

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- High temperatures and humidity
- Skin trauma
- Injury from scratches or ectoparasites
- Aggressive behaviour
- Unhygienic conditions
- Crowding in kennels

Clinical signs

Common clinical symptoms include multifocal baldness, mild to severe itching, and round, scaly lesions with erythematous and scaly borders. As other clinical manifestations of dermatophytosis: Folliculitis Nodular lesions, nail lesions, and foliculitis. Persian cats are most commonly affected by this unusual dermal/subcutaneous illness, which shows up as nodules with draining tracts on the back (Hameed *et al.*, 2017; Haggag *et al*., 2017). These cats typically have a history of antibiotic resistance when they enter medical facilities. Folliculitis is caused by an infection of the hair with dermatophytes. It manifests as papules and pustules that develop swiftly and leave behind crusts, alopecia circularis, and epidermal collarettes.

Diagnosis

Clinical history, physical examination, and diagnostic procedures like Wood's light, direct microscopic examination of infected hairs and/or crusts, fungal culture, and biopsy are used to diagnose dermatophytosis. The clinical symptoms and lesions of the dermatophytosis are not unique and may simulate other skin diseases making it difficult to adopt a proper treatment course. The isolation and identification of dermatophytes remains as the essential practice to prescribe specific treatment regimes. (Rudramurthy, and Shaw 2017; Outerbridge *et al*., 2006; Brasch *et al*., 2011).

Direct microscopic examination

Direct Microscopic Examination (DME) in 20% KOH or Lactophenol Cotton Blue (LCB) stain and then examined for distinctive spore (arthospore) or hyphae on a clean glass slide under light microscope, culture in appropriate fungal media followed by identification by colony and microscopic morphology. The major drawback of DME is inability to differentiate the hyphae of various species of dermatophytes from the hyphae of non-dermatophytes (Brillowska-Dabrowska et al., 2007; Robert et al., 2008).

When examining clinical samples under the microscope, it is important to take note of the existe nce of septate hyphae and the distribution of spores inside (endothrix) or outside (ectothrix) the hair.

Fungal culture

Clinical samples are inoculated on suitable fungal media, such as Sabouraud dextrose agar or Potato dextrose agar, for dermatophyte isolation. Cycloheximide and chloramphenicol should be added to the media in order to inhibit the growth of saprophytic fungi and bacteria, respectively (Pihet *et al*., 2017). Dermatophytes are aerobic in nature and incubation is usually done at 20-25˚C, but if we are suspecting an infection caused by *T. verrucosum*, temperature should be raised to 30-37˚C, since optimum growth of *T. verrucosum* is noticed at higher temperatures than other dermatophytes (Robert, and Pihet, 2008). Growth characteristics are also varies with species of dermatophytes and hence regular examination is necessary to detect the presence of dermatophyte in the growth media.

The colony morphology of *Microsporum* spp. produce dusty, gritty colonies with a cottony surface and a yellowish-orange hue. It generates macroconidia that are pyriform, fusiform, or cylindro-fusiform, measuring 6-150 by 6-26 m, with echinulate or verrucous walls and 1-15 moderately thick to heavy septa. It has clustered or directly on the hyphae borne sessile or clavate microconidia (Molina de Diego *et al.*, 2011).

Wood's Lamp

It is still advised to utilise a Wood's lamp as a screening tool, and it is now generally acknowledged that the majority of clinical samples containing *M. canis* will glow apple green when exposed to a Wood's lamp. It can be used as a screening test to determine if an animal has *M. canis* infection. The degree of positive for this method ranges from 91% to 100%. (Moriello *et al.*, 2017). A tryptophan metabolite is required for the development of fluorescence when exposed to UV radiation. The capacity to fluoresce starts to appear after the first week of illness and can continue at the tips of hairs even after the infection has subsided (Moriello *et al*., 2017).

Molecular techniques

Differentiating between dermatophyte species and strains frequently requires the use of molecular methods. In research labs, various PCR techniques, RFLP, AFLP, sequencing of genomic areas, and MALDI-TOF are frequently used. We can better comprehend inter- and intra-species changes by genotyping isolates based on conserved sections such the ITS (internal transcribed spacer region), beta-tubulin, and TEF (translation elongation factor) regions.

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Treatment

For dermatophytosis in dogs and cats to be properly treated, a mix of topical, systemic, and environmental disinfection is needed.

Topical treatments

To clean hairs, reduce disease transmission, and avoid contaminating the environment, topical antifungal medication is required. Topical therapy is a crucial part of the management of dermatophytosis in small animals since it is transmitted by contact with arthrospores. Topical therapy helps to clear up infection and lessens arthrospore discharge into the environment.

A popular topical therapy for dermatophytosis is dips in lime sulphur. Several studies have shown the efficiency of lime sulphur dips, with twice-weekly application being more beneficial than once-weekly application (Moriello *et al.,* 2013). Shampoos are the most popular product among pet owners because of how simple they are to use. Two-weekly applications of miconazole and chlorhexidine are the most efficient topical treatment (Moriello *et al.,* 2017). Although having antifungal qualities, chlorhexidine has been shown to have poor effectiveness for dermatophytosis (DeBoer *et al.,* 1995)

Systemic treatments

The illness within the hair follicle is eliminated by systemic antifungal medication. The best drugs for systemic therapy are those that accumulate in skin and keratin and are keratinophilic and lipophilic. Currently, the most efficient systemic therapies for both canine and feline dermatophytosis are oral itraconazole or oral terbinafine (Moriello *et al.,* 2017)

Conclusion

A zoonotic disease called dermatophytosis is curable. Patients with folliculitis or alopecia must be diagnosed correctly using a step-by-step logical process. A diagnosis can be made using a combination of clinical symptoms and positive fungal culture results. It is still advised to perform a Wood's lamp examination to quickly screen for *M. canis* infection. A combination of topical and systemic therapies are necessary for the majority of affected people. The best oral treatments are terbinafine and itraconazole. This can be combined with miconazole- and chlorhexidine-containing shampoos, topical lime-sulphur dips applied twice a week, and other treatments. It is best to utilise a combination of clinical sign resolution and a negative culture to assess whether a patient has fully recovered.

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