

Dermatophytosis

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ABSTRACT

Dermatophytosis is a contagious fungal disease that affects and multiplies the skin, hair, and nails. Dermatophytosis prevalence has been increasing gradually in recent years, particularly in tropical or subtropical nations where temperatures and relative humidity are high. There are seven genera of dermatophytosis including Trichophyton, Epidermophyton, Nannizzia, Paraphyton, Lophophyton, Microsporum, and Arthroderma. Most dermatophytosis infections are characterized by scaling, pustules, itching, inflammation, and loss of hair and nails. The main diagnosis of Dermatophytosis depends on microscopy and culture. And molecular study. DNA sequencing, or microscopy can then be used to identify the cultures. DNA-based molecular assays (PCR) can directly diagnose and identify clinical samples, depending on the assay. Several classical agents, such as Whitfield's ointment and Castellani's (Carbol fuchsin solution) paint, are still in use today but have no antibacterial properties. This article highlighted dermatophytosis, causative agent, clinical manifestation, diagnosis, and treatment.

Keywords: Dermatophytosis, Contiguous infection, Fungal infection, Diagnosis, Treatment

To cite this article: Ismael SS, BH Abdullah & AJ Sadiq. Dermatophytosis. Biological Times. 2024 December 3(12): 22-23.

Introduction

Dermatophytosis is a fungal disease sometimes named tinea infections that affect and multiply the skin, hair, and nails (1, 2). Human infections are caused by dermatophyte fungi, which are classified into three types or groups based on their genera. Trichophyton, which typically affects skin, hair, and nails, Epidermophyton, which typically affect skin, and Microsporum, which typically affect skin and hair (3, 4). According to their mode of transmission, dermatophytosis is divided into three categories: anthropophilic, zoophilic, and geophilic. Clinically, these have been divided into the following categories according to the affected site: tinea capitis (head), tinea faciei (face), tinea barbae (beard), tinea corporis (body), tinea manus (hand), tinea cruris (groin), tinea pedis (foot), and tinea unguium (nail). tinea imbricata, tinea pseudoimbricata, and Majocchi granuloma are other clinical variations (4, 5).

Dermatophytosis prevalence has been increasing gradually in recent years, particularly in tropical or subtropical nations where temperatures and relative humidity are high (6, 7, 8). Numerous risk factors, including type 2 diabetes, inactivity, vascular disease, anemia, immunosuppression from cancer, a transplanted organ, acquired immune deficiency syndrome (AIDS), and immunosuppressive medication usage, may further raise the incidence of dermatophyte infection (9, 10). Patients' quality of life is significantly impacted by the high prevalence of dermatophyte infections, particularly chronic and recurring dermatophytosis, which frequently necessitates lengthy therapies, resulting in psychological and financial strain (11, 12). This article highlighted to describe Dermatophytosis.

Causative agent and Classification

Dermatophytes fungi are members of the Arthrodermataceae family, the Onygenales order, the Eurotiomycetes class, and the Ascomycota phylum (13,14). Trichophyton, Epidermophyton, Nannizzia, Paraphyton, Lophophyton, Microsporum, and Arthroderma are the seven recognized genera of dermatophytes at the moment (13). De Hoog et al. (5) recently undertook a comprehensive revision of the taxonomy and nomenclature of dermatophytes, based on their genetic study and the "one fungus – one name" policy, which mandates that the anamorphs (asexual stages) and teleomorphs (sexual stages) share a single designation (14).

Mechanism of infection

Despite existing freely in the environment, dermatophytes can infect both humans and animals in specific situations. These fungi are mostly made up of mycelium and are septate, hyaline, filamentous molds that have the ability to form spores, or conidia (15). The combination of fungal tube structures called hyphae results in mycelium structures. In addition to producing spores and absorbing nutrition, mycelium also senses temperature, light, and nutrients in the environment (16,17). The dermatophyte species and the surrounding environment influence the formation of different kinds of conidia. Examples of asexual spores include arthroconidia, which are infectious fragments of hyphae, microconidia, which are small, unicellular conidia, and macroconidia, which are massive, multi-septate conidia (15).

Arthroconidia, which are infectious parts of dermatophytes, are attached to keratinized tissues to initiate a dermatophyte infection. Arthroconidia start to germinate in the stratum corneum and adhere to the epidermis within 2

to 6 hours of contact (18, 19). These spores produce germ tubes as arthroconidia start to germinate, which allows them to pass through the stratum corneum, the first layer of the epidermis (19). In order to facilitate the activity of downstream fungal proteases, the dermatophyte breaks down keratin, lowering the pH at the infection site (20). Within seven days of infection, the fungus can move to other anatomical areas of the initial host, to new hosts, or to contaminate the environment because its hyphae continue to proliferate, enter keratinized tissues, and produce arthroconidia as shown in Fig. 1 (21).

Because the host's immune system stops the fungi from invading healthy epidermis, Arthroconidia are unable to infiltrate healthy tissue (6, 22, 23). As a result, there are usually predisposing conditions for an infection. Young age, immunosuppression, malnutrition, cutaneous damage, high ambient temperatures and/or humidity are common risk factors for infection (23, 24). According to one study, cats exposed to dermatophyte spores in an experimental setting did not become sick until a predisposing condition was produced; in this case, the factors were restricted grooming and occlusive bandages (25, 26).

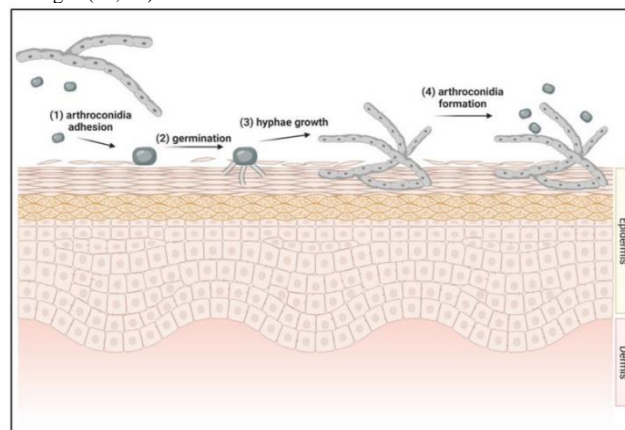


Fig. 1: Mechanism of infection of Dermatophytosis (27)

Clinical Manifestations

The clinical manifestation of dermatophytosis often varies based on the host's immunological circumstance, the kinds of dermatophytes, and the location of the infection site (28) When tinea is present on human infected skin, it manifests as an annular area with a central clearing and an approaching, elevated, scaling border (29, 30). Variable levels of scales and inflammation response may be seen in these characteristics, which may progress to the formation of scarring and an alopecia area. Thus, it is evident that there is inflammation and erythematous symptoms (31). Therefore, it is easy to recognize erythematous and inflammatory symptoms in a severe form of dermatophytosis infection (32). Itching, maceration, discomfort, scaling, vesicles or plaster developing, and erythematous rate are other clinical characteristics that range in severity from mild to severe (32, 33). These clinical symptoms are mostly brought on by the host's reaction to

fungal metabolites that diffuse through the skin's Malpighian layer (28, 34). The main clinical manifestations are pustules, scaling, inflammation, itching, inflammation, and loss of nails and hair (35).

Diagnosis of Dermatophytosis

The diagnosis of dermatophytosis is based on the microscopic examination of the clinical specimen, culturing, PCR technique, and molecular study (36, 37). The fungus dermatophytes are cultured on the Sabouraud dextrose agar with antibacterial and cycloheximide, then depend on the colony characteristics (1, 38). The microscopic and culture methods are more sensitive and specific (36, 39,40).

Treatment of Dermatophytosis

There are several classical agents, such as Whitfield's ointment and Castellani's (Carbol fuchsin solution) paint, are still in use today but have no particular antibacterial properties. These preparations' effectiveness has not been adequately assessed (41, 42). Because long-term usage of antifungal medications can result in cytotoxicity, adverse effects, and drug resistance, natural products were recommended (43). There has been an increase in interest in researching natural remedies lately, as they may be more effective than the currently used medications at controlling illnesses and causing less damage to the environment. Probiotics, which are naturally occurring intestinal tract microorganisms, can be made into a variety of products that support the growth of other microorganisms (44, 45, 46). Since the current drug therapy for these infections is frequently costly, long-term, toxic, and ineffective, it is imperative to find new anti-dermatophytic compounds. The most effective source for the development of new drugs has been natural products (47, 48).

Conclusion

This article highlighted that dermatophytosis is a contagious disease and the best way to manage and prevent infection is to practice proper hygiene and limit the amount of things you share with other people. Furthermore, reducing animal contact is crucial for obtaining a high level of protection.

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