

Causes, transmission, signs and  
symptoms, diagnosis, prevention,  
treatment, Isolation and  
identification of dermatophytes

A SEMINAR PRESENTED

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# SUMMARY

Dermatophytes are parasite fungi that infect the skin and cause infections of the skin, hair and nails because of their ability to obtain nutrients from keratinized material. Dermasep agar can be used as a rapid screening medium for the isolation and identification of dermatophytes compared to SDA.

Patients with a tinea infection should be properly studied for a mycological examination and should be treated accordingly. Preventive measure of Tinea infections include practicing good personal hygiene, keeping the skin dry and cool at all times and avoid sharing towels, clothing or hair accessories with infected individuals.

# INTRODUCTION

Dermatophytes are parasitic fungi that infect the skin and cause infections of the skin, hair, and nails because of their ability to obtain nutrient from keratinized materials. Skin infection are common disease in developing countries of which dermatophytosis, are of particular concern in the tropic. A fungal skin infection is usually the result of some presence of some types of foreign fungus on the skin. These fungi grow best on the area of the skin that are warm, dark and moist..

**They are classified into three genera:**

***Microsporum***

***Trichophyton***

***Epidermophyton***

Dermatophytosis is an infection produced by dermatophytic fungi in the keratinized tissues. These cutaneous mycoses affect 20% to 25% of the world's population. Clinically, dermatophytosis can be classified depending on the site involved. These include Tinea capitis (scalp), Tinea corporis (non-hairy skin of the body), Tinea unguium (nail infection), Tinea cruris (groin), Tinea pedis (athlete's foot), and Tinea barbae (bearded areas of the face and neck).



Figure 9

Tinea capitis showing circular lesions with black dot alopecia



Figure 10

Tinea corporis showing circular erythematous scaly lesions with advancing margin on the abdomen.



Figure 11

Tinea pedis showing lesions between the toes.

**Dermatophytes may be grouped into three (3) categories based on host preference and natural habitat.**

Animals are categorized under (*zoophilic dermatophytes*).

Soil as a natural habitat is categorized under (geophilic dermatophytes).

To man or through direct infection by personal contact (anthropophilic dermatophytes).

## **CAUSES**

Three different types of fungi can cause dermatophyte infection. They are called Trichophyton, microsporum, and Epidermophyton. These fungi may live for an extended period as spores in the soil. Humans and animals can contract ringworm after direct contact with infected animals or humans. The infection is commonly spread among children and by sharing items that may not be clean.

# TRANSMISSION

Dermatophytes are transmitted by direct contact with infected host (human or animal) or by direct or indirect contact with infected exfoliated skin or hair in clothing, combs, hair brushes, theatre seats, caps, furniture, bed linens, shoes, stocks, towels, hotel rugs, sauna, bath houses and locker room floors. Depending on the species, the organism may be viable in the environment for up to 15 months.

## SIGNS AND SYMPTOMS

Infections on the body may give rise to typical enlarging raised red rings of ringworm. Infection on the skin of the feet may cause athlete's foot and in the groin, jock itch. Involvement of the nail is termed onychomycosis, and they may thicken, discolour, and finally crumble and fall off. Specific signs may be:

Red, Scaly, itchy or raised patches.

Patches may be redder on outside edges or resemble a ring.

Patches may develop, when the scalp is affected.

Nails may thicken, discolour or begin to crack.

## DIAGNOSIS AND IDENTIFICATION

Rapid in office testing can be done with scraping of the nail, skin, or scalp. Characteristic hyphae can be seen interspersed among the epithelial cells. *Trichophyton tonsurans*, the causative agent of tinea capitis (scalp infection) can be seen as solidly packed arthrospores within the broken hair shafts scraped from the plugged black dots of the scalp. Fungal culture medium is used for positive identification of the species. Usually, fungal growth is noted in 5-14 days. Microscopic morphology of the micro and macroconidia is the most reliable identification character, but a good slide preparation is needed and also the stimulation of sporulation in some strains. Culture characteristics such as surface texture, topography and pigmentation are variable so they are the least reliable criteria for identification. Clinical information such as the appearance of the lesion, site, geographic location, travel history, animal contacts and race is also important, especially in identifying rare non-sporulating species like *Trichophyton concentricum*, *Microsporum audouinii* and *Trichophyton schoenleinii*. A special agar called dermatophyte test medium (DTM) has been formulated to grow and identify dermatophytes. Without having to look at the colony, the hyphae, or macroconidia can identify the dermatophyte by a simple color test. The specimen (scraping from skin, nail, nail, or hair) is embedded in the DTM culture medium. It is incubated at room temperature for 10 to 14 days. If the fungus is a dermatophyte, the medium will turn bright red. If the fungus is not a dermatophyte, no color change will be noted. If kept beyond 14 days, false positive can result even with non-dermatophytes.

## **PREVENTION**

Dermatophytic infection can be prevented by practicing healthy and hygienic behaviours. Many infections came from contact with animals and lack of proper hygiene. Washing of hands is advised after interacting with an animal. Those who own pets should keep its living areas clean and disinfected. Immune suppressed individuals should avoid any animal or individuals who are suspected of having dermatophytosis. In terms of personal care, individuals should shower and shampoo their hairs regularly, wear shoes if they shower in community areas, avoid sharing personal items such as clothing or hair brushes, as these can carry infected spores, always keep their feet and skin clean and dry.

# TREATMENT

Tinea corpora (body), tinea manum (hands), tinea cruris (groin), tinea pedis (foot) and tinea faciei (face) can be treated topically. Tinea Unguium (nails) usually will require oral treatment with terbinafine, itraconazole, or griseofulvin. Tinea capitis (scalp) must be treated orally, as the medication must be present deep in the hair follicles to eradicate the fungus. Usually griseofulvin is given orally for 2 to 3 months. Clinically dosage up to twice the recommended dose might be used due to relative resistance of some strains of dermatophytes.

Tinea pedis is usually treated with topical medicines like, ketoconazole or terbinafine, and pills, or with medicines that contains miconazole, clotrimazole, or tolnaftate. Antibiotics may be necessary to treat secondary bacterial infections that occur in addition to the fungus (for example, from scratching).

and arthroconidia was seen internally (endothrix infection)

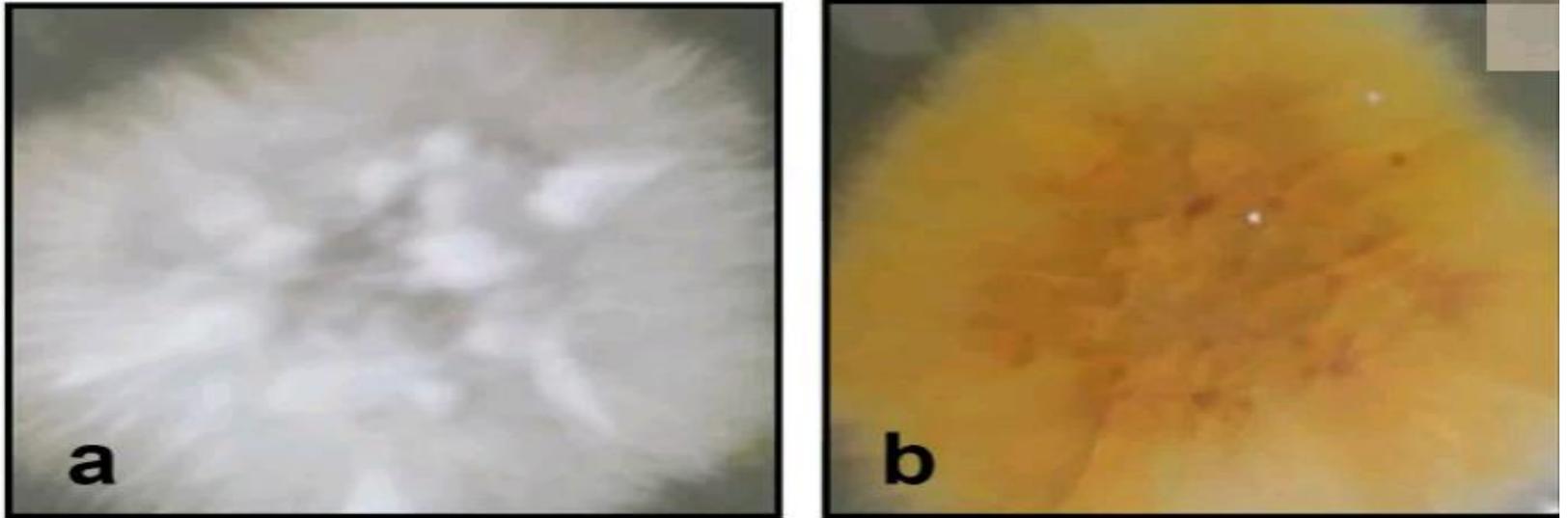


Figure 2

Macroscopic appearance of culture of *Microsporum canis* on Dermasel agar base supplemented with chloramphenicol and cycloheximide: a) flat spreading white to cream colored with dense cottony surface and b) bright golden yellow reverse pigment.

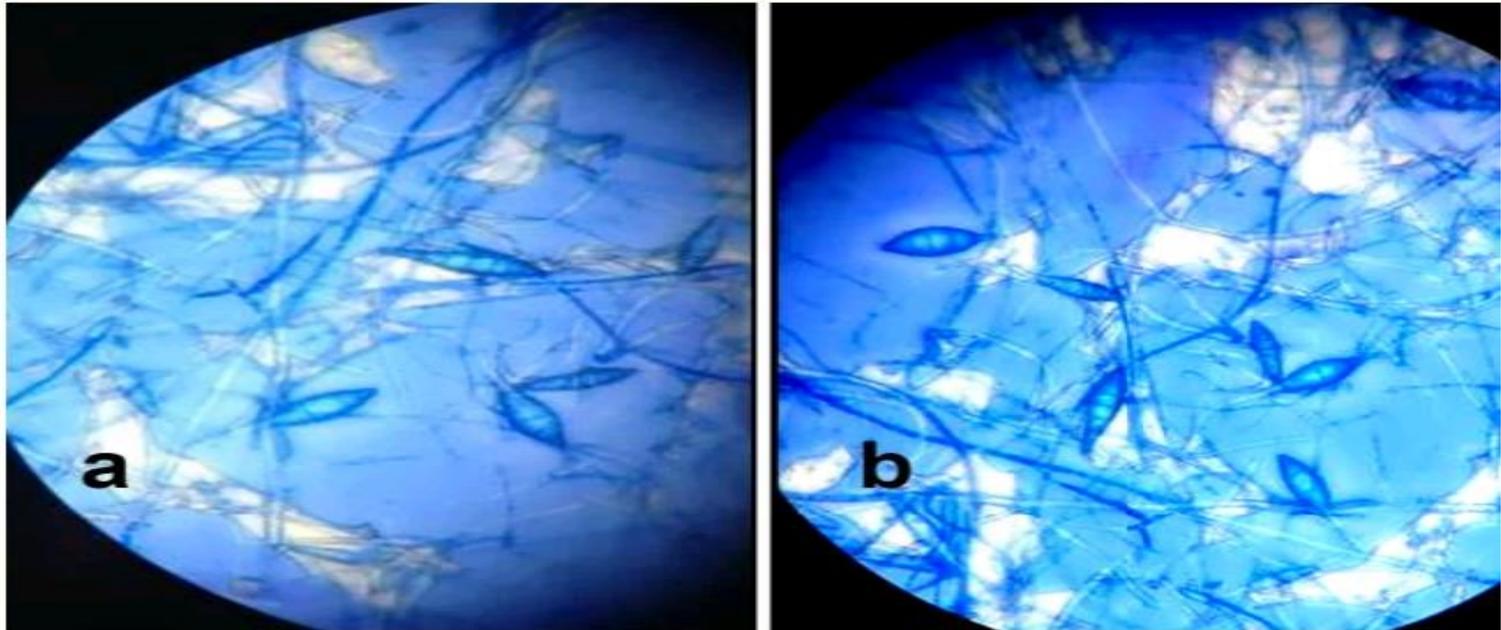


Figure 4

Microscopic appearance of *Microsporium canis* macroconidia; spindle shaped with 5–15 cells with rough surface, a thick outer wall, and a terminal knob.

Dermatophytes infections are very common in our country, where the hot and humid climate in association with poor hygienic conditions play an important role in the growth of these fungi. Our study signified the importance of the mycological examination in the diagnosis of various dermatophytosis for their effective management. Dermasel agar can be used as a rapid screening medium for the isolation and identification of dermatophytes compared to SDA.

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