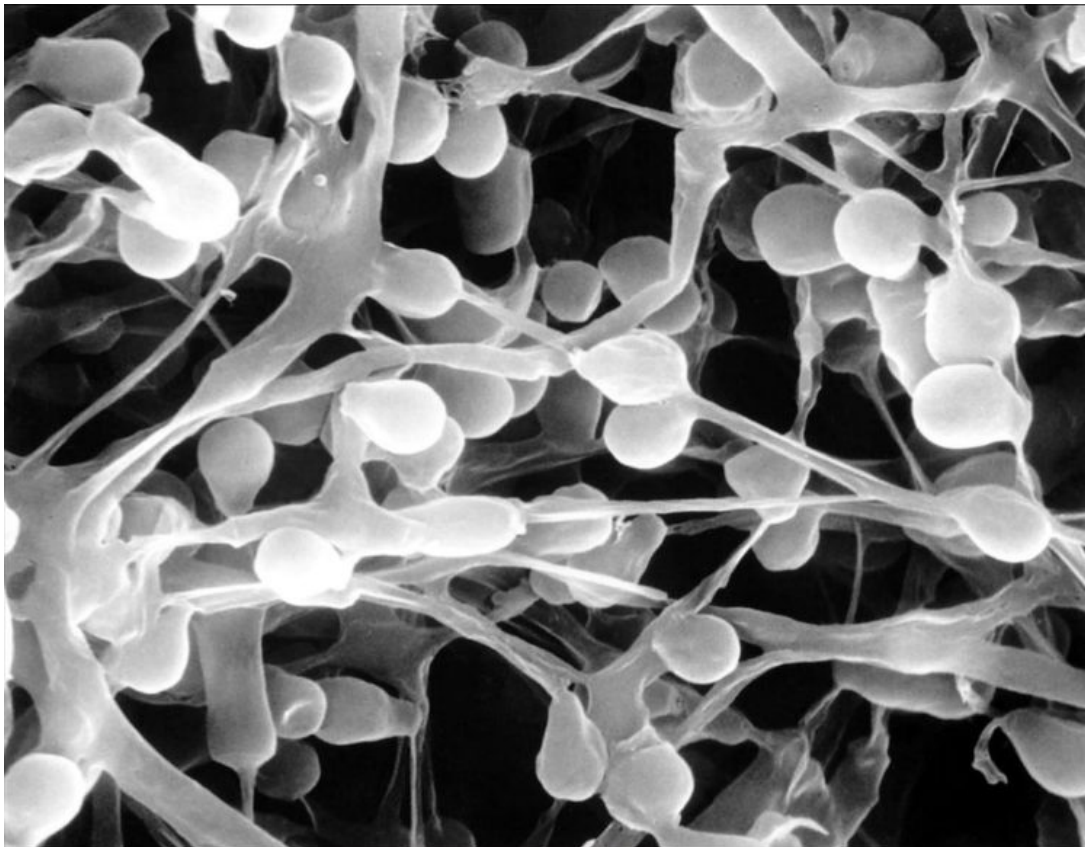


Tinea Infections — Symptoms and Treatment

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Tinea infections are caused by different fungi species that are known to infest the skin, nails and hair. The infections can be classified according to the affected site into Tinea corporis, Tinea pedis and Tinea capitis. Tinea corporis and Tinea pedis can be easily diagnosed clinically and patients should receive topical anti-fungal therapy once the diagnosis is confirmed. Patients with Tinea capitis should receive combined topical and systemic anti-fungal therapy. Patients with Tinea nail infections should undergo a confirmatory test, such as potassium hydroxide preparation or culture, before initiating therapy.



Definition of Tinea Infections

Tinea infections are a group of **different fungal infections** that affect different sites of the human body. The fungal organism that causes tinea is called a **dermatophyte**.

Dermatophytes are a unique group of fungi that are capable of infecting non-viable keratinized cutaneous structures, such as stratum corneum, nails and hair; thus, they can be broadly classified as:

- Epidermomycosis if involving the skin.
- Trichomycosis if involving the hair follicles.
- Onychomycosis if involving the nail apparatus.

Tinea is a term that means fungal infection and the word “Tinea” is usually followed by the name of the infected site of the human body in Latin.

- **Tinea corporis**, means a fungal infection that affects the body, i.e. back and shoulders.
- **Tinea capitis** means the fungal infection of the scalp.
- **Tinea pedis means infection of the feet.**
- **Tinea cruris** means infection of the groin.
- **Tinea barbae** means infection of the beard.
- **Tinea manuum** means infection of the hand.
- **Tinea unguium** is the fungal infection of the nails.

Epidemiology of Tinea Infections



Image: “This micrograph reveals both a macroconidium and some microconidia of the fungus *Trichophyton rubrum* var. *rodhaini*.”
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Tinea infections are common, especially among **pre-pubertal children**. Fungal infections of the skin are more common in **hot and humid areas**. Different organisms are responsible for the development of Tinea infections with **Trichophyton rubrum** being the most common etiology of Tinea corporis. On the other hand, **Trichophyton tonsurans** is identified as the most common cause of Tinea capitis.

There does not seem to be any difference in Tinea infections frequency among females and males except for **pregnant women**. Due to their increased contact with potentially infected infants and because of the **physiologically decreased immunity in pregnancy**, pregnant women are more likely to develop Tinea infections.

Possible risk factors for acquiring Tinea infections among children are **direct contact** with an infected child, i.e. in pre-school, or with **infected animals and pets**. Tinea corporis can happen because of tinea capitis in children. Fortunately, the prognosis of Tinea infections is excellent and the cure rate is 100%.

Older people are associated with the intertriginous disease.

Etiology of Tinea Infections

Tinea infections are caused by a group of different fungi which are known to infest the skin, especially in children. There are three genera associated with dermatophytic infections:

Trichophyton: it has more than 40 species, but the most common include:

- *Trichophyton tonsurans* that causes onychomycosis in developed countries.
- *Trichophyton rubrum* that causes tinea corporis.

Microsporum: It is made up of species such as:

- **Microsporum canis** which is another common cause of Tinea corporis in children.
- **Microsporum fulvum** is thought to be responsible for a few rare cases of Tinea corporis in the forearm.

Epidermophyton

Pathophysiology

These fungi are transmitted either:

- From another person through skin to skin contact.
- From animals (zoophilic species such as *trichophyton* spp.).
- From the soil (geophilic species such as most microphyton species).

The fungi are known to **inhabit the non-living parts of the skin** such as the hair, nails, and the layers of the skin. **Hair and nails can be moist and oily** which is preferred by the fungi for accelerated growth. Usually, the infection is limited to the epidermis and rarely can go deeper. The most likely cause of limited invasiveness is the non-specific immune response of the host which includes the **activation of polymorphonuclear leukocytes and the complement system**.

The **incubation period** of most Tinea organisms is **1 to 3 weeks**. Once the incubation period is over, the fungus releases **keratinases** which digest keratin in tissues and help the organism to invade the skin and symptoms start to occur. Usually, the **lesions** appear to be **round** and with a **central healthy skin**, and a **scaly infested rim**.

The lesions are more common in cases of local or systemic immunosuppression, such as with glucocorticoid use or chemotherapy.

Clinical Presentation of Tinea Infections

It is quite evident by now that Tinea infections can affect **any part of the body**; therefore, we will discuss the semiology of the different types of Tinea infections separately. There are, however, some common clues that should be explored in the history such as **recent travel history to hot climates, contact with an infected person**, and **obstetric history**.

Tinea corporis and Tinea pedis



Image: "Athlete's foot." by ProjectManhattan - Own work.
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Tinea corporis is the fungal infection of the **chest, back or upper and lower arms**. The patient develops **red centric lesions** that are **itchy** and have a **scaly** appearance. These circular lesions can range in size from **one to five cm** in diameter.

Tinea pedis is the fungal infection responsible for the **athletic foot**. Patients present with an **itchy rash between the toes**. In a few cases, the rash can spread to the sole and sides of the foot. Patients can also develop **painful small vesicles** between the toes.

Tinea capitis

As the name implies, Tinea capitis is a fungal infection of the **scalp**.

Patients are usually **African children** who are aged **three to nine years**.

Patients can present with a **gray patch on the scalp** which can be **black dotted**. Black dots are caused by the fungus *Trichophyton tonsurans* and are considered as the most common form of the disease. Patients usually develop **patches of scaly alopecia** which has broken hairs that resemble black dots. Patients with Tinea capitis have **cervical and sub-occipital lymphadenopathy**.

There are various pathological forms of the disease which include:

Endothrix infection: Refers to infection within the hair shaft without visible destruction.

Ectothrix infection: Refers to infection outside the hair shaft into arthroconidia leading to cuticle destruction. It has three variants:

- Black dot tinea capitis
- Kerion
- Favus

Diagnostic Workup for Tinea Infections

It is important to note that the diagnosis of Tinea infections is usually a clinical one; however, in many cases, it would also be useful to confirm the diagnosis to exclude other causes of scaly skin patches. The distinction of **psoriasis**, **lupus erythematosus** and **eczema** from Tinea infections is essential because anti-fungal treatment of Tinea infections is thought to worsen skin lesions caused by these other etiologies.

A **potassium hydroxide preparation** is a very easy procedure that is usually sufficient to confirm the diagnosis. Potassium hydroxide preparation allows the **identification of the fungus** and confirms the diagnosis of Tinea corporis or Tinea capitis. It is important to note that treatment of Tinea infections should be **aggressive** and started **early** based on the clinical picture to avoid delayed treatment which is associated with possible **scarring**.

Patients presenting with Tinea infection of the nails, **onychomycosis**, should undergo a confirmatory test before starting treatment. Potassium hydroxide preparation, fungal culture, or periodic acid-Schiff stain are useful for the confirmation of Tinea unguium which is responsible for onychomycosis.

Patients with an **atypical picture of Tinea infection** can undergo a **polymerase chain reaction** for the identification of the fungal DNA. This method is useful in the identification of the organisms when the potassium hydroxide preparation technique is inconclusive.

Fungal cultures can also be done after obtaining a specimen harvested using a toothbrush on keratinized debris.

Treatment of Tinea Infections

Tinea corporis and Tinea pedis respond well to **topical anti-fungal treatment**. **Terbinafine** and **butenafine** are two appropriate choices for topical treatment of these fungal infections. Patients with **severe Tinea infections** and those who are **immunosuppressed** may need **systemic anti-fungal therapy**. **Fluconazole** can be used to treat fungal infections in this group of patients.

Patients with Tinea capitis usually receive **Griseofulvin**, which should be given orally. Other possible systemic treatments for Tinea capitis include **fluconazole** and **Terbinafine**. If the type of the infecting organism can be identified, it is useful to alter the treatment plan according to this finding. For example, patients infected with Trichophyton species should receive terbinafine, while those who are found to have microsporum are more likely to benefit from Griseofulvin.

In addition to systemic anti-fungal therapy for Tinea capitis, patients should also use some form of an **antifungal shampoo** to lower the risk of disease transmission. **Selenium sulfide** or **ketoconazole shampoos** are both effective in lowering the risk of disease transmission, but they are not effective in eradicating the infecting organism; therefore, **topical anti-fungal therapy** for Tinea capitis should be **combined with systemic anti-fungal treatment**.

Finally, patients with confirmed onychomycosis should receive **terbinafine long-term** for at least six to nine months to treat the condition. Systemic anti-fungals are the mainstay of treatment for this condition, and patients should be encouraged to comply with the treatment plan. Patients who refuse systemic anti-fungals for onychomycosis can receive **ciclopirox nail lacquer**. Unfortunately, regardless of the treatment plan, the failure rate and recurrence rate for treating onychomycosis are very high.

References

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