

A SYSTEMATIC REVIEW OF DERMATOPHYTOSIS: SYMPTOMS, AND TREATMENTS**Tarun Kumar Sinha, Smruti Ranjan Dash *, Prerana Sahu, Sandip Prasad Tiwari****Faculty of Pharmacy, Kalinga University, Naya Raipur, Chhattisgarh India (492101)***Corresponding Author's E mail: smrutiranjana.dash@kalingauniversity.ac.in

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ABSTRACT

Dermatophytosis, often known as ringworm, is a fungal illness of the skin, hair, and nails caused by dermatophytes. Despite its name, it is not caused by worms but by fungus that thrive in warm, moist environments. This study looks at the history, classification, present situation, risk factors, pathogenesis, diagnosis, and therapy of dermatophytosis. The history goes back to ancient literature, with substantial advances in diagnosis and therapy in the nineteenth and twentieth centuries. Dermatophytosis has been a significant problem in India as a result of antifungal resistance and changing climatic circumstances. Classification according to infection location and mechanism of transmission offers information about its spread and control. Clinical examination and microscopic investigation are used to make the diagnosis, and treatment choices range from topical to oral antifungal drugs, depending on the severity. Susceptibility is influenced by a variety of risk factors, including inadequate hygiene and environmental exposure. Understanding the pathophysiology of fungal infections, hosts, and environmental variables assists in prevention and treatment. The treatment options vary depending on the site and severity of the illness, with oral antifungals being required for scalp and nail infections. Home treatments, such as aloe vera and coconut oil, can supplement medical treatment. Overall, dermatophytosis is a major worldwide health concern that need multidisciplinary collaboration for successful care and prevention.

Keywords: Dermatophytosis, infections, ringworm, Dermatophyte.

INTRODUCTION

Dermatophytosis, often known as ringworm, is a fungal Inflammation of skin, hair, and nails. Despite its name, dermatophytes are microorganisms which cause this illness rather than worms. These fungi flourish in warm, damp conditions, making the groin, foot, and scalp especially susceptible to infection.

Dermatophytosis is characterized by red, scaly skin infections frequently accompanied by itching and pain. In scalp situations, it might cause hair loss and the formation of bald patches. Dermatophytosis is very infectious and can be transmitted by direct Contact with suffering humans or animals, or contaminated things such as towels and clothing ¹.

Antifungal medicines are usually applied to treat dermatophytosis, and they can be delivered topically or orally depending on the severity and location of the infection. Preventive strategies include maintaining excellent hygiene, not sharing personal belongings, and keeping the skin clean and dry.

Various forms of superficial cutaneous mycoses, such as tinea pedis, onychomycosis, tinea capitis, and tinea corporis, are the typical presentation of dermatophyte infections.

CLASSIFICATION OF DERMATOPHYTOSIS ²

1. Tinea corporis: infection of the body excluding the feet, hand, groin and scalp.
2. Tinea capitis: infection of the scalp and hair.
3. Tinea pedis: infection of the feet , Also known as athlete's foot.
4. Tinea manuum: infection of hands.
5. Tinea faciei: infection of the face, often Mistaken for other dermatologic disorders.

CLASSIFICATION BY MODE OF TRANSMISSION ³

Dermatophytosis is classified according to mode of transmission, which provides information on how the fungal infection travels from one person to another or from an animal to a human. Such categorization usually includes:

- 1) Anthrophilic
 - 2) Zoophilic
 - 3) Geophilic
1. **Anthrophilic Transmission:** Dermatophytes spread largely between people. This kind of transmission is widespread in illnesses like tinea corporis and tinea pedis.
 2. **Zoophilic Transmission:** Dermatophytes spread from animals to humans. Domestic animals, including dogs, cats, and rats, can serve as reservoirs for dermatophyte infections, resulting in illnesses such as tinea corporis and tinea capitis.
 3. **Geophilic Transmission:** Dermatophytes are collected from the environment, specifically dirt. Direct contact with contaminated soil or Fomites can cause infections like tinea corporis and tinea pedis.

Table 1: Showing categorization of Dermatophytes into three categories.

Sl. No.	Anthrophilic species	Zoophilic species	Geophilic species
1.	T. gourvilii	M. canis (Dogs and cats)	M. nanum
2.	M.audouinii	M. gollinae (Fowl)	M. amazonicum
3.	M. ferrugineum	M. equinum (horse)	M. cookei
4.	T. konei		M .ripariae
5.	T. megninii		T. aielloi
6.	T. raubitschekii		
7.	T. violaceum		

IDENTIFICATION, ANALYSIS, AND TREATMENT OF DERMATOPHYTOSIS ⁴

Identification:

Dermatophytosis causes red, itchy, scaly areas on the skin, usually in a circular or ring-shaped pattern. It can affect many other places of the body, including the scalp, feet (athlete's foot), groin (jock itch), and others. Diagnosis involves clinical examination, medical history, and microscopic investigation of skin scrapings or cultures to identify the specific fungus species.



Figure 1: Affected skin area by Dermatophytosis

Analysis:

Determining the degree and severity of the infection is critical for optimal management. Treatment options may be influenced by the patient's age, overall health, immunological state, and any underlying diseases (e.g., diabetes or immunosuppression). To avoid recurrence, identify contributory factors such as inadequate hygiene, intimate contact with infected humans or animals, or predisposed circumstances (e.g., excessive perspiration).

Treatment: ⁵

Topical antifungal medicines are often the first-line therapy for mild to severe infections. These might be creams, lotions, or powders containing active substances such as clotrimazole, miconazole, terbinafine, or ketoconazole. For severe or extensive infections, oral antifungal medicines may be administered. Terbinafine, fluconazole, and itraconazole are some of these medications. Treatment times may differ based on the location and severity of the illness ⁶.

Oral antifungal drugs, together with medicated shampoos containing selenium sulfide, ketoconazole, or ciclopirox, are often required for scalp infections.

Good hygiene habits, such as keeping the afflicted region clean and dry, not sharing personal objects like towels or clothes, and wearing loose-fitting, breathable clothing, can help prevent the development and recurrence of dermatophytosis ⁷.

Several risk factors might raise the possibility of getting dermatophytosis. These include the following:

- 1) Environmental Factors
- 2) Poor Hygiene
- 3) Skin Trauma
- 4) Age
- 5) Genetic Predisposition

Environmental Factors:

Dermatophyte fungus thrive in warm, humid areas. Locker rooms, swimming pools, and community showers are frequent sites of exposure.

Poor Hygiene:

Incomplete hygiene practices, such infrequent bathing or failing to fully wash and dry afflicted areas, might increase the incidence of dermatophytosis.

Skin Trauma:

Injuries and abrasions on the skin can allow dermatophyte fungus to enter and cause infection. Activities that involve repetitive friction or perspiration, such as sports training or wearing tight-fitting shoes, can potentially increase skin damage and infection susceptibility ⁷.

Age:

Children and the elderly are more vulnerable to dermatophytosis due to factors such as underdeveloped or impaired immune systems, limited movement, which allows for extended skin contact with contaminated surfaces, and a diminished capacity to maintain basic hygiene ⁸.

Genetic predisposition:

Some people may be genetically predisposed to fungal infections, such as dermatophytosis. Variations in immune responses or skin barrier function might enhance vulnerability.

PATHOPHYSIOLOGY

- 1) Fungal Pathogens
- 2) Host Factors
- 3) Environmental Factors
- 4) Treatment and Prevention

Fungal Pathogens:

Dermatophytes such as *Trichophyton*, *Microsporum*, and *Epidermophyton* are the principal culprits. They infiltrate the skin, hair, and nails because they can create keratinases, enzymes that break down keratin, the protein present in these tissues ⁹.

Host Factors:

Factors such as weak immune function, skin diseases (e.g., eczema), skin fold occlusion, and all genetic predispositions can contribute to increased vulnerability. Individuals with diabetes mellitus or obesity may be at increased risk because to changes in skin physiology and immunological function ¹⁰.

Environmental Factors:

Dermatophytes grow in warm, wet conditions. Direct interaction with sick individuals or animals is the most prevalent mode of transmission, followed by indirect transmission via contaminated fomites such as towels and clothing. Activities that require close contact with potentially contaminated surfaces increase the risk of infection ¹¹.

Treatment and Prevention:

Antifungal medicines are usually applied for treatment, either topically or orally. However, insufficient therapy or prolonged environmental exposure might cause recurrence. Prevention techniques include maintaining excellent hygiene, avoiding sharing personal belongings, and quickly treating skin injuries or infections ¹².

TREATMENT

Ringworm treatment varies depending on the location and severity of the condition. Some varieties of ringworm may be treated with OTC medications, while others require prescription antifungal therapy ¹³.

Treatment of the skin (tinea corporis)

Non-prescription antifungal creams, lotions, or powders can effectively cure cutaneous ringworm problems including jock itch and athlete's foot for 2 to 4 weeks. There are several over-the-counter drugs available to treat ringworm. Topical treatments for tinea corporis/tinea cruris include terbinafine, butenafine, econazole, miconazole, ketoconazole, clotrimazole, and ciclopirox. Topical formulations can treat small regions of illness, however oral medication may be necessary for larger areas, chronic or recurring infections ¹⁴.

The recommended fluconazole dose for tinea corporis/tinea cruris is 150-300 mg once weekly for 2-4 weeks. Oral medications are preferable over ketoconazole due to probable hepatic adverse effects, whereas griseofulvin is not suggested due to insufficient keratin binding in the stratum corneum, limiting effectiveness. For these conditions, the recommended dosage of griseofulvin is 250 mg twice day until cured. For ketoconazole, the recommended dosage is 200-400 mg daily for 4-8 weeks ¹⁵.

Treatment of scalp (tinea capitis)

Tinea capitis, unlike other dermatophytoses, does not respond well to topical treatment. Topical medicines cannot enter the affected hair shaft, hence oral medication is necessary for effective treatment of tinea capitis. Topical antifungals, such as shampoos containing ketoconazole, selenium sulfide, povidone iodine, and zinc pyrithione, can be used alongside oral antifungals to prevent reinfection or treat asymptomatic carriers ¹⁶.

Antibiotic is the sole authorized Oral antifungal treatment for tinea capitis in North America. However, terbinafine, itraconazole, and fluconazole have also been extensively used in the medical literature. Terbinafine, itraconazole, and fluconazole have comparable efficacy and safety profiles to high

resistance and can be administered if therapy fails. Itraconazole, terbinafine, and fluconazole offer shorter treatment durations compared to griseofulvin ^{17, 18}.

Treatment of nail infection (tinea unguium)

Fingernails may have greater treatment success rates compared to toenails because to quicker outgrowth and shorter dose regimes. Even if the infection may be cleared up, nail expansion may be sluggish and the nail may never return to its usual form if it has been damaged or exhibits other atypical growth patterns. Moreover, infection recurrence is often observed. In order to help the patient realize that effective treatment is unlikely to occur fast, that long-term follow-up is important to notice any relapses in the early stages, and that the nail may not return to a normal look even though the infection may clear, nail development should be monitored and patient expectations should be reviewed. A subtype of onychomycosis, inea unguium is a dermatophyte infection of the nail that can also be brought on by yeast and nondermatophyte molds ^{19,20}.

Medications

Based on the intensity of your ringworm infection, your doctor can recommend several therapies. Antifungals are commonly used to treat athlete's foot, jock itch, and skin

1. Creams
2. Sprays
3. Ointment
4. Gels

Home remedies for ringworm

Ringworm is a fungal infection that affects a ring-shaped red or silver rash on the skin. While it is always best to visit a healthcare professional for a correct diagnosis and treatment, There are specific home treatments that may assist relieve symptoms and aid in recovery. However, these treatments should be taken with caution and stopped if they aggravate the illness. Here are several home cures that have been recommended ²¹⁻²³.

- 1) Aloe Vera
- 2) Coconut Oil
- 3) Garlic
- 4) Turmeric

Aloe Vera: Aloe vera offers soothing characteristics that may help reduce the itching and irritation caused by ringworm. Apply fresh aloe vera gel straight to the afflicted region several times daily.

Coconut Oil: Coconut oil includes medium chain fatty acids, which have antifungal properties. Apply virgin coconut oil to the affected area several times daily.

Garlic: Garlic includes chemicals with antifungal activity. Crush one clove of garlic and apply it straight to the afflicted region. Cover with a bandage and allow for several hours before cleaning.

Turmeric: Turmeric contains antibacterial and anti-inflammatory effects. Make a paste of turmeric powder with water or coconut oil, then apply it to the afflicted region. Leave it on for 30 minutes before washing ²⁴.

CONCLUSION

Dermatophyte infections affect all populations, and there are little in vivo trials to examine potential treatments. To further understand dermatophyte formation, host immunological response, and treatment efficiency, an animal model is necessary. In recent years, dermatophyte revolutions have been a prominent trend in this illness. Animal models play a significant role in evaluating new medicines for treating dermatophytosis.

Molecular approaches for detecting and identifying dermatophytes have gained popularity due to their speed and accuracy. However, these procedures have not been extensively used in clinical laboratories. Most fungal strains are identified using sequencing approaches that target the ITS region. This technique is only applicable to reference labs and laboratories with big PCR platforms. As commercial kits become more validated, smaller laboratories will increasingly adopt PCR tests to detect dermatophytes on nail, skin, and hair samples.

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