Programme: Bachelor of Science (Third Year)

Subject: Microbiology

Course Code: MIC 105

Course Title: Medical Microbiology

Unit 6: Fungal diseases

Module Name: Cutaneous Mycoses: Athlete's Foot (*Tina pedis*)

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Notes

❖ **ATHLETE'S FOOT (Tinea pedis)**

- Cutaneous mycoses—also called dermatomycoses, ringworms, or tineas
- Cutaneous mycoses are caused by fungi that infect only the keratinized tissue (skin, hair, and nails).
- The most important of these are the dermatophytes
- Dermatophytes are probably restricted to the nonviable skin because most are unable to grow at 37°C or in the presence of serum.
- Three genera of cutaneous fungi, or dermatophytes, are involved in these mycoses: *Epidermophyton*, *Microsporum*, and *Trichophyton*.

- **Tinea pedis** is the most prevalent of all dermatophytoses.
- Tinea pedis also known as athlete's foot is a dermatophytic infection of the feet.
- Most infections are caused by ***T. rubrum***, ***T. mentagrophytes***, or ***E. floccosum***.
- Tinea pedis occurs throughout the world, is most commonly found in adults, and increases in frequency with age.

- *Trichophyton* species, may infect hair, skin, or nails.
- They develop cylindric, smooth-walled macroconidia and characteristic microconidia.
- Colonies of *T. mentagrophytes* may be cottony to granular; both types display abundant grape-like clusters of spherical microconidia on terminal branches.
- Coiled or spiral hyphae are commonly found in primary isolates.
- The typical colony of *T. rubrum* has a white, cottony surface and a deep red, non-diffusible pigment when viewed from the reverse side of the colony. The microconidia are small and piriform (pear-shaped).

- *Epidermophyton floccosum*, is the only pathogen in this genus.
- It produces only macroconidia, which are smooth-walled, clavate, two- to four-celled, and formed in small clusters.
- The colonies are usually flat and velvety with a tan to olive-green tinge.
- *Epidermophyton floccosum* infects the skin and nails but not the hair.

↳ **Mode of Transmission**

- Infections are spread by contact with arthrospores, the thick-walled vegetative cells formed by dermatophyte hyphae, which can survive for months on fomites.
- **Tinea pedis** (athlete's foot) commonly spreads in public showers.
- The causative fungi grow well in the dark, moist confines of sweaty shoes and socks.
- Warmth, humidity, trauma, and occlusion increase susceptibility to infection.

↳ **Pathogenesis**

- The dermatophytes are keratin-loving organisms and invade the keratinized structures of the body (i.e. skin, hair and nails).
- Dermatophytes have septate hyphae and form arthrospores which adhere to keratinocytes, germinate and invade.
- In adapting to life in the skin, they produce:
  i. proteases to break down keratin
  ii. Lys M proteins to evade recognition by the host
  iii. kinases and pseudokinases to modulate host cell metabolism.

↳ **Symptoms**

- Tinea pedis usually occurs as a chronic infection of the toe webs.
- Other varieties are the vesicular, ulcerative, and moccasin types, with hyperkeratosis of the sole.
- Clinical symptoms vary from a fine scale to a vesiculopustular eruption.
- Initially, there is itching between the toes and the development of small vesicles that rupture and discharge a thin fluid.
- The skin of the toe webs becomes macerated and peels, whereupon cracks appear that are prone to develop secondary bacterial (Gram negative) infection.
- When the fungal infection becomes chronic, peeling and cracking of the skin are the principal manifestations, accompanied by pain and pruritus.

↳ **Laboratory Diagnosis**

- Microscopic examination of biopsied areas of the skin cleared with 10% potassium hydroxide.
- Culture of scrapings or clippings from lesions on Sabouraud dextrose agar or other agars to which inhibitory agents (antibiotics / cycloheximide) have been added to provide some selectivity.

↳ **Chemotherapy**

- The most effective drugs are itraconazole and terbinafine.
- Treatment with topical ointments such as miconazole nitrate (MonistatDerm), tolnaftate (Tinactin), or clotrimazole (Lotrimin) for 2 to 4 weeks.
- Griseofulvin (Grifulvin V) and itraconazole (Sporanox) are the oral antifungal agents for troublesome cases.

↳ **Prophylaxis**

- Moving around barefoot in locker rooms, gyms or public showers should be avoided.
- Socks and undergarments should be regularly changed.
- Sharing of towels, sports gear, or other personal items should be avoided.