SUPERFICIAL MYCOSES

Prof. Akram Hossain
Feb 2009
SUPERFICIAL MYCOSES

- Dermatophytosis
- Pityriasis versicolor
- Keratomycosis
- Tinea nigra
- Black piedra
- White piedra
DERMATOPHYTOSIS
(=Tinea = Ringworm)

- Infection of the skin, hair or nails caused by a group of keratinophilic fungi, called dermatophytes

- *Microsporum* Hair, skin
- *Epidermophyton* Skin, nail
- *Trichophyton* Hair, skin, nail
Trichophyton (19 species)

- Hair
- Skin
- Nails
Microsporum (13 species)

- Skin
- Hair
Epidermophyton floccosum

- Skin
- Nails
- **Dermatophytosis** - "ringworm" disease of the nails, hair, and/or stratum corneum of the skin caused by fungi called dermatophytes.

- **Dermatomycosis** - more general name for any skin disease caused by a fungus.
THE SKIN PLANTS

- Dermatophytes are keratinophilic - "keratin loving". Keratin is a major protein found in horns, hooves, nails, hair, and skin.
- Ringworm - disease called 'herpes' by the Greeks, and by the Romans 'tinea' (which means small insect larvae).
Why named as Ringworm lesion

- Lesions on skin and sometimes nails have a characteristic circular pattern that was mistaken by ancient physicians as being a worm down in the tissue.
- These lesions are still today called *ringworm* infections even though the etiology is known to be a fungus rather than a worm.
Classical “Ringworm” Lesion
Infections by Dermatophytes

- Geophilic species - keratin-utilizing soil saprophytes (e.g., *M. gypseum, T. ajelloi*).

- Zoophilic species - keratin-utilizing on hosts - living animals (e.g., *M. canis, T. verrucosum*).

- Anthropophilic species - keratin-utilizing on hosts - humans (e.g., *M. audounii, T. tonsurans*)
DERMATOPHYTIES

- Digest keratin by their keratinases
- Resistant to cycloheximide
- Classified into three groups depending on their usual habitat
DERMATOPHYTES

- **ANTROPOPHILIC**
  Trichophyton rubrum...

- **GEOPHILIC**
  Microsporum gypseum...

- **ZOOPHILIC**
  Microsporum canis: cats and dogs
  Microsporum nanum: swine
  Trichophyton verrucosum: horse and swine...
DERMATOPHYTOSIS
Pathogenesis and Immunity

- Contact and trauma
- Moisture
- Crowded living conditions
- Cellular immunodeficiency (chronic inf.)
- Re-infection is possible (but, larger inoculum is needed, the course is shorter)
DERMATOPHYTOSIS
Clinical Classification

1. **Tinea capitis** - ringworm infection of the head, scalp, eyebrows, eyelashes
2. **Tinea favosa** - ringworm infection of the scalp (crusty hair)
3. **Tinea corporis** - ringworm infection of the body (smooth skin)
4. **Tinea cruris** - ringworm infection of the groin (jock itch)
5. **Tinea unguium** - ringworm infection of the nails
6. **Tinea barbae** - ringworm infection of the beard
7. **Tinea manuum** - ringworm infection of the hand
8. **Tinea pedis** - ringworm infection of the foot (athlete's foot)
Tinea Capitis

Gray Patch
Tinea corporis – body ringworm
Tinea Pedis – Athlete’s Foot Infection
Dermatophytid Reaction
Tinea Cruris – Jock Itch
Tinea Unguium – Nail Infection
Major sources of ringworm infection

- Schools, military camps, prisons.
- Warm damp areas (e.g., tropics, moisture accumulation in clothing and shoes).
- Animals (e.g., dogs, cats, cattle, poultry, etc.).
Lab Diagnosis of Dermatophytes

Direct M/E

Treating skin and nail scrapings and “snippets” of hair with 10-20% potassium hydroxide (KOH) dissolves keratin but not chitin - hyphae) is usually very effective in detecting dermatophyte hyphae in clinical specimens.

The addition of calcofluor white (1,4 polymer specific fluorochrome dye) and dimethysulfoxide (DMSO) to the KOH and viewing with a fluorescent microscope is recommended.
DERMATOPHYTOSIS

Diagnosis

I. Clinical
Appearance
Wood lamp (UV, 365 nm)

II. Lab
A. Direct microscopic examination
(10-25% KOH)
Ectothrix/endothrix/favic hair
Ectothrix and Endothrix

Fluorescing hair (under Wood's lamp) is seen in dogs and cats infected with some dermatophytes
DERMATOPHYTOSIS
Diagnosis

B. Culture
Mycobiotic agar
Sabouraud dextrose agar
Dermatophytes test agar
# DERMATOPHYTES Identification

## A. Colony characteristics

## B. Microscopic morphology

<table>
<thead>
<tr>
<th></th>
<th>Macroconidium</th>
<th>Microconidium</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microsporum</strong></td>
<td>fusiform</td>
<td>(+)</td>
</tr>
<tr>
<td><strong>Epidermophyton</strong></td>
<td>clavate</td>
<td>(-)</td>
</tr>
<tr>
<td><strong>Trichophyton</strong></td>
<td>(few) cylindrical/ clavate/fusiform</td>
<td>(+) single, in clusters</td>
</tr>
</tbody>
</table>
Microsporum species

- Thick wall
- Spindle shape
- Multicellular
Epidermophyton floccosum

Bifurcated hyphae with multiple, smooth, club shaped macroconidia (2-4 cells)
Trichophyton species

Large, smooth, thin wall, septate, pencil-shaped
C. Physiological tests

- In vitro hair perforation test
- Special amino acid and vitamin requirements
- Urea hydrolysis
- Growth on BCP-milk solids-glucose medium
- Growth on polished rice grains
- Temperature tolerance and enhancement
DERMATOPHTOSIS

Treatment

- **Topical**
  - Miconazole, clotrimazole, econazole, terbinafine...

- **Oral**
  - Griseofulvin
  - Ketoconazole
  - Itraconazole
  - Terbinafine
PITYRIASIS VERSICOLOR

• Superficial chronic infection of Stratum corneum
• Etio: Malassezia furfur (Pityrosporum orbiculare) (Lipophilic yeast)
• Clinical findings: Hyperpigmented or depigmented maculae on chest, back, arms, abdomen
PITYRIASIS VERSICOLOR

- Systemic infection (parenteral lipid solution)
- **Micr.:** Short hyphae, yeast cells
- **Culture:** Yeast (suppl.: olive oil)
- **Treatm.:** Topical selenium sulfide
  Oral ketoconazole
  Oral itraconazole
KERATOMYCOSIS (=Mycotic keratitis)

- Posttraumatic / postsurgical corneal inf.

- **Etio:** Saprophytic fungi (Aspergillus, Fusarium, Alternaria, Candida), Histoplasma capsulatum

- **Clinical findings:** Corneal ulcer
KERATOMYCOSIS

• **Micr.:** Hyphae in corneal scrapings

• **Treatm.:** Surgery (keratoplasty)
  Topical pimaricin
  Nystatin
  Amphotericin B
TINEA NIGRA

- Superficial chronic infection of Stratum corneum
- **Etio:** *Hortae (Exophiala) werneckii* (pigmented)
- Frequent in tropical areas
- Clinical findings: Brownish maculae on palms, fingers, face
TINEA NIGRA

- **Micr.**: Septate hyphae and yeast cells (brown in color)
- **Culture**: Black colonies
- **Treatm.**: Topical salicylic acid, tincture of iodine
BLACK PIEDRA

- Fungal infection of the scalp hair
- **Etio:** *Piedraia hortae*
- Frequent in tropical areas
- **Clinical findings:** Discrete, hard, dark brown to black nodules on the hair
BLACK PIEDRA

- **Micr.** Septate pigmented hyphae, and asci; unicellular and fusiform ascospores with polar filament(s)
- **Culture:** Brown to black colonies
- **Treatm.:** Topical salicylic acid, azol cremes
WHITE PIEDRA

- Fungal infection of facial, axillary or genital hair
- **Etio:** *Trichosporon* (yeast)
- Frequent in tropical and temperate zones
WHITE PIEDRA

- Clinical findings: Soft, white to yellowish nodules loosely attached to the hair
- Micr.: Intertwined septate hyphae, blasto- and arthroconidia
- Culture: Soft, creamy colonies
- Treatm.: Shaving, azoles
Believers always have two things on their lips, Silence & a Smile
Smile to solve the problems & Silence to avoid the Problems.

Islamic Reflections/XY