Mycetoma

Pathogenesis, Diagnosis, and Treatment

Objective

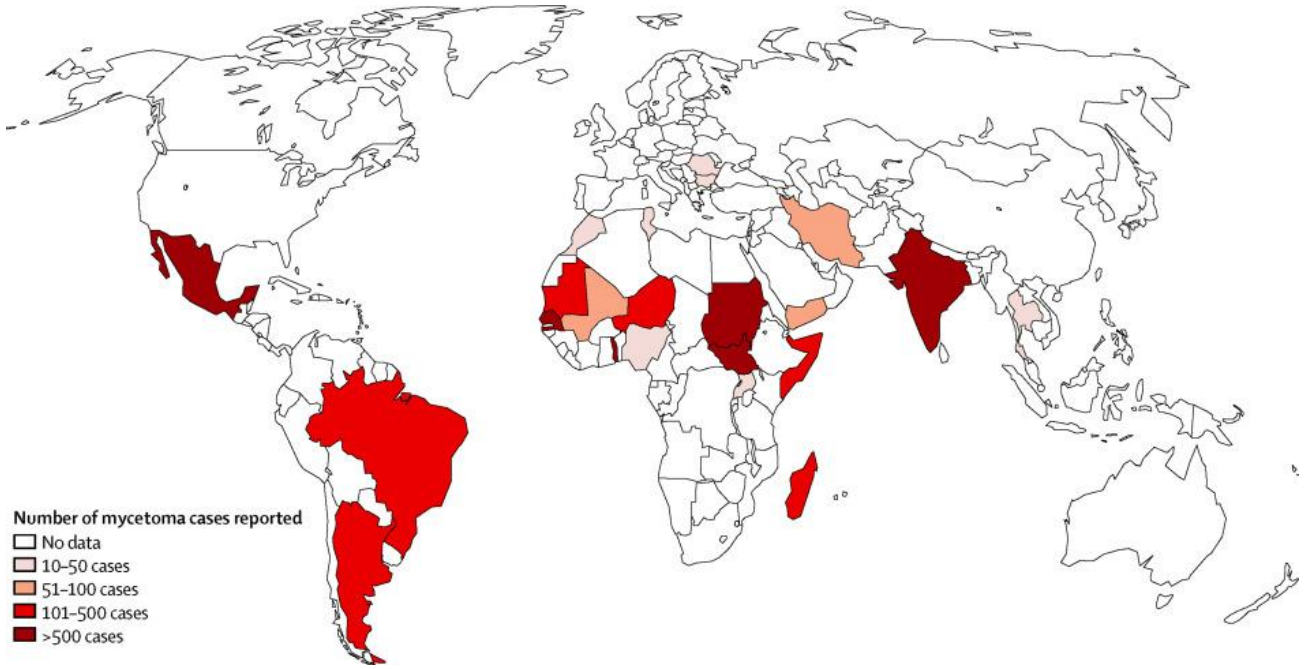
- Background
- Epidemiology
- Pathogenesis
- Causative Agent
- Diagnosis
- Treatment
- Animal model
- Unusual case report

Mycetoma
A Neglected Tropical Disease

- WHO-recognised NTD
- It affects people of all ages
- Caused by either bacteria or fungi.
- Clinical presentation is the same
- No body part is immune
- Can result in amputation and death

Epidemiology

- Mycetoma is endemic in tropic and subtropical area: Mycetoma belt
- Africa, South America, and South Asia.
- Global burden is UNKNOWN due to absence of case report system
- Rare in USA: recent report of Latin American immigrant with eumycetoma in the State of Maryland, USA.



https://pmc.ncbi.nlm.nih.gov/articles/PMC9323607/

Pathogenesis

Subcutaneous Inculcation of causative agent may be the infection route.

Localized infection and granuloma and slowly progress over time.

Clinically starts as a small painless nodule or swelling.

Pathogenesis

- Over time, it spreads to involve the muscles and bones.
- It forms subcutaneous masses, sinuses and discharge that contain grains
- In severe cases massive destruction, disfiguration and disabilities occur

Eumycetoma Causative Agents

Black grains

- *Madurella mycetomatis*
- *M. pseudomycetomatis*
- *M. fahalii, M.Tropicana*
- *Falciformispora senegalensis*
- *Falciformispora tompkinsii*
- *Medicopsis romero*
- *Chaetomium atrobrunneum*
- *Exophiala jeanselmei*
- *Aspergillus*

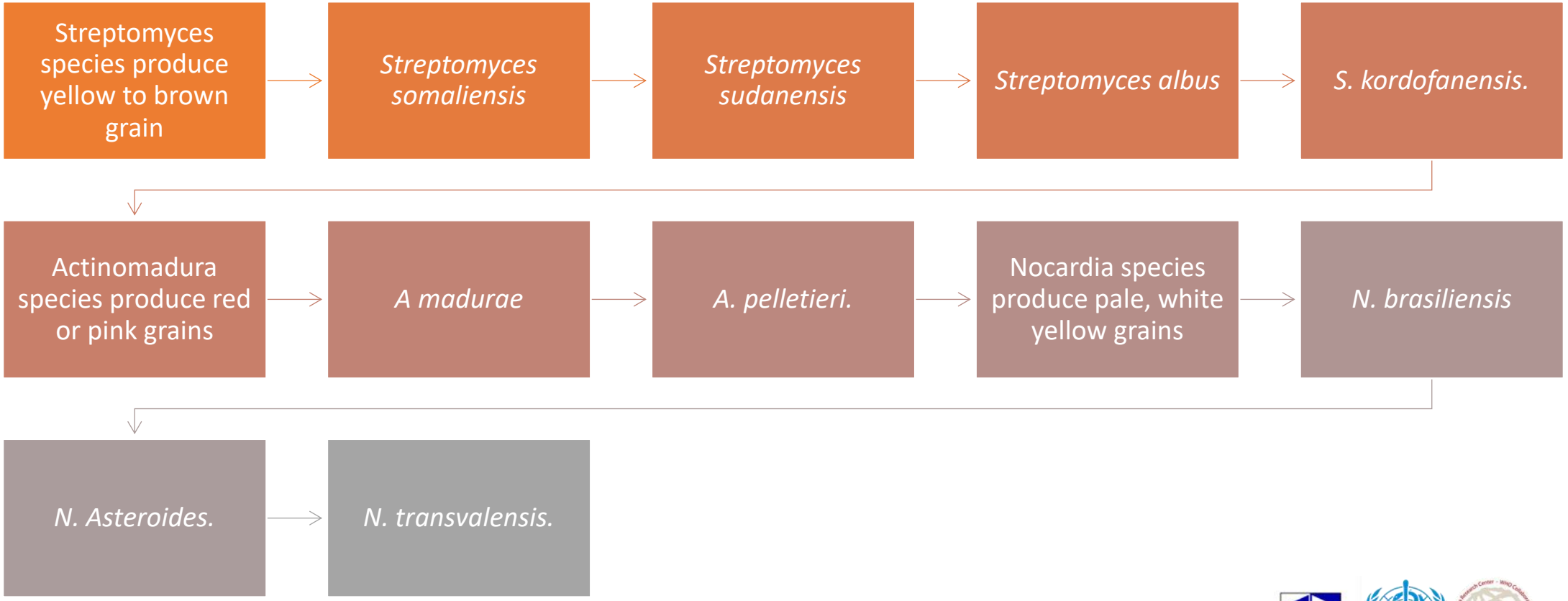
White grains

- *Fusarium solani complex.*
- *Acremonium falciforme.*
- *Scedosporium apiospermum.*
- *Aspergillus flavus*
- *Aspergillus candidus*

Yellow grains

- *Pleurostomatophora ochracea.*

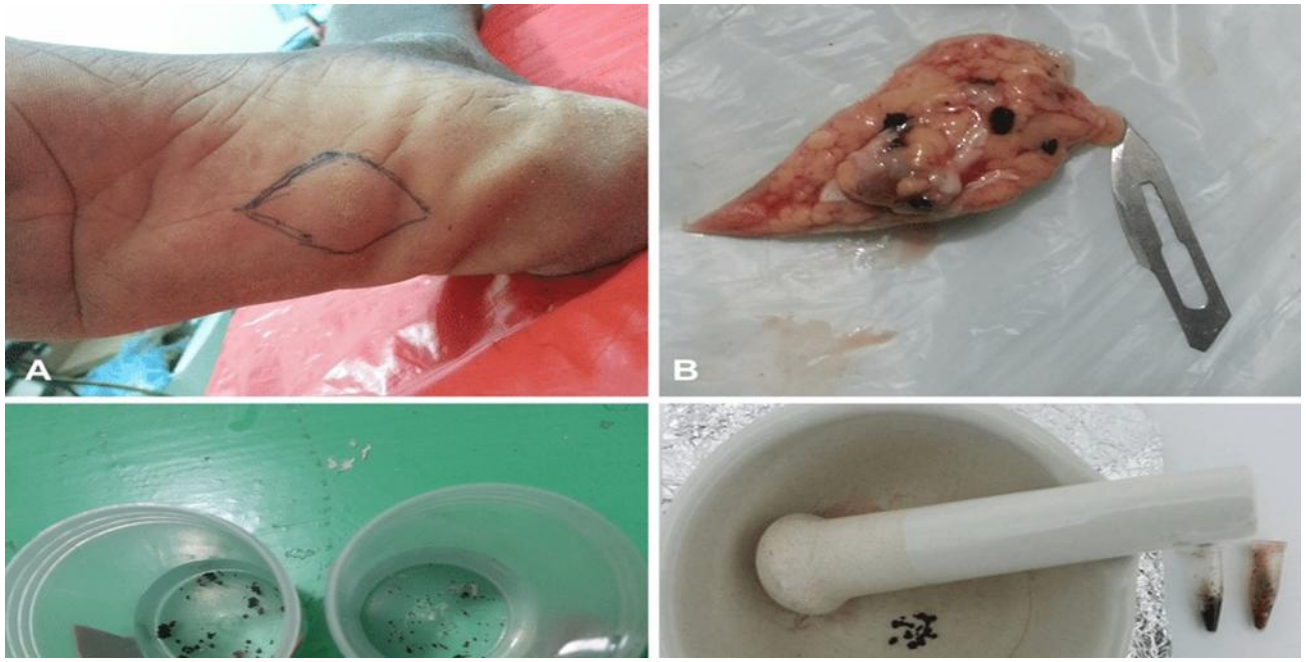
Actinomycetoma Causative Agent

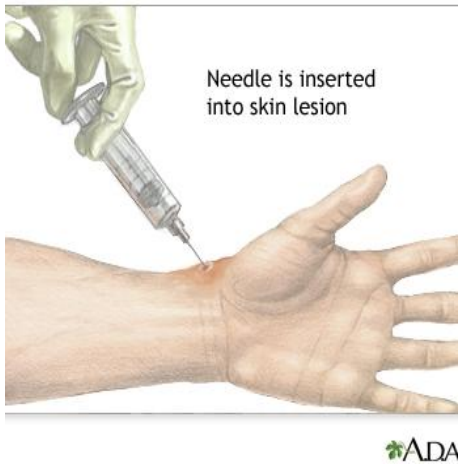


Diagnosis

Sample collection and preparation

- Fine Needle Aspiration (FNA)
- A surgical biopsy or Excisional Biopsy





Note:

- The sample must be handled properly to avoid contamination to ensure reliable results.
- Wash 3 times with normal saline or more to remove any tissue debris to reduce the contamination.

Macroscopic Examination

- Present or absent of the grain
- The colour, size, consistency
- It can help and guide the diagnosis
- Additional tests are needed for the final diagnosis.

Culture

For eumycetoma

SDA supplemented with antibiotics we use gentamycin

For actinomycetoma

Yeast Extract Agar, L J media and Brain heart infusion broth

Culture

Cultured in duplicate

Incubated in different temp for eumycetoma 25-37°C.

Culture

Limitation

Bacterial contamination can occur

Time-consuming

Need expert laboratory personnel.

Culture

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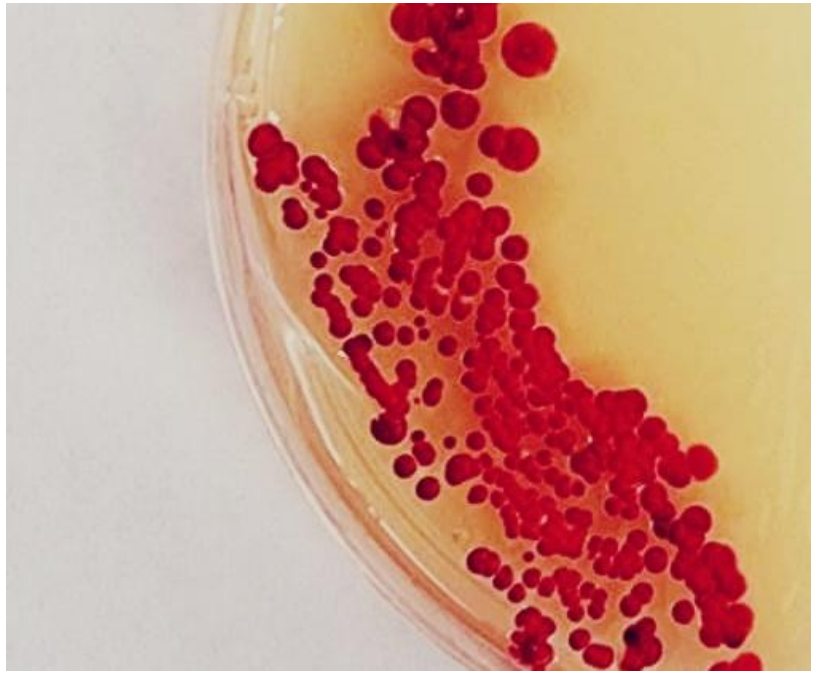
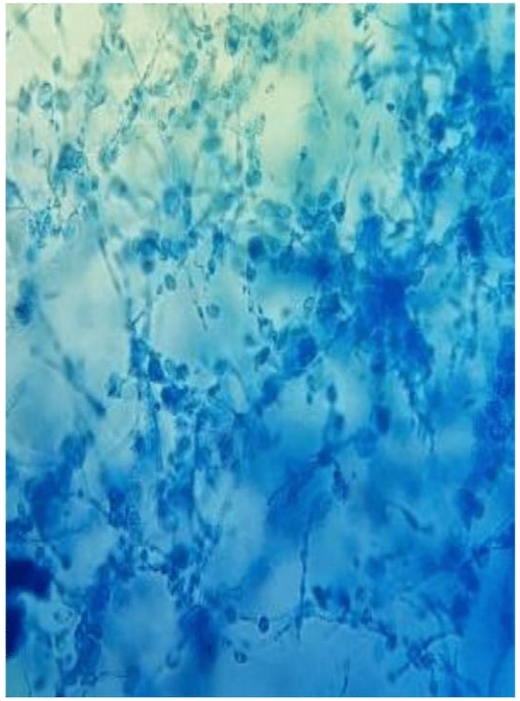



MRC 21

Microscopic Examination

- For Eumycetoma

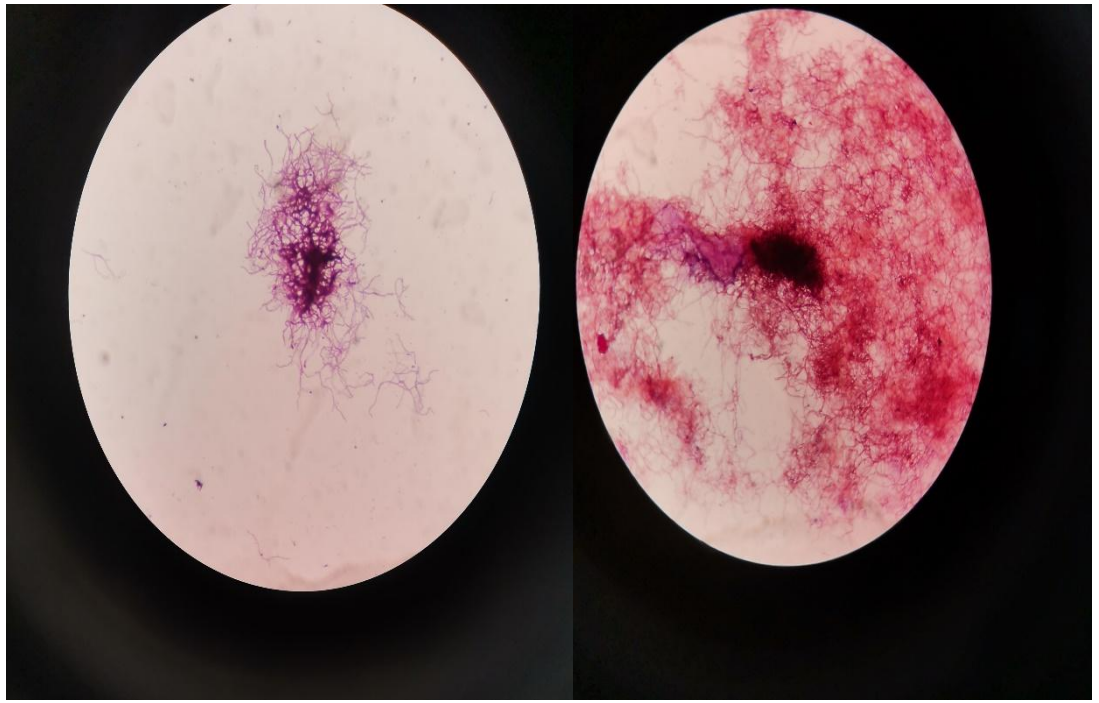
  10% KOH and Lactophenol cotton blue



- For Actinomycetoma

  Gram stain

  Modified ZN stain if the causative agent suspect Nocardia



Diagnosis

Molecular-Based Identification

For Eumycetoma

Depends on the identification of ITS then sequenced and compared with sequences found in the gene bank

Madurella fahalii, *Madurella tropicana* and *Madurella pseudomycetomatis*, and *Pleurostomophoraochracea*

Spp specific PCR for *M. mycetomatis*

(differentiate the clinical and environment)

Diagnosis

Molecular-Based Identification

For actinomycetoma

Sequence of 16 S gene able to differentiate between the genera.

Diagnosis

- Molecular-Based Identification

Limitation?

Not used in endemic areas – cost

- New application of LAMP
- Immunodiagnostic: ELISA, Immunoblot, CIE, IHA, ID

Limitation

- Time consumption
- Cross-reaction can occur especially for actinomycetoma with *M. leprae* and *M. tuberculosis*

Diagnosis

Imaging

- Conventional X-ray
- MRI
- CT Scan.

Treatment

Eumycetoma

- More challenges required antifungal treatment +surgery
- Itraconazole 200mg tow ices/day +50%folic Acid for 6 to 12 months
- Fosravuconazole 200 mg once time weekly.
- Voriconazole used for resistances cases of itraconazole.

Treatment

Actinomycetoma

- Response well and the STD treatment contains combination therapy.
- First line TMP-SMX.
- Second line Amikacin sulfate +TMP-SMX.

Animal model

- Murine model for Nocardia brasiliensis
- Mice model for Nocardia brasiliensis

- To access the efficacy of ciprofloxacin and moxifloxacin using alone or combined with trimethoprim-sulfamethoxazole

Animal model

- Galleria mellonella larvae for *M. mycetomatis* and *F. senegalensis*

- To test the efficacy itraconazole, amphotericin B, and terbinafine

Unusual Case Report

- Extensive Actinomycetoma lesion

- Cutaneous tuberculosis mimicking a mycetoma

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Thank
You