

OTOMYCOSIS in Tropical Climate: Tailoring Treatment Strategies for the Indonesian Context

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INTRODUCTION


- The population of Indonesia: estimated to exceed **281 million** in 2023 (WHO)



INDONESIA: Tropical Climate

- Predominantly features a tropical environment with high temperatures throughout the year. The temperature consistently warm, around 28°C
- Rainfall patterns vary by region
- The area's relative humidity ranges between 70-90%, sometimes reached to 95%
- Jakarta, Surabaya, and Bali: High and persistent humidity due to their proximity to the sea

FUNGAL INFECTION

 Fungal infections categorised into 5 categories:

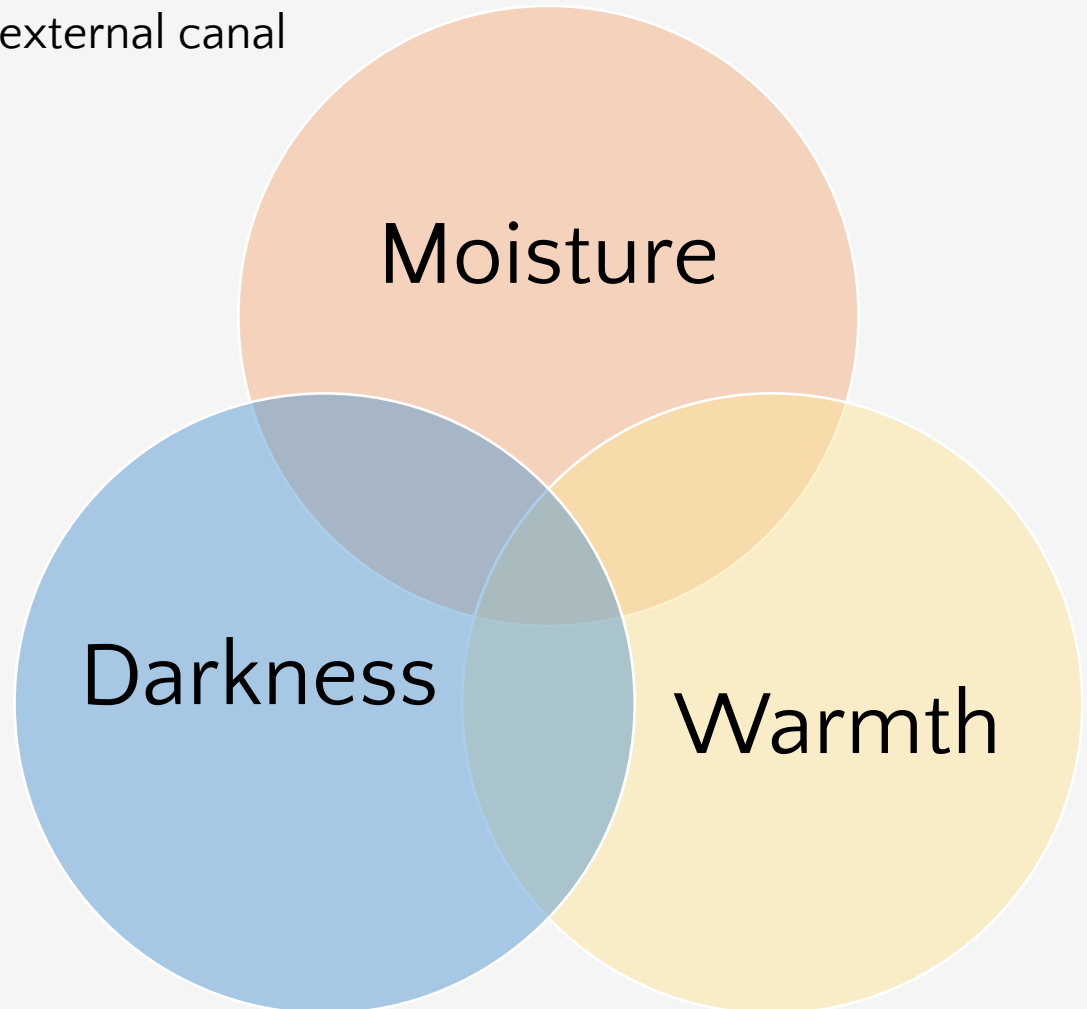
1. Invasive
2. Immediately life- or sight threatening
3. Chronic
4. Allergic
5. Mucosal and cutaneous (hair, nails and skin).

OTOMYCOSIS

- Otomycosis is a fungal infection of the skin of the external canal

All fungi have 3 basic growth requirements :
all of which commonly are present in the EAC

- Immunodeficient patients
- Immunocompetent patients



OTOMYCOSIS...

● Mechanical Barrier of External Auditory Canal (EAC) Skin:

Intact skin

Cerumen : forms a protective layer on the skin's surface · exhibits antimicrobial properties due to its low pH

● EAC Microbial Species:

Staphylococcus spp.

Corynebacterium spp.

Bacillus spp.

Streptococcus spp.

Gram-negative bacilli (e.g., Pseudomonas aeruginosa, Escherichia coli),

Fungi : predominantly of the Aspergillus & Candida species

Saprophytic microorganisms--pathogenic : Disrupted balance between bacterial & fungal growth

OTOMYCOSIS...



Prevalence:

9-30% cases worldwide



Worldwide:

Asia

Africa

Central America

South America

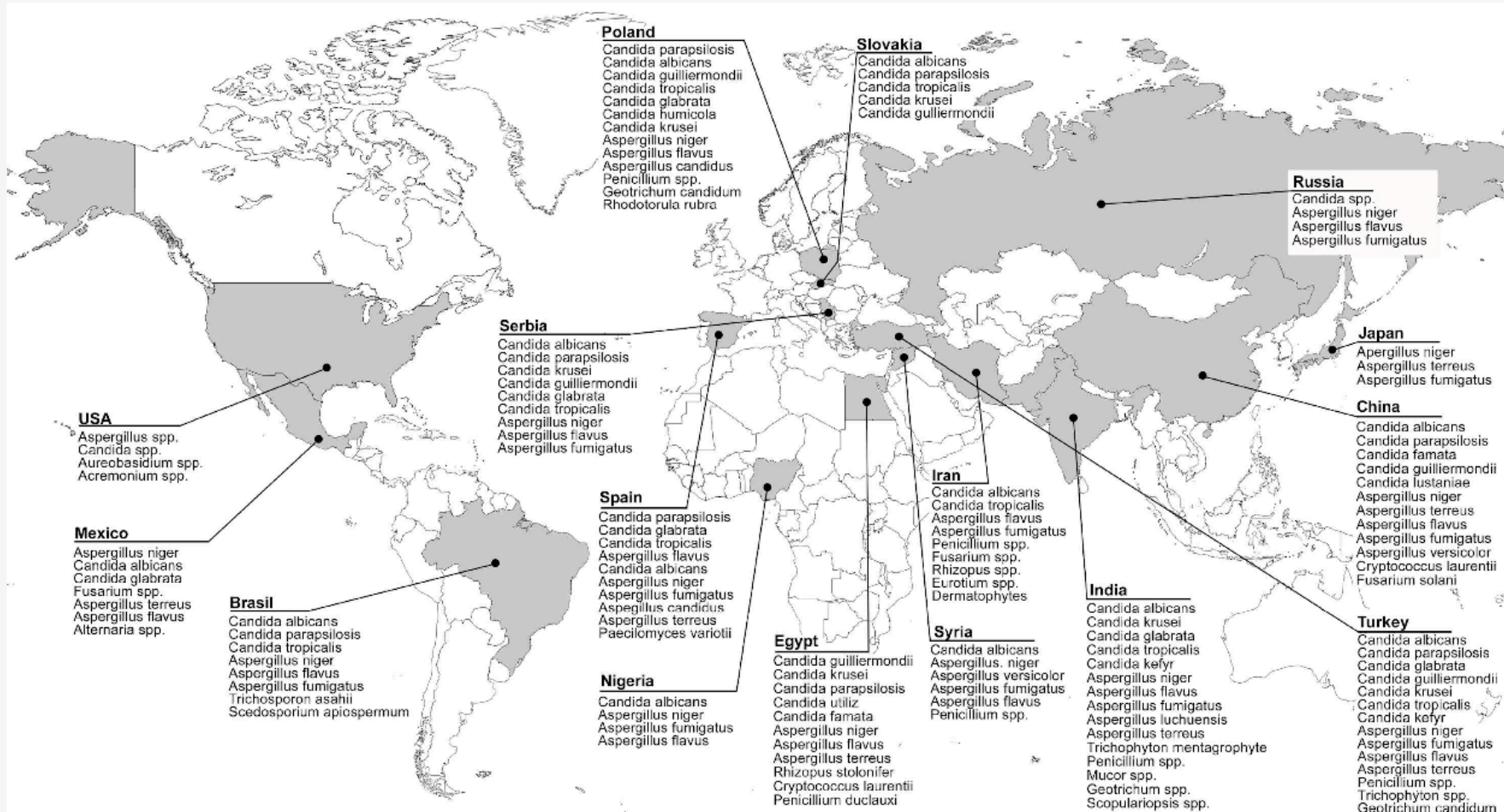
Europe

Povidone iodine soaked gelfoam for the treatment of recalcitrant otomycosis – Our experiences at a tertiary care teaching hospital of eastern India

Bojanovic M, Stalevic M, Arsic V, Ignjatovic A. et al. Etiology, Predisposing Factors, Clinical Features and Diagnostic Procedure of Otomycosis: A Literature Review. J. Fungi. 2023; 9, 662:1-15.

Mofatteh MR, Yazdi ZN, Yousefi M, Namaei MH. Comparison of the recovery rate of otomycosis using betadine and clotrimazole topical treatment. Braz J Otorhinolaryngol. 2018; 84(4): 404-9.

OTOMYCOSIS...



Distribution of otomycosis causative agents

OTOMYCOSIS...



Predisposing factors:

Climate changes (extremely hot and moist environment) : Rainy or Summer weather season

Swimming, Spa baths

Headphone usage & Clothing (head coverings)

Bacterial otitis externa – History of topical antibacterial drugs and topical corticosteroid drugs

Self cleaning with non appropriate objects : local trauma

Dermatomycosis : autoinoculation

History of otologic procedures

Long-term use of oral antibiotics

Immunosuppressive therapy

Comorbidities: HIV, DM, CSOM, Sino-nasal and nasopharyngeal malignancy

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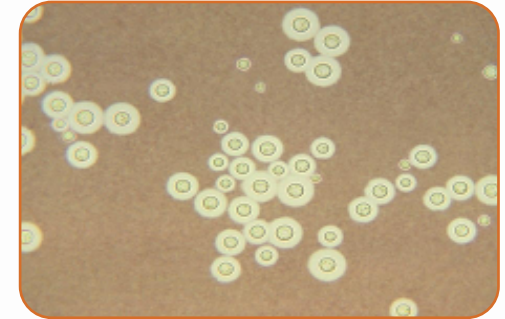
OTOMYCOSIS...

● Pathogens – Fungi:

6% of all patients with ear symptoms in outpatient clinic

25% of all otitis externa cases

9-30% cases worldwide



Molds

(Non-dermatophyte filamentous fungus)

Aspergillus spp.

Fusarium

Mucormycetes

Yeast

Candida spp.

Cryptococcus

Others

Rhodotorulla spp.

Coccidioides

Blastomyces,

Histoplasma

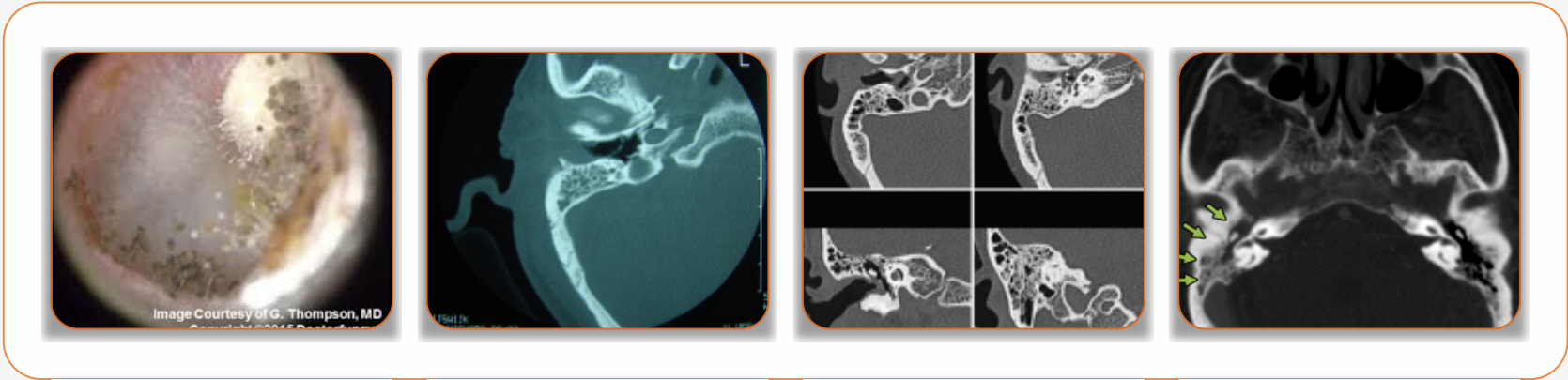
Geotrichum

candidum

OTOMYCOSIS...



Classifications of otomycosis on the basis of its spread in ear and temporal bone by Chen et al.



Type 1

- Limited to EAC

Type 2

- Extending to the mastoid cavity

Type 3

- Invasive Mastoiditis + VII nerve palsy

Type 4

- Invasive mastoiditis + VII palsy + skull base osteomyelitis

OTOMYCOSIS...



Signs & Symptoms

Pruritus

Otalgia

Ear blockage / ear fullness

Hearing loss

Tinnitus

Otorrhea

Headache

EAC swelling and redness

Nausea

OTOMYCOSIS...

● Signs & Symptoms

whitish, cotton like fungal hyphae

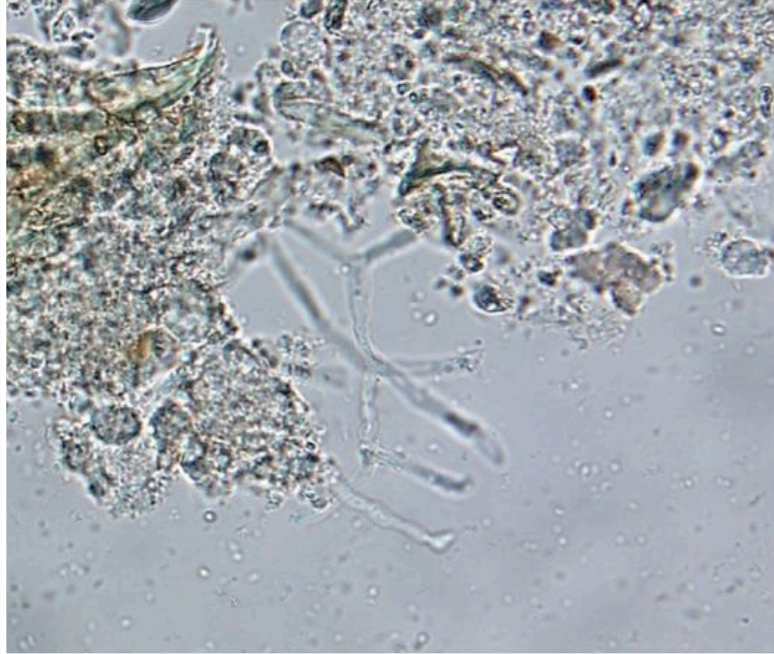
and/or blackish greasy spores : “pepper” – like

Aspergillus niger infections : spores are visualized as fine coal dust that has been scattered or “pepper” like inside the ear canal. They might also look like a crumpled newspaper or blotting paper.

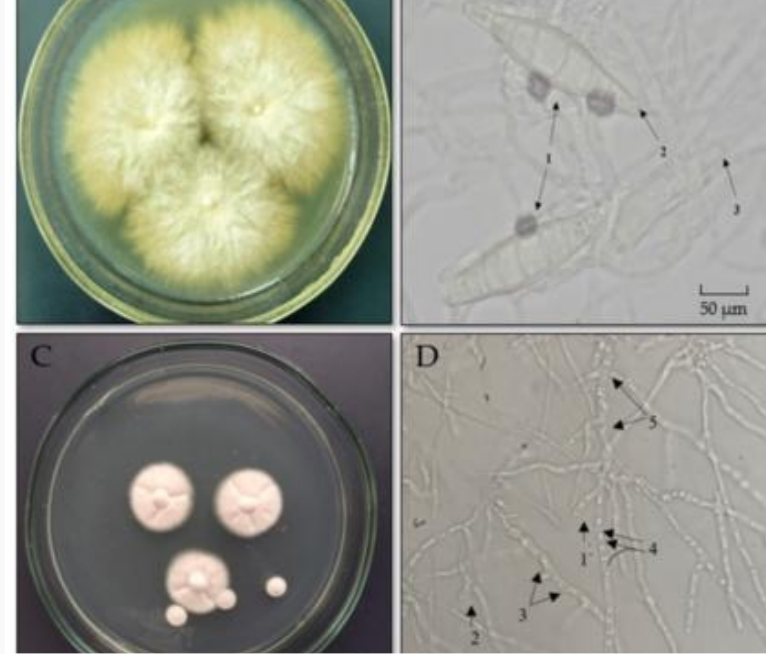
Candida infections : characterized by a white, cheesy substance that resembles sebaceous material and, in extreme situations, may even fill the entire ear canal.



OTOMYCOSIS – Diagnosis



KOH Test
Direct Microscope Examination



Sabouraud Dextrose Agar +
Chloramphenicol

OTOMYCOSIS Treatment

- 1900 : One of the earliest published pieces of literature on otomycosis : ear cleaning & the application of **alcohol** and **mercury** followed by **boric acid**, **bismuth salicylate**, and **zinc oxide**
- The lack of official therapeutic guidelines - disagreement among expert for the optimal treatment for fungal infections
- Treatment duration: undefined ???

OTOMYCOSIS Treatment...

Causative Agent –
Determined
Specific Sensitivity

The diagram consists of two large, stylized arrows pointing towards each other. The left arrow is orange and points right, containing the text 'Causative Agent – Determined Specific Sensitivity'. The right arrow is grey and points left, containing the text 'General Effectiveness & Characteristics of the Drug'. The two arrows meet at a central point, suggesting a relationship or interaction between the two concepts.

General
Effectiveness &
Characteristics of
the Drug

OTOMYCOSIS Treatment



France:

First-line : Nystatin

Combination: Oxytetracycline + polymyxin B + dexamethasone

Duration : 15 days



USA:

Drug of choice : Clotrimazole topical

Duration : ?

OTOMYCOSIS Treatment

● India:

Drug of choice: 1% Clotrimazole cream

Duration : 2-3 weeks

Swain SK et al.: Povidone iodine 10% soaked gelfoam (10 days) vs Clotrimazole ear drops (2 weeks , 2x/day) for the recalcitrant otomycosis. Encourage the use of povidone iodine soaked gelfoam due to its cost-effectiveness

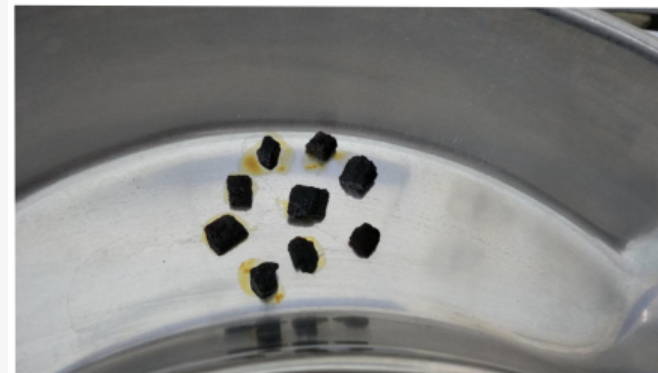
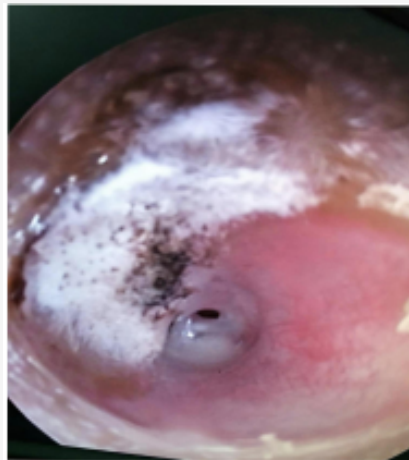


Figure 2 Povidone iodine soaked gelfoam before placing in ear canal.

OTOMYCOSIS Treatment



Rusia:

Drug of choice for mold infections: Terbinafine, Naftifine, and Clornitrophenol

Drug of choice for candida infections: Clotrimazole or allylamines (Terbinafine and Naftifine)

Duration : 3-4 weeks



Serbia:

Drug of choice for Aspergillus infections: Nystatin and Naftifine better than Clotrimazole

Duration : ?

OTOMYCOSIS Treatment Modalities



Ear Toilet / Debridement:

Important Role!!!

40 studies mentioned aural toilet included clearance of fungal mass, suction, dry mopping, before the administration of therapeutic agents



Therapeutic Agents:

a. Administration

Topical formulations:

- Drops : the most frequently formulations to used
- Creams
- Ointments
- Powders
- Solutions
- Lotions
- Sprays

OTOMYCOSIS Treatment Modalities



Therapeutic Agents:

a. Administration...

Systemic formulations:

- Oral: Drops, Tablet, Capsules
- Intravenous Route

b. Types

ANTIFUNGAL

- Azoles (Clotrimazole, fluconazole, miconazole, voriconazole, ketoconazole, itraconazoles, luliconazole, etc.)
- Polyenes (Amphotericin B and Nystatin)
- Echinocandin (Caspofungin)
- Allylamine (Terbinafine)
- Thiocarbamate (Tolnafate)
- Hydroxyquinoline (Clioquinol)
- Griseofulvin

OTOMYCOSIS Treatment Modalities



ANTISEPTICS

- a. Betadine (povidone-iodine)
- b. Gentian Violet (methylrosanilin)
- c. Iodine
- d. N-chlorotaurine
- e. Boric acid
- f. Castellani's paint
- g. Cresylate drops
- h. Mercurochrome
- i. Tincture Merthiolate

STEROIDS

- a. Beclomethasone
- b. Betamethasone
- c. Dexamethasone
- d. Hydrocortisone

OTOMYCOSIS Treatment Modalities



ANAESTHETICS

- a. Lignocaine

ACIDIFYING AGENTS

- a. 2-3% Acetic Acid in water or alcohol
- b. 2% Salicylic Acid
- c. 2% H₂O₂

COMBINATION THERAPY

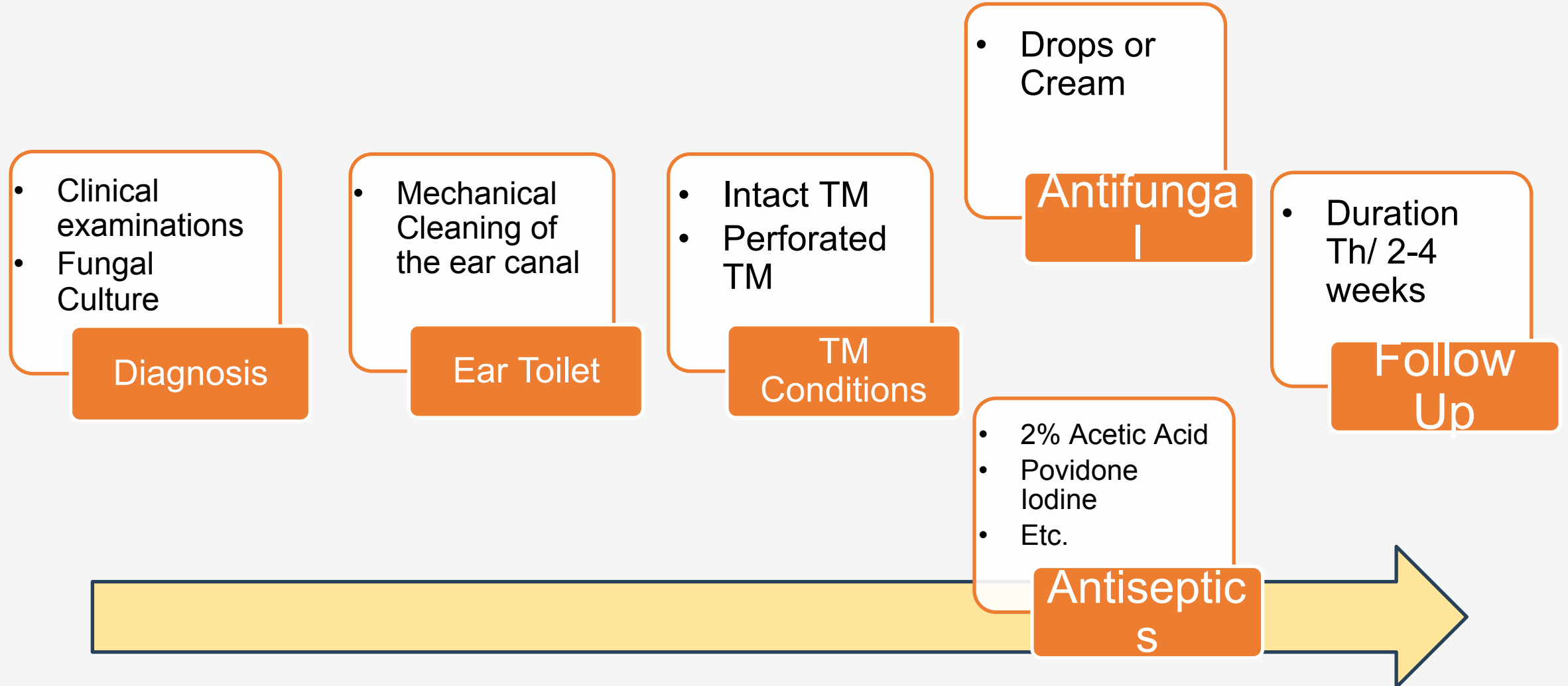
- a. Antifungal + Antibiotic
- b. Antifungal + Acidifying agent
- c. Antifungal + Steroid
- d. Two Antifungal
- e. Antifungal + Antiseptic
- f. Antifungal + Anaesthetic
- g. Etc.

OTOMYCOSIS Treatment

- Clotrimazole or nystatin : effective for Candida infections but Aspergillus infections do not respond well
- Systemic antimycotics
 - For previous topical antifungal has been ineffective
 - For severe otomycosis
 - For Complications: mastoiditis and meningitis : must identifying specific causative agents and conducting susceptibility
 - Triazole antifungal drugs: fluconazole, itraconazole, voriconazole, posaconazole
- The high prevalence of bacterial coinfection in otomycosis, particularly with resistant organisms such as MRSA, highlights the need for combined antifungal and antibacterial therapy
Kumar et al. : A. niger commonly coexisted with Staphylococcus aureus (MRSA) and Pseudomonas aeruginosa.

In Indonesia?
Available?

OTOMYCOSIS Treatment Algorithm



Future Treatment for Otomycosis

Fluconazole Ear drops:

Fluconazole ear drops should be used at a concentration of 0.2% to 0.3% solution, with the standard dosage being 3–5 drops instilled into the affected ear(s) twice daily for 7–14 days.

Not available in Indonesia



Future Treatment for Otomycosis

Clotrimazole Ear drops:

Clotrimazole has been shown to be effective in treating otomycosis, with response rates ranging from **68.6% to 97.5%** in different studies

The efficacy of other antifungal ear drops, such as **salicylic acid** and **povidone iodine**, may be lower than that of clotrimazole, although they may still be effective in treating otomycosis

Available in Indonesia (imported)



Future Treatment for Otomycosis

Acetic acid ear drops:

Acetic acid in water vs acetic acid in alcohol: Marthin et al. The cure rate was, **73.68%** for clotrimazole 1%, **50%** for acetic acid in alcohol 2% and **none** of the patients responded to acetic acid in water 2%

In terms of geographical region, clotrimazole is still a popular drug all around the world, especially in Asia.

Available in Indonesia (fortified)



Take Home Message

- Effective management starts with thorough cleaning of the ear canal (EAR TOILET) to improve topical antifungal penetration
- Maintaining an acidifying pH in the ear canal is beneficial to prevent fungal regrowth
- Future collaboration with pharmacist to make antifungal drops formulations to meet our health service needs

Reference

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THANK YOU..