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**Diploma in Pharmacy 1<sup>st</sup> Year  
Pharmaceutical Chemistry  
Important Questions  
Chapter 11 : Anti-Infective Agents**

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# Chapter 11

## Anti-Infective Agents

### IMPORTANT Questions

#### Q1. What are the Antifungal Agent with example Ketoconazole,

Ans.

#### ANTIFUNGAL AGENTS

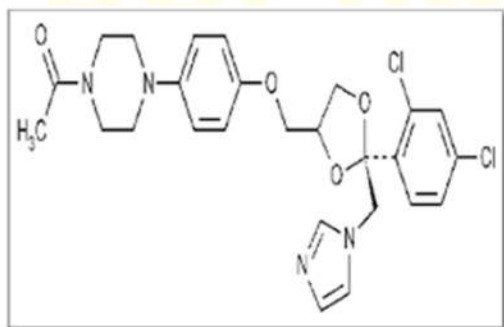
- Fungi are neither plants nor animals, and are classified as their own kingdom.
- Fungi grow either as yeasts (single round cells) or as molds (many cells forming long, thin threads called hyphae).
- Some fungi even go through both the forms during their life cycle.
- Many fungi, including bread molds and mushrooms, can be seen with the naked eye.
- Fungal infections are often caused by fungi present in the environment.
- Most fungi are not dangerous, but some of them can be harmful. Fungal spores are present in the air or in soil, thus fungal infections begin mostly in the lungs or on the skin.
- These infections progress slowly and are not serious, unless they weaken the immune system.
- Antifungal agents used to treat fungal infections are either applied topically on the infected site or are taken orally or injected in case the infection is serious.

#### Ketoconazole

- Ketoconazole is a broad spectrum antifungal agent that is used in high doses for long periods in immune suppressed patients. It is a racemate comprising of equimolar amounts of (2R,4S) and (2S,4R) ketoconazole with the chiral centers on acetal ring.

#### Chemical Name and Structure

1-[4-[4-[2-(2,4-dichlorophenyl)-2 (imidazol-1-ylmethyl); 1,3-dioxolan-4-yl]methoxy]phenyl]piperazin-1-yl]ethanone



#### Uses

- Ketoconazole is used in a wide range of systemic fungal infections, like candidiasis, chronic mucocutaneous candidiasis, oral thrush, candiduria, blastomycosis, coccidioidomycosis, histoplasmosis, chromomycosis, and paracoccidioidomycosis.

#### Stability and Storage Conditions

- ♦ Ketoconazole topical cream should not be stored at a temperature less than 25°C

#### Types of Formulations

- Shampoo Foam, Cream, Gel

#### Popular Brand Names

- Extina, Kuric, Nizoral

## Q2. What are the Urinary Track Anti Infective agent with example Dfloxacin.

Ans.

### URINARY TRACT ANTI INFECTIVE AGENTS

- Urinary tract infections are among most common bacterial infections of human.
- These infections range from asymptomatic bacteriuria on one hand to acute pyelonephritis and [gram-negative septicaemia (only in men) on the other hand.
- Females are mostly at risk of developing UTIs because of their short urethra, and certain behavioural factors which include delay in micturition, sexual activity, and the use of diaphragms and spermicides.
- A symptomatic bacterial infection of the urinary tract is termed Urinary Tract Infection (UTI).
- It includes a lower urinary tract infection, eg. cystitis (symptomatic infection of bladder), urethritis (infection in (urethra), prostatitis (infection in prostate gland), or an upper urinary tract infection, eg. pyelonephritis (symptomatic infection of kidney).
- In UTIs, many drugs are used for killing or inhibiting the growth of pathogenic organisms in the urinary tract.
- These agents are retained in the renal tubules.
- They are effective antiseptics due to their localised actions in the urinary bladder, ureters, and kidneys.
- Some important urinary antiseptics include mandelic acid, methenamine mandelate, nitrofurantoin, nalidixic acid, and hexylresorcinol.

### Examples

The following drugs are studied in detail:

1. Norfloxacin,
2. Ciprofloxacin, Ofloxacin, and

## Q3. What are the Anti Tubercular Agent example INH.

Ans.

### ANTI - TUBERCULAR AGENTS

- Tuberculosis (TB) is an infective diseases most commonly affecting the lungs, and caused by Mycobacterium tuberculosis and Mycobacterium bovis.
- Since TB is an it spreads via air in the form of small droplets Patients infected with pulmonary TB or laryngeal TB may the infection by sneezing, coughing, singing, or even while talking.
- The infective droplets, once released into the air in there for a few hours due to their very small size.
- Tuberculosis can be treated in a long-term, i.e.. 8 months to 3 years
- Tuberculosis infection can be cured it proper treatment is given within time. Non tuberculosis mycobacterial infections are known as M. arium complex (MAC) as they are caused by M. alam, M. kansali, M. murinum, and M. scrofulaceum. These organisms are resistant the commonly used anti-tuberculosis drugs; thus along with the standard Jugh some newer agents like fluoroquinolones. amikacin clarithromycin, azithromycin, or rifabutin are used.

### Isoniazid

→ Isoniazid (or isonicotinyldiazine, INH) an organic compound used the first line drug for preventing and treating tuberculosis.

### Uses

- ★ It is used with other drugs in the treatment of active tuberculosis (TB) infection.
- ★ Stability Storage Conditions
- ★ It should be stored in room temperature.

### Types of Formulations

- Tablet, Solution

### Popular Brand Names

- ◆ Nydravid, Pms-Isoniazid

## Q4. Explain Antiviral Agent example Acyclovir,

Ans.

### ANTIVIRAL AGENTS

- Antiviral agents are used for treating viral infections.
- Similar to antibiotics for bacteria, specific antivirals are effective against specific viruses.
- Antiviral drugs, instead of destroying their target pathogen, inhibit their development.
- Since antiviral drugs are harmless to the host, they can be used to treat infections.
- They should be distinguished from viricides that are not medications but destroy virus particles outside the body.
- The available antivirals are mostly designed to help against HIV, herpes viruses (that mainly causes cold sores and genital herpes; however, can cause various other diseases), hepatitis B and C viruses (that cause liver cancer), and influenza A and B viruses.
- Since the viruses replicate within the host cells, it is difficult to find targets for the drug that would interfere with the virus without harming the host cells.
- Due to this reason, designing safe and effective antiviral drugs is a difficult task.

### Acyclovir

- Acyclovir is a nucleotide analog antiviral that is used for treating infections like herpes simplex, herpes zoster, herpes labialis, and acute herpetic keratitis.
- It is the first line drug to be used in the treatment of infections caused by these viruses.

### Chemical Name

2-Amino-1,9-dihydro-9-((2-hydroxyethoxy)methyl)-3H-purin-6-one

### Uses

- ☞ Acyclovir cream with hydrocortisone is used in recurrent herpes labialis, and shortening lesion healing time in 6 years and older patients.
- ☞ Acyclovir ophthalmic ointment is used in acute herpetic keratitis.
- ☞ Acyclovir oral tablets, capsules, and suspensions are used in herpes zoster, genital herpes, and chickenpox.
- ☞ Acyclovir buccal tablet is used in recurrent herpes labialis.

### Stability and Storage Conditions

- ◆ Acyclovir suspension should be stored at 59°F to 77°F (15°C to 25°C) and kept away from light.

### Types of Formulations

- Capsules, Tablets, Suspensions

### Popular Brand Name

- ◆ Zovirax

## Q5. What are the Antimalarials with example Phosphate,

Ans.

### ANTIMALARIALS

- Malaria is an infectious disease affecting humans and other animals.
- It is a mosquito-borne infectious disease caused by parasitic protozoans (group of single-celled microorganisms) of *Plasmodium* type.
- The symptoms of this disease include fever, vomiting, fatigue, and headache.
- The symptoms usually begin 10-15 days after being bitten by mosquitoes.
- In severe cases, the skin becomes yellow, the patient experiences seizures, goes to coma, or finally dies
- Malaria is transmitted by an infected female *Anopheles* mosquito,
- which introduces the parasites from its saliva into the person's blood.
- The parasites reach the liver to mature and reproduce there.
- Five species of *Plasmodium* can infect humans, *P. falciparum* causes most of the deaths; while *P. vivax*, *P. ovale*, and *P. malariae* cause milder forms of malaria; *P. knowlesi* rarely cause a disease in humans.
- The risks can be reduced by the prevention of mosquito bites by using mosquito nets, repellents, spraying insecticides, and draining standing water

### Chloroquine Phosphate

- Chloroquine is the precedent antimalarial drug. It is used for treating all types of malaria, excluding the one caused by chloroquine-resistant *Plasmodium falciparum*.

### Chemical Name and Structure

(RS)-N-(7-chloroquinolin-4-yl)-N,N-diethyl-pentane-1,4-diamine

### Uses

1. Chloroquine is used for acute malarial attacks caused by *P. vivax*, *P. malariae*, *P. ovale*, and susceptible strains of *P. falciparum*.
2. It is also used for suppressive treatment of malaria.

### Stability and Storage Conditions

1. It should be stored at room temperature between 15-25°C.
2. It should be protected from light.
3. Product in powder form is stable for 6 months at room temperature when it is properly stored.

### Type of Formulation

- Tablets

### Popular Brand Names

- Aralen Phosphate
- Aralen Hydrochloride