

Concept and Necessity of Drugs and Pharmaceuticals

Concept of Drugs

A **drug** is any chemical substance that is used to **prevent, diagnose, treat, or cure diseases**, or to modify the normal functions of the body. Drugs act by interacting with specific molecules (called targets) in the body, such as enzymes, receptors, or microorganisms.

Examples:

- Paracetamol – reduces fever and relieves pain.
- Amoxicillin – treats bacterial infections.
- Insulin – controls blood glucose in diabetes.

Concept of Pharmaceuticals

Pharmaceuticals are medicinal products prepared from drugs and formulated into suitable dosage forms such as **tablets, capsules, syrups, injections, ointments, and creams**. The pharmaceutical industry is responsible for the **research, development, manufacturing, quality control, and distribution** of medicines.

Necessity (Importance) of Drugs and Pharmaceuticals

1. **Prevention of diseases**
 - Vaccines help prevent diseases such as polio, measles, and hepatitis.
2. **Treatment of diseases**
 - Medicines cure or control bacterial, viral, fungal, and parasitic infections.
3. **Relief from symptoms**
 - Drugs reduce pain, fever, inflammation, cough, and allergies.
4. **Management of chronic diseases**
 - Medicines help control conditions such as diabetes, hypertension, asthma, and heart disease.
5. **Life-saving role**
 - Emergency drugs such as adrenaline, insulin, and antibiotics save lives in critical situations.
6. **Support during surgery**
 - Anaesthetics, antiseptics, and antibiotics make surgeries safer and reduce complications.
7. **Improvement of quality of life**
 - Medicines help people with chronic illnesses live healthier and more productive lives.
8. **Public health benefits**
 - Pharmaceutical products reduce the spread of infectious diseases and increase life expectancy.

Difference Between Drugs and Pharmaceuticals

Drug	Pharmaceutical
Active chemical substance that produces a biological effect	Finished medicinal product containing one or more drugs with other ingredients
May exist as a pure chemical	Available as tablets, capsules, syrups, injections, creams, etc.
Example: Paracetamol (active ingredient)	Example: Paracetamol 500 mg tablet

Uses of Aspirin and Paracetamol

Aspirin (Acetylsalicylic Acid)

Uses

1. **Pain relief (Analgesic)**
 - Relieves mild to moderate pain such as headache, toothache, muscle pain, and joint pain.
2. **Reduces fever (Antipyretic)**
 - Used to lower body temperature during fever.
3. **Reduces inflammation (Anti-inflammatory)**
 - Treats inflammatory conditions such as rheumatoid arthritis and osteoarthritis.
4. **Prevents blood clots (Antiplatelet)**
 - Low-dose aspirin helps prevent heart attacks and strokes by reducing platelet aggregation.

Common Side Effects

- Stomach irritation and ulcers
- Increased risk of bleeding
- Allergic reactions in some people

Paracetamol (Acetaminophen)

Uses

1. **Pain relief (Analgesic)**
 - Treats headache, toothache, muscle pain, back pain, menstrual pain, and mild arthritis pain.
2. **Reduces fever (Antipyretic)**
 - Commonly used to lower fever caused by infections.
3. **Safe for many patients**

- Often preferred for people with stomach ulcers because it does not usually irritate the stomach like aspirin.

Common Side Effects

- Usually safe at recommended doses.
- Overdose can cause severe liver damage
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Differences Between Aspirin and Paracetamol

Aspirin	Paracetamol
Pain reliever, fever reducer, anti-inflammatory	Pain reliever and fever reducer
Prevents blood clot formation	Does not prevent blood clots
May cause stomach irritation and bleeding	Less likely to irritate the stomach
Not recommended for children with viral infections (risk of Reye's syndrome)	Generally safer for children when used at the correct dose

Uses of Sulphadiazine and Quinine

1. Sulphadiazine

Sulphadiazine is a **sulfonamide (sulfa) antibiotic** used to treat bacterial infections.

Uses

- Treats **bacterial infections**, especially urinary tract infections (UTIs).
- Used with **pyrimethamine** to treat **toxoplasmosis**.
- Helps treat certain respiratory and skin infections caused by susceptible bacteria.
- **Silver sulphadiazine** cream is widely used to prevent and treat infections in **burn wounds**.

2. Quinine

Quinine is an **antimalarial drug** obtained from the bark of the **Cinchona** tree.

Uses

- Used to **treat malaria**, especially severe malaria caused by *Plasmodium falciparum* when other medicines are not suitable.
- Helps reduce fever and kill malaria parasites in the blood.
- Occasionally used to treat **babesiosis** (a parasitic infection), usually in combination with other medicines.

Uses of Chloroquine, Phenobarbital, and Metronidazole

1. Chloroquine

Chloroquine is an **antimalarial drug**.

Uses

- Treats and prevents **malaria** caused by chloroquine-sensitive *Plasmodium* species.
- Sometimes used to treat **amoebic liver abscess** (along with other medicines).
- Occasionally used for certain autoimmune diseases, such as **rheumatoid arthritis** and **systemic lupus erythematosus (SLE)**.

2. Phenobarbital (Phenobarbitone)

Phenobarbital is a **barbiturate** with anticonvulsant and sedative properties.

Uses

- Controls and prevents **epileptic seizures**.
- Used in the emergency treatment of **status epilepticus** (with other appropriate medicines).
- Used as a **sedative** in selected situations.
- Sometimes used to treat **neonatal seizures** (seizures in newborn babies).

3. Metronidazole

Metronidazole is an **antibiotic and antiprotozoal drug**.

Uses

- Treats infections caused by **anaerobic bacteria**.
- Treats **amoebiasis** (amoebic dysentery and liver abscess).
- Treats **giardiasis** and **trichomoniasis**.
- Used in **dental infections** caused by anaerobic bacteria.
- Used as part of treatment for **Helicobacter pylori** infection (with other medicines).

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MCQs on Drugs and Pharmaceuticals

1. A drug is a substance used to:

- A. Increase food production
- B. Prevent, diagnose, and treat diseases
- C. Make cosmetics
- D. Purify water

Answer: B. Prevent, diagnose, and treat diseases

2. Aspirin is mainly used as a:

- A. Antibiotic
- B. Antimalarial
- C. Analgesic, antipyretic, and anti-inflammatory drug
- D. Antifungal

Answer: C. Analgesic, antipyretic, and anti-inflammatory drug

3. Paracetamol is mainly used as a:

- A. Antibiotic
- B. Analgesic and antipyretic
- C. Antifungal
- D. Antacid

Answer: B. Analgesic and antipyretic

4. Which drug is commonly used to treat malaria?

- A. Aspirin
- B. Chloroquine
- C. Metronidazole
- D. Phenobarbital

Answer: B. Chloroquine

5. Metronidazole is effective against:

- A. Viral infections only
- B. Anaerobic bacterial and protozoal infections
- C. Fungal infections only
- D. Allergic reactions

Answer: B. Anaerobic bacterial and protozoal infections

6. Sulphadiazine belongs to the group of:

- A. Antacids
- B. Sulfonamide antibiotics
- C. Antihistamines
- D. Vaccines

Answer: B. Sulfonamide antibiotics

7. Quinine is obtained from the:

- A. Neem tree
- B. Cinchona tree
- C. Eucalyptus tree
- D. Mango tree

Answer: B. Cinchona tree

8. Phenobarbital is mainly used to:

- A. Treat malaria
- B. Control seizures (epilepsy)
- C. Lower blood sugar
- D. Treat fungal infections

Answer: B. Control seizures (epilepsy)

9. Which drug helps prevent blood clot formation?

- A. Paracetamol
- B. Aspirin
- C. Quinine
- D. Metronidazole

Answer: B. Aspirin

10. Which of the following is an antimalarial drug?

- A. Quinine
- B. Chloroquine
- C. Both A and B
- D. Aspirin

Answer: C. Both A and B

11. Which medicine is generally safer for reducing fever in children?

- A. Aspirin
- B. Paracetamol
- C. Quinine
- D. Phenobarbital

Answer: B. Paracetamol

12. Which drug is used with pyrimethamine to treat toxoplasmosis?

- A. Chloroquine
- B. Sulphadiazine
- C. Aspirin
- D. Quinine

Answer: B. Sulphadiazine

13. The pharmaceutical industry is mainly concerned with:

- A. Manufacturing and distributing medicines
- B. Building hospitals
- C. Producing fertilizers
- D. Manufacturing food products

Answer: A. Manufacturing and distributing medicines

14. Which drug is used to treat amoebiasis?

- A. Aspirin
- B. Metronidazole
- C. Paracetamol
- D. Phenobarbital

Answer: B. Metronidazole

15. Drugs that reduce fever are called:

- A. Antibiotics
- B. Antipyretics
- C. Sedatives
- D. Antacids

Answer: B. Antipyretics

16. Drugs that relieve pain are called:

- A. Analgesics
- B. Antacids
- C. Antihistamines
- D. Laxatives

Answer: A. Analgesics

17. Drugs that reduce inflammation are called:

- A. Sedatives
- B. Anti-inflammatory drugs
- C. Antifungals
- D. Antacids

Answer: B. Anti-inflammatory drugs

18. Which of the following is a sedative and anticonvulsant?

- A. Aspirin
- B. Phenobarbital
- C. Quinine
- D. Sulphadiazine

Answer: B. Phenobarbital

19. Which drug can cause liver damage if taken in excessive doses?

- A. Paracetamol
- B. Aspirin
- C. Quinine
- D. Chloroquine

Answer: A. Paracetamol

20. Which dosage form is not a pharmaceutical preparation?

- A. Tablet
- B. Capsule
- C. Syrup
- D. Cotton

Answer: D. Cotton