

# PHARMACEUTICS – I

## UNIT – 1

### Historical Background and Development of the Pharmacy Profession:

- The pharmacy profession has a long history dating back to ancient civilizations. In ancient times, pharmacists were responsible for preparing and dispensing medications from natural sources.
- The development of pharmacy as a profession evolved with advancements in chemistry, pharmacology, and medicine. Pharmacists played a crucial role in compounding and dispensing medications.

### History of the Pharmacy Profession in India:

- In India, the practice of pharmacy has ancient roots. Traditional systems of medicine, such as Ayurveda, relied on the preparation of herbal medicines, and those who prepared these medicines were early pharmacists.
- Modern pharmacy education in India began with the establishment of the first pharmacy college, the Banaras Hindu University (BHU) College of Pharmacy, in 1932.
- The Pharmacy Act of 1948 regulated the profession in India, and the Pharmacy Council of India (PCI) was established to oversee education and practice.

### Pharmacy Education, Industry, and Organization:

- Pharmacy education in India has expanded significantly, with numerous colleges and universities offering undergraduate and postgraduate programs in pharmacy.
- The pharmaceutical industry in India has grown to become a major player in the global market, with the production of generic drugs and active pharmaceutical ingredients.
- Various organizations, including the Indian Pharmaceutical Association (IPA) and PCI, work to promote and regulate the pharmacy profession.

### Pharmacy as a Career:

- Pharmacy offers a range of career opportunities. Pharmacists can work in various sectors, including community pharmacy, hospital pharmacy, pharmaceutical industry, research and development, regulatory affairs, and academia.
- The role of a pharmacist has evolved to include patient counseling, drug therapy management, and medication safety.

### Pharmacopoeias: Introduction to IP, BP, USP, and Extra Pharmacopoeia:

- **Indian Pharmacopoeia (IP):** The IP is an official document that sets quality standards for pharmaceutical substances and dosage forms in India. It helps ensure the safety and efficacy of medicines.

- **British Pharmacopoeia (BP):** The BP is a reference book for pharmacists and pharmaceutical manufacturers in the United Kingdom. It provides standards for the quality and purity of medicinal products.
- **United States Pharmacopoeia (USP):** The USP is a comprehensive publication that establishes quality standards for medicines, dietary supplements, and related products in the United States.
- **Extra Pharmacopoeia:** Extra pharmacopoeias include additional standards and guidelines for substances and preparations not covered in the official pharmacopoeias.

Pharmacy education, industry, and practice have significantly evolved over the years, and the pharmacy profession continues to play a crucial role in healthcare and the pharmaceutical sector. The use of pharmacopoeias ensures that medicines meet specific quality standards, promoting the safety and effectiveness of pharmaceutical products.

### **Introduction to Dosage Forms:**

- Dosage forms, also known as pharmaceutical formulations, are the physical forms in which pharmaceutical agents are administered to patients.
- They play a crucial role in the administration, delivery, and effectiveness of pharmaceutical products.

### **Classification of Dosage Forms:**

#### **1. Solid Dosage Forms:**

- **Tablets:** Compressed or molded solid dosage forms containing an active pharmaceutical ingredient (API) and excipients.
- **Capsules:** Gelatin shells containing powdered or granulated drug substances.
- **Powders:** Fine, dry particles of drug substances.
- **Suppositories:** Solid dosage forms for rectal or vaginal administration.

#### **2. Liquid Dosage Forms:**

- **Syrups:** Concentrated solutions of sugar, water, and an API.
- **Suspensions:** Particles of the API are dispersed in a liquid medium.
- **Emulsions:** Liquid preparations in which two immiscible liquids are combined using an emulsifying agent.

#### **3. Semi-solid Dosage Forms:**

- **Creams:** Semi-solid emulsions that are used for topical application.
- **Ointments:** Semi-solid preparations for topical application, usually containing an API and a base.

#### **4. Gas Dosage Forms:**

- **Inhalers:** Gaseous medications for inhalation into the respiratory tract.

- **Aerosols:** Liquid or solid drugs dispersed in a gas for inhalation.

### **Definitions of Dosage Forms:**

- **Tablet:** A solid dosage form containing an API and excipients, usually compressed or moulded into a specific shape.
- **Capsule:** A solid dosage form in which the API is enclosed in a gelatin shell.
- **Syrup:** A concentrated aqueous solution of sugar, an API, and flavoring agents.
- **Cream:** A semi-solid emulsion for topical application.
- **Inhaler:** A device used for the administration of gaseous medications via inhalation.

### **Prescription: Definition, Parts of Prescription, Handling, and Errors:**

#### **Definition of Prescription:**

- A prescription is a written or electronic order from a qualified healthcare provider, such as a physician, dentist, or nurse practitioner, for the preparation and administration of a specific medication or treatment to a patient.

#### **Parts of a Prescription:**

1. **Superscription:** Contains the symbol "Rx," which stands for the Latin word "recipe," meaning "to take." It is followed by the prescriber's information.
2. **Inscription:** Contains the name and quantity of the medication, along with instructions for compounding or dispensing.
3. **Subscription:** Provides directions to the pharmacist regarding how the medication should be prepared.
4. **Signa (Sig):** Offers specific instructions for the patient regarding dosage, route of administration, frequency, and duration of treatment.
5. **Prescriber's Signature:** Includes the name, contact information, and signature of the prescriber.

#### **Handling of Prescriptions:**

- Pharmacists and healthcare professionals must carefully handle prescriptions to ensure patient safety and the correct administration of medications.
- The prescription must be properly reviewed, and any discrepancies or questions should be clarified with the prescriber.

#### **Errors in Prescription:**

- Errors in prescription can have serious consequences for patient safety. Common prescription errors include:
  - Incorrect drug name, strength, or dosage form.
  - Unclear or illegible handwriting.

- Incomplete instructions for administration.
- Allergic reactions or interactions with other medications.

Pharmacists play a critical role in ensuring that prescriptions are accurate and appropriate for patients. Understanding dosage forms, their classifications, and the components of a prescription is essential for healthcare professionals to provide safe and effective medication therapy.

### **Posology:**

#### **Definition of Posology:**

- Posology is the branch of pharmacology that deals with the determination of appropriate doses and dosing regimens of medications for individual patients. It involves the science and art of dosage calculation and administration.

#### **Factors Affecting Posology:**

1. **Age:** Age is a critical factor in determining the appropriate dosage of medications. Paediatric, adult, and geriatric patients may require different dosages due to variations in drug metabolism and body composition.
2. **Body Weight:** The body weight of a patient, especially in paediatric cases, is an important factor. Dosage calculations often use milligrams of medication per kilogram of body weight.
3. **Body Surface Area (BSA):** BSA is a more precise measure of the body's size and can be used in dosage calculations for some medications, especially in pediatric oncology.
4. **Disease State:** The presence of certain diseases or conditions can affect drug metabolism and distribution in the body. Patients with impaired organ function (e.g., liver or kidney) may require dose adjustments.
5. **Route of Administration:** The route of drug administration (e.g., oral, intravenous, topical) affects the dose calculation. Some routes may require higher or lower doses.
6. **Pharmacokinetics:** Understanding the pharmacokinetics of a drug, including its absorption, distribution, metabolism, and excretion, is crucial in determining the appropriate dosage.
7. **Drug Interactions:** Potential interactions with other medications a patient is taking may require dosage adjustments to prevent adverse effects or reduced efficacy.
8. **Genetics:** Genetic factors, such as variations in drug-metabolizing enzymes, can influence how individuals respond to medications and may necessitate personalized dosing.

## **Paediatric Dose Calculations:**

### **Paediatric Dose Based on Age:**

- In pediatrics, dosages are often calculated based on the child's age. For example, a common method is to use the child's age to determine if the medication is appropriate and then specify a dosage based on age-related guidelines.

### **Paediatric Dose Based on Body Weight:**

- In paediatric dosing, body weight is a critical parameter. Dosages may be calculated as milligrams per kilogram (mg/kg) of body weight. For example, a medication might be prescribed at 5 mg/kg of body weight.

### **Paediatric Dose Based on Body Surface Area (BSA):**

- BSA-based dosing is used in some paediatric oncology and chemotherapy regimens. The BSA is calculated using the child's height and weight, and the dosage is often expressed as milligrams per square meter (mg/m<sup>2</sup>) of BSA.

### **Individualized Paediatric Dosing:**

- In many cases, paediatric dosing takes into account the specific patient's age, weight, and clinical condition. The goal is to tailor the medication regimen to achieve the desired therapeutic effect while minimizing the risk of adverse effects.

Paediatric dosing is a specialized area of posology that requires precise calculations and consideration of factors like age, weight, and BSA. Healthcare providers, including paediatricians and pharmacists, play a crucial role in ensuring that paediatric patients receive appropriate and safe dosages of medications.