Dosage forms

Introduction to Dosage Forms

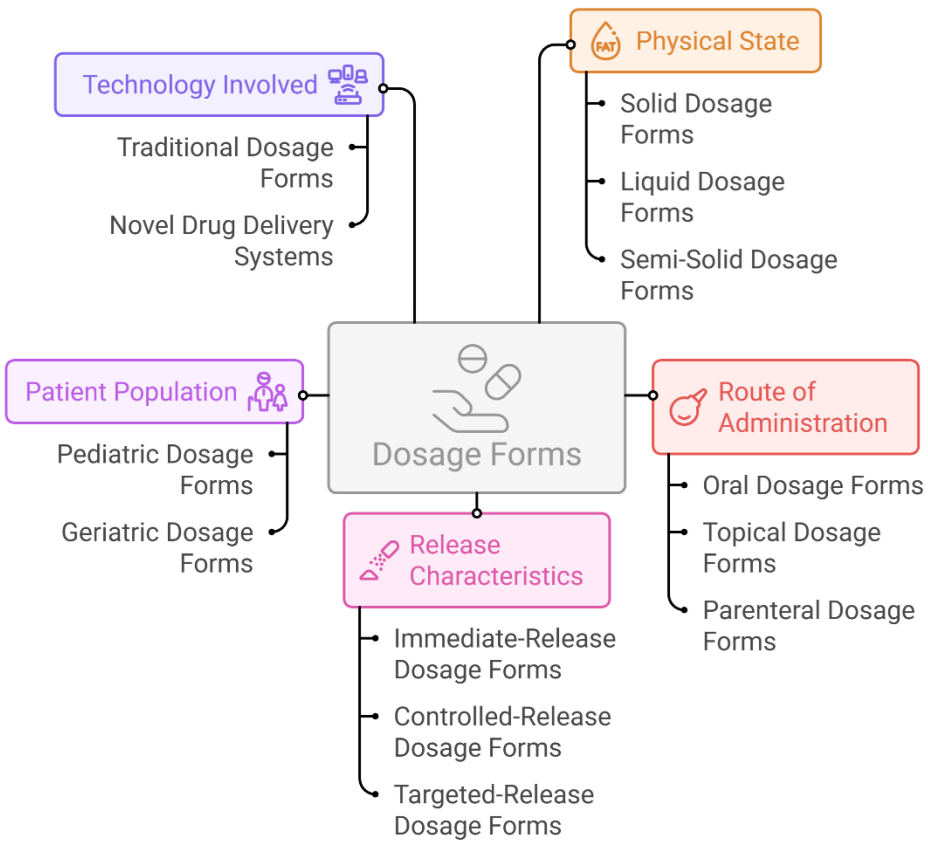
Concept of Pharmaceutical Dosage Form

- A **pharmaceutical dosage form** refers to the physical form in which a drug is produced and administered to a patient.
- It is a combination of the active pharmaceutical ingredient (API) and inactive ingredients (excipients), formulated into a specific form to ensure that the medication is:
  - Effective
  - Safe
  - Delivered in a controlled manner

Dosage forms are designed to ensure:

1. **Stability** of the drug (chemical and physical).
2. **Accurate dosing** of the medication.
3. **Ease of administration** to the patient.
4. **Acceptability** (taste, appearance, etc.).
5. **Controlled release** of the drug to achieve the desired therapeutic effect.
6. **Bioavailability**, i.e., how efficiently the drug is absorbed and reaches systemic circulation.

Classification of Dosage Forms



A. Based on Physical State:

Dosage forms can be solid, liquid, or semi-solid.

1. Solid Dosage Forms:

- **Tablets**: Compressed or molded solid forms containing one or more APIs and excipients. They may be swallowed whole, chewed, or dissolved in the mouth.
- **Capsules**: Gelatin or cellulose-based shells containing powdered, granulated, or liquid APIs. They are easy to swallow and often mask unpleasant drug tastes or odors.
- **Powders**: Fine, dry particles of the API used directly or mixed with food or beverages, or reconstituted into liquid forms.

2. Liquid Dosage Forms:

- **Solutions**: Homogeneous mixtures of APIs dissolved in a solvent like water or alcohol.
- **Suspensions**: Formulations where insoluble drug particles are dispersed in a liquid medium, often stabilized by suspending agents to prevent settling.
- **Emulsions**: A mix of two immiscible liquids (e.g., oil and water) stabilized by emulsifying agents. Used when the drug is poorly soluble in water.
- **Syrups**: Sweetened aqueous solutions of APIs, often used to mask the taste of drugs and provide a pleasant flavor.

3. Semi-Solid Dosage Forms:

- **Ointments**: Greasy formulations meant for topical application, where APIs are dispersed in a hydrophobic base.
- **Creams**: Semi-solid emulsions (oil in water) that are less greasy than ointments and are easily absorbed by the skin.
- **Gels**: Semi-solid systems where the API is suspended in a liquid phase within a three-dimensional polymeric network, used for topical, oral, or other applications.

B. Based on Route of Administration:

The route of administration determines how the drug enters the body.

1. Oral Dosage Forms:

- These are administered through the mouth. Examples include tablets, capsules, solutions, suspensions, emulsions, and syrups.

2. Topical Dosage Forms:

- Applied directly to the skin or mucous membranes. Examples include ointments, creams, gels, lotions, and transdermal patches.

3. Parenteral Dosage Forms:

- Administered via injection, infusion, or implantation. Examples include solutions, suspensions, and emulsions.

4. Rectal and Vaginal Dosage Forms:

- Designed for insertion into the rectum or vagina. Examples include suppositories, creams, and gels.

5. Inhalation Dosage Forms:

- Delivered directly to the lungs via inhalers or nebulizers in the form of aerosols, powders, or mists.

6. Ophthalmic and Otic Dosage Forms:

- Administered to the eyes or ears. Examples include solutions, suspensions, or ointments.

C. Based on Release Characteristics:

The drug release profile can vary depending on the dosage form design.

1. Immediate-Release Dosage Forms:

- Designed to release the API quickly upon administration, providing rapid onset of action.

2. Controlled-Release Dosage Forms:

- These release the API over an extended period, maintaining therapeutic levels for a prolonged duration and reducing the need for frequent dosing.

3. Targeted-Release Dosage Forms:

- These deliver the API to a specific site in the body, enhancing efficacy while minimizing systemic side effects.

D. Based on Patient Population:

Special considerations are made for different patient groups.

1. Pediatric Dosage Forms:

- Designed for infants and children, with considerations for age, size, and physiological differences from adults.
- Examples include oral suspensions, chewable tablets, and pediatric drops.

2. Geriatric Dosage Forms:

- Tailored to meet the unique needs of elderly patients, who may have altered drug metabolism or physical impairments.
- Examples include easy-to-swallow tablets, liquid formulations, and transdermal patches.

E. Based on Technology Involved:

Different technologies are used to enhance drug delivery.

1. Traditional Dosage Forms:

- These include conventional forms such as tablets, capsules, solutions, suspensions, and ointments that have been used for many years in pharmaceutical practice.

2. Novel Drug Delivery Systems:

- Innovative dosage forms or technologies that improve drug delivery, efficacy, and safety.
- Examples include liposomes, nanoparticles, microspheres, and hydrogels.

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