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Pharmaceutical Formulation & Drug Delivery Technologies

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ABSTRACT

Pharmaceutics is a design of dosage forms in different delivery technologies. A formulation could be defined as a set of operations which aims to create a drug with certain specifications and ensure the maintenance of its efficacy and safety characteristics. The drug contains an active substance present in it. The main objective of formulation is to make the drug delivery easier and compatible. There are many types of formulations that make the patient necessary easier.

INTRODUCTION

Formulation mainly focuses on safety and efficacy of the active substance present in the drug. Its objective is to make the drug deliver easier. Now-a-days the formulation objective has been more focused on the bioavailability of drug [1-10]. The formulation starts from selecting the excipients, manufacturing process, evaluating the formulation by different physicochemical and pharmaceuticals tests, which helps the drug to be in its specified characteristics and specifications. Pharmaceutical formulation is developing a preparation of the active substance (drug) in a stable state and accepted by a patient [9-18].

The Active substances in the drug are delivered to various parts of body by transforming them into a formulation. These formulations are classified according to Route of administration and physical form [19-25].

Route of Administration:

1. Oral
2. Topical
3. Rectal
4. Parenteral
5. Vaginal
6. Inhaled
7. Ophthalmic

Physical Form:

1. Solid
2. Semi solid
3. Liquid
4. Gaseous

Explanation

1. Oral Dosage Form

Dosage forms that are taken through mouth [26].

a) Tablet: A tablet is a hard, compressed medication present in round, oval, or square shapes. Excipients used in preparation of tablets are Binders, glidants, lubricants, disintegrates, sweeteners and flavor's [27-30].

b) Coated tablets: tablets are applied with a coating to mask the taste of the ingredients. It helps the tablet to smoother and easier to swallow.

c) Sublingual and buccal medications are used by placing them in the mouth, either under the tongue (sublingual) or between the gum and the cheek (buccal).

d) Effervescent tablet are uncoated tablets. These tablets contain acid substances and carbonates and bicarbonates that react rapidly in presence of water. These release carbon dioxides when reacted.

e) Chewable tablet: these tablets are used for chewing before swallowing.

f) Capsule: the capsule contains the drug in a gelatin container and used to mask the taste of the medication. There are two types of capsules: hard-gelatin capsule and soft-gelatin capsules.

g) Lozenge is a solid preparation that contains sugar and gum. The latter gives the strength and cohesiveness to the lozenge and helps in slow release of the medicament [31-45].

h) Pastilles is a solid medicated preparation that dissolves slowly in the mouth.

i) pills are spherical medicaments that contain more than one or two active substances incorporated with other excipients.

j) Granules are solid, dry aggregates of powder particles that often supplied in single-dose sachets.

k) Powders: mixtures of dry finely divided aggregates that are intended for external or internal use. These powders should be suspended in a suitable vehicle while using [44, 46-58].

l) Liquid Preparations: the liquid preparations are liquids forms of formulations. They are oral solutions, oral emulsions, oral suspensions, syrup, elixir, linctus's, oral drops, gargles, mouth washes, etc. liquid preparations are mainly helpful for infant drug deliver.

2. Topical Dosage Forms:

Topical medications are used for topical use, which is applied to the topical parts of the body.

a) Ointments: these are semi solid preparations used for skin, rectum, and nasal mucosa. Ointments may be used as emollients or to apply suspended or dissolved medicaments to the skin [57,59,60].

b) Creams: these are semi-solid emulsions, prepared by using oil and water mixtures.

They are two types: oil-in-water and water-in oil type of emulsions. Oil-in-water type emulsions are composed of small droplets of oil dispersed in water or any aqueous phase. Water-in-oil type of emulsion is prepared by dispersing small droplets of water in oil phase [58-62].

c) Gels: it is a semi solid preparation in which a liquid phase is constrained in a 3D-polymorphic matrix having a high degree of physical and chemical cross-linking.

d)poultice: A soft viscous, pasty preparation for external use. Poultice helps in retaining the heat for a considerable time.

E) Pastes: it is an ointment into which high percentage of insoluble solids has been added. These pastes are of two types: fatty pastes and non-greasy pastes.

f) Dusting Powders: these are free flowing fine powders that are used only for external use.

g) Liniments: fluid or semi-solid preparations that are used for external purpose. They may be alcoholic, emulsions or oily solutions. Liniments are not to be used on broken skin.

h) Lotions: fluid aqueous preparations that are used for external use without applying friction [63-74].

i) collodion: it is a solution of nitrocellulose in ether or acetone or alcohol's (sometimes).

j) paints:

k) pressurized dispensers: also known as aerosols. used as surface disinfectants, wound or burn dressing, relieve irritation of bites.

3. Rectal Dosage Forms:

Liquid, semi-solid or solid preparations containing one or more active ingredients which are intended for rectal application in order to obtain a systemic or local effect [75-89].

a) Suppository: these are small solid medicated mass that are inserted either into the rectum or vagina. It melts due to the body temperature and obtains the systemic effect.

b) Enema: it is a process where liquids are introduced into the rectum and colon via the anus. There are two types: Evacuated Enema and Retention Enema.

4. Vaginal Dosage Forms:

Dosage forms that are inserted through vagina for its action.

a) Pessary: these are solid medicated preparations that are designed for insertion into the vagina where they melt or dissolve. They are 3 types: moulded, compressed and vaginal [90-96].

5. Parenteral Dosage Forms:

Parenteral are injectable preparations.

The active substance of the drug is induced into the body through the needle by piercing the skin to a sufficient depth.

There are several methods:

a) Intravenous Injection: Drug is administered in the form of liquid through veins into blood stream.

b) Intramuscular Injection: Drug is administered in the form of liquid through muscles.

c) Sub-cutaneous Injection: Drug is given by injecting a fluid into the sub cutis, the layer of skin directly below the dermis and epidermis.

6. Inhaled Dosage Forms:

a) Inhaler: these are solutions, suspensions or emulsion of drugs in a mixture of inert propellants held under pressure in an aerosol Dispenser.

b) Nebulizer: it is a medical device used to administer medication to people in the form of liquid mist to the airways.

7. Ophthalmic Dosage Forms:

a) Eye Drops: here the medication is in the liquid form using saline-containing drop as vehicle.

b) Ophthalmic ointment or gel: it is semi-solid preparations applied to conjunctiva and eyelid margin [97-99].

8. Otic Dosage Forms:

a) Ear Drops: they may be solutions, suspensions or emulsions of drugs that are instilled into the ear with a dropper. These are used to treat or prevent ear infections, especially infections of the outer ear and ear canal.

9) Nasal Dosage Forms:

These are solution which are instilled into the nose from a dropper or from a plastic squeeze bottle which helps in treating the local effect [100-102].

Eg: Antihistamines.

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