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A Basic Review on Tablets

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Abstract

In practice, solid dose forms like tablets are widely used. The pharmaceutical industry's capacity for mass production and ease of administration are the reasons behind this. Approximately 70% of all ethical pharmaceutical preparations are tablets, making them the most often used dose form. Tablets are solid pharmaceutical dose forms made by compression or molding that contain medicinal ingredients with or without appropriate excipients. Diluents, binders, adhesives, disintegrants, and other substances are examples of excipients. Depending on how much medication is present, tablets can have a wide range of shapes, sizes, and weights.

Keywords: Tablets, types, preparation and evaluation

Introduction[1]

A compacted solid dosage form that contains medications, either with or without excipients, is called a tablet. The Indian Pharmacopoeia defines pharmaceutical tablets as solid, flat, or biconvex dishes that are used as a unit dose form. They are made by compressing a medication or a combination of medications, either with or without diluents. Depending on the quantity of therapeutic chemicals and the intended manner of administration, they fluctuate significantly in size, weight, and shape. Tablets are the most widely used dose form, accounting for 70% of all medications. All medications are accessible in tablet form, with the exception of those that are challenging to prepare or administer.

Advantages of Tablets[2]

1. They are unit dosage forms that provide the best dose precision and the least amount of content variability of any oral dosage form.

2. Of all oral dosing forms, it is the least expensive.

3. Compact and lighter.

4. The simplest and least expensive to strip and package.

5. Easy to swallow and less likely to hang up.

6. Enteric coating makes sustained release products possible.

7. Coating techniques can cover up offensive odors and harsh tastes.

Disadvantages of Tablets[3]

1. Children and unconscious individuals may find it difficult to swallow.

2. Because of their low density and amorphous nature, several medications are resistant to compression into dense compacts.

3. It may be challenging to create or produce a tablet that will nevertheless deliver sufficient or complete drug bioavailability for medications with poor wetting, slow dissolving characteristics, and optimal absorption high in GIT.

4. Drugs that test bitter, have an unpleasant smell, or are oxygen-sensitive may need to be coated or encapsulated. Capsules might be the best and most affordable option in these situations.

General properties of Tablets

1. Their weight should be precise and consistent.

2. The medication ought to be evenly dispersed throughout the tablets.

3. For ease of administration, the size and form should be appropriate.

4. To prevent the tablet from dissolving in the stomach, it shouldn't be too firm.

5. No incompatibility should exist.

6. They ought to be stable both physically and chemically while being stored.

7. They shouldn't disintegrate in a patient's palm or shatter throughout transit.

Different types of Tablets[4]

(A) Tablets ingested orally:

1. Compressed tablet, e.g. Paracetamol tablet

2. Multiple compressed tablet

3. Repeat action tablet

4. Delayed release tablet, e.g. Enteric coated Bisacodyl tablet

5. Sugar coated tablet, e.g. Multivitamin tablet

6. Film coated tablet, e.g. Metronidazole tablet

7. Chewable tablet, e.g. Antacid tablet

(B) Tablets used in oral cavity:

1. Buccal tablet, e.g. Vitamin-c tablet

2. Sublingual tablet, e.g. Sorbitrate 5 Tablet

3. Troches or lozenges

4. Dental cone

(C) Tablets administered by other route:

1. Implantation tablet

2. Vaginal tablet, e.g. Clotrimazole tablet

(D) Tablets used to prepare solution:

1. Effervescent tablet, e.g. Dispirin tablet (Aspirin)

2. Dispensing tablet, e.g. Enzyme tablet (Digiplex)

3. Hypodermic tablet

4. Tablet triturates e.g. Enzyme tablet (Digiplex)[4]

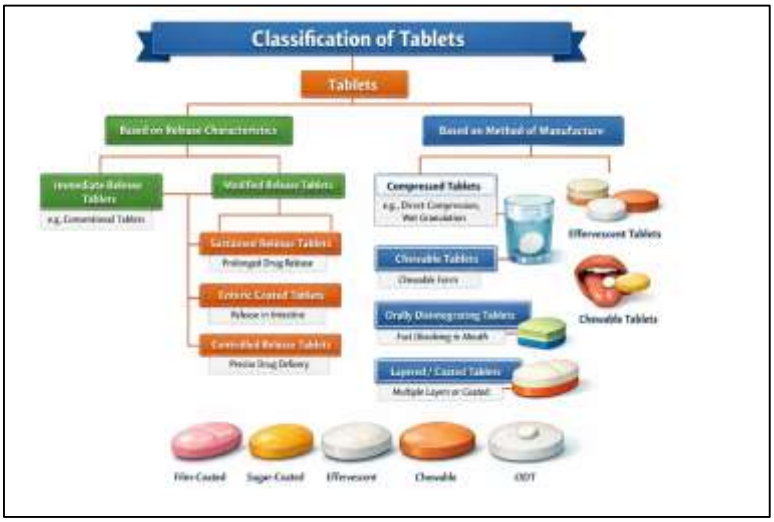

Figure: Various types of classification of tablets

Tablet Ingredients[5-8]

Tablets have a variety of inert substances called excipients or additives in addition to active compounds. Various excipients include:

Sr. No.	Ingredients	Examples
1	Diluents	Calcium Phosphate; Carboxymethylcellulose Calcium; Cellulose; Dextrin; Lactose; Microcrystalline Cellulose; PR gelatinized Starch; Sorbitol; Starch
2	Binders	Acacia; Alginic Acid; Carboxymethylcellulose; Cellulose; Dextrin; Gelatin; Liquid Glucose; Magnesium Aluminum Silicate; Maltodextrin; Methylcellulose; Povidone; Sodium Alginate; Starch; Zein.
3	Lubricants	Calcium Stearate; Glyceryl Palmitostearate; Magnesium Oxide; Poloxamer; Polyvinyl Alcohol; Sodium Benzoate; Sodium Lauryl Sulfate; Sodium Stearyl Sulfate; Stearic Acid; Talc; Zinc Stearate
4	Glidants	Magnesium Trisilicate; Cellulose; Starch; Talc; Tribasic Calcium Phosphate
5	Anti adherents	-Corn Starch; Metallic Stearate; Talc

6	Disintegrants	Alginic Acid; Carboxymethylcellulose; Cellulose; Colloidal Silicon Dioxide; Croscarmellose Sodium; Crospovidone; Potassium Polacrilin; Povidone
7	Coloring agents	FD&C or D&C Dyes or Lake Pigments
8	Flavoring agents	Ethyl Maltol; Ethyl Vanillin; Menthol; Vanillin
9	Absorbents	Kaolin; Magnesium Aluminum Silicate; Tricalcium Phosphate

Figure: Tabular representation of different ingredients used in tablets

1. Diluent: When the drug dosage is insufficient to create the necessary bulk of the tablet, diluents are added as fillers. Better tablet qualities, such as increased cohesiveness, the ability to use direct compression manufacture, or the promotion of flow, are the secondary reasons. The following characteristics should be present in a diluent:

1. They have to be safe.

2. They ought to be of a suitable grade and commercially available.

3. It must be inexpensive.

4. They have to be inactive biologically.

5. Both alone and in conjunction with the medications, they must be chemically and physically stable.
6. They have to be devoid of any microbiological contamination.
7. They don't change the drug's bioavailability.

8. They must be color compatible.

2. Binders: To create cohesive compacts for tablets that are compressed directly.

3) Lubricants: Lubricants are designed to lessen interparticle friction, stop tablet materials from sticking to the surface of dies and punches, and possibly increase the rate at which tablet granulation flows.

4) Glidants: By lowering particle friction, glidants are designed to facilitate the flow of granules or powder material.

5) Anti-adherents: To stop the material from adhering to the tablet press walls, anti-adherents are added to tablet formulations.

6) Disintegrates: Added to a tablet formulation to help it dissolve or disintegrate when it comes into contact with water in the gastrointestinal tract.

7) Coloring Agents: There are three reasons why colors and dyes are used in tablets:

(A) Disguising off-color medications

(B) Identification of Products

(C) The creation of a more refined product.

8) Flavoring Agents: Chewable pills require flavoring oils. Usually, the oil is added in a dry form, such spray-dried beadlets.

9) Absorbents: If a tablet formulation comprises a material that has a strong affinity for water, absorbents must be added. If hygroscopic ingredients are present, the blend becomes moist and challenging to work with during production.

Tablet Manufacturing Methods

Tablets are prepared by three methods

1) Direct compression

The procedure of compressing tablets directly from powder mixes of active ingredient and appropriate excipients, which will flow uniformly in the die cavity and create a hard compact, is referred to as "direct compression."

Figure: Image showing Direct Compression Method

2) Dry Granulation

Liquids are not used in this method. Slugs are formed throughout the procedure. Granules are then produced by screening or milling the slugs. After that, the granules are compacted to create tablets.

Figure: Image showing Dry Granulation Method

3) Wet Granulation

The procedure of adding a liquid to a powder in a vessel with any kind of agitation that would result in agglomeration or granules is known as wet granulation. After drying, these granules are compacted to create tablets.

Figure: Image showing Wet Granulation Method

Evaluation of Tablet[9-23]

1. General Appearance: Consumer acceptance, lot-to-lot uniformity, and tablet-to-tablet uniformity are all dependent on a tablet's overall appearance, identity, and elegance. Measurements of size, form, color, taste, odor, and other characteristics are all part of controlling overall appearance.

2. Size and Shape: It can be regulated and characterized in terms of dimensions. A tablet's thickness is just a variable. A micrometer or another instrument can be used to measure the thickness of tablets. Tablet thickness should be kept between ± 5% of the normal value.

3. Distinctive identification markings: These markings make use of printing, engraving, or embossing. Product names, product codes, and corporate names or symbols are examples of these markers.
4. Organoleptic characteristics: There should be no mottling and a homogeneous color distribution. Compare the sample's color to the standard color for a visual color comparison.

5. Hardness and Friability: To endure the mechanical vibrations of handling during production, packaging, and transportation, tablets need to possess a specific level of strength or hardness and resistance to friability. In general, tablet crushing strength is measured by hardness.

Figure: Pfizer type hardness tester

Figure: Monsanto hardness tester

6. Friability: The Roche friabilator can assess a tablet's friability in a lab. This is made up of a plastic chamber that rotates at 25 rpm, dropping the tablets six inches into the friabilator before it rotates for 100 revolutions. We reweigh the tablets. Tablets that are compressed and lose less than 0.5 to 1% of their weight are deemed acceptable.

Figure: Digital Friability Test Apparatus

7. Drug Release and Content:

(I) Weight Variation Test (U.S.P.): Take 20 tablets and weigh each one separately. Determine the average weight and contrast it with the weight of each tablet. If no tablet deviates by more than two times the percentage limit and if no more than two tablets are outside the percentage limit, the tablet passes the U.S.P. test.

(II) U.S.P. Disintegration Test: Six 3" glass tubes with an open top and a 10 mesh screen at the bottom are used in the U.S.P. disintegration test apparatus. One tablet is put in each tube to measure the disintegration time. The basket rack is placed in a 1-liter beaker filled with water, simulated gastric fluid, or simulated intestinal fluid at 37 ± 2 0 C so that the tablet stays 2.5 cm below the liquid's surface when moving upward and no closer than 2.5 cm from the beaker's bottom when moving downward. At a frequency of 28 to 32 cycles per minute, move the basket holding the tablets up and down over a distance of 5 to 6 cm. Putting perforated plastic discs on each tablet will stop the tablets from floating. The test requires that the pill dissolve and that every particle pass through the 10 mesh screen within the allotted time. Any residue that is left must have a soft mass. Time of disintegration: Tablet without coating: 5–30 minutes Tablet coating: 1-2 hours.

Figure: Disintegration test apparatus

Conclusion:

Pharmaceutical research now revolves around the production and assessment of tablets. It is possible to get the conclusion that tablets are unique and have a great deal of versatility based on the different data sources. Over the past few decades, there have been significant developments in the production and assessment of tablets. The improvements in assessment methods have shown themselves to be cost-effective and time-saving. The scope for researchers is also improved by the variety of manufacturing and evaluation criteria available, which enables tablets to firmly establish their position in this dynamic pharmaceutical industry.

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