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A REVIEW ON TABLET FORMULATION

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ABSTRACT

Tablets are Pharmaceutical dosage forms contain a quantity of drug which is given as a single unit and are known as solid unit dosage form. A tablet contains one or more medicaments with or without suitable excipients and prepared either by molding or by compression. The excipients include diluents, Binders and adhesives, disintegrents, etc. Tablets vary in shape and differ greatly in size and weight depending on the amount of the medicinal substance. The ingredients must be granulated prior to compression to assure an even distribution of the active compound in the final tablet. There are two basic techniques which can be used to granulate powders for compressions into a tablet are wet granulation and dry granulation. In this review article tablet manufacturing and evaluation have been discussed.

KEYWORDS: Pharmaceutical Dosage Form, Tablet coating, Manufacturing of Tablet, Granulation, Tablet excipients, Tablet defects.

INTRODUCTION

Tablets are solid dosage form which contains one or more medicaments. According to the Indian Pharmacopoeia Pharmaceutical tablets are solid dosage form prepared by compressing a drug or a mixture of drugs, with or without excipients. They vary in shape and differ greatly in size and weight depending on the amount of the medicinal substance. Tablet fabrication by compression was initiated in 1843 by Brockedon.These dosage forms contain a quantity of drug which is given as a single unit and they are known collectively as solid unit dosage form. Solid medicaments may be administered orally as powders, pills, capsules or tablets. [1]
A tablet should have elegant product identity while free of defects like chips, cracks, discoloration, and contamination. They should have sufficient strength to withstand mechanical shock during its production packaging, shipping and dispensing. They should

have the chemical and physical stability to maintain its physical attributes over time. The tablet must be able to release the medicinal agents in a predictable and reproducible manner. It must have a chemical stability over time so as not to follow alteration of the medicinal agents.[1]

Advantages

1. Tablets are easy to handle.
2. Tablets have more stability as compare to the other dosage form.
3. Some type of tablets has long duration of action.
4. Tablets are easily available in the market.
5. They are cheapest oral dosage form.
6. It is carrying out with attractive and elegant appearance.
7. They are lighter and compact.
8. Suitable for large scale production.

Disadvantages

1. They have low density characters.
2. Hygroscopic drugs are not suitable for compressed tablets.
3. Slow dissolution drug cannot be placed in the form of tablets.
4. They are bitter tasting,

TYPES OF TABLETS

1. Tablets ingested orally.

A. Compressed tablet, e.g. Paracetamol tablet.
B. Multiple compressed tablet.
C. Delayed release tablet, e.g. Enteric coated Bisacodyl tablet.
D. Sugar coated tablet, e.g. Multivitamin tablet.
E. Film coated tablet, e.g. Metronidazole tablet.
F. Chewable tablet, e.g. Antacid tablet.

2. Tablets used in oral cavity.

A. Buccal tablet, e.g. Vitamin-c tablet.
B. Sublingual tablet, e.g. Vicks Menthol tablet.
C. Dental cone.

3. Tablets administered by other route.

A. Implantation tablet

B. Vaginal tablet, e.g. Clotrimazole tablet

4. Tablets used to prepare solution:

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

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

C. Hypodermic tablet

D. Tablet triturates e.g. Enzyme tablet (Digiplex).[7]

TABLET EXCIPIENTS

In addition to active ingredients, tablet contains a number of inert materials known as additives or excipients. Different excipients are.

1. Diluents
2. Binders and adhesives
3. Disintegrents
4. Lubricants
5. Glidants
6. Coloring agents
7. Flavoring agents
8. Sweetening agents

1. **Diluents':** Diluents are fillers used to make required bulk of the tablet when the drug dosage itself is inadequate to produce the bulk. Secondary reason is to provide better tablet properties such as improve cohesion, to permit use of direct compression manufacturing or to promote flow. Examples are sodium salt, sodium chloride.
2. **Binders and Adhesives:** These materials are added either dry or in wet- form to form granules or to form cohesive compacts for directly compressed tablet. Examples are Acacia, tragacanth, etc.
3. **Disintegrents:** It facilitates tablet breaking or disintegration when it contact in water in the GIT. Examples are Starch, Primogel, Explotab, Clays, bentonite etc.
4. **Lubricants:** Lubricants are intended to prevent adhesion of the tablet materials to the surface of dies and punches, reduce inter particle friction and improves the rate of flow of the tablet granulation. Examples are Stearic acid, Magnesium stearate, Talc etc.

5. **Glidants:** Glidants are intended to promote flow of granules or powder material by reducing the friction between the particles. Examples are Colloidal Silicon dioxide (Aerosil), Cornstarch, Talc etc.
6. **Coloring agents:** Colors and dyes are used in tablet for masking of off-color drugs, improves appearance of the product and product identification.
7. **Flavoring agents:** It imparts flavour to the tablet and used to mask unpleasant taste of the drug. Examples are vanilla, Mint, Cherry, etc.
8. **Sweetening agents:** They are added to make the ingredients more palatable, especially in chewable tablets such as antacid or liquids like cough syrup. Sugar can be used to mask unpleasant tastes or smells.[1]

MANUFACTURING OF TABLET

A. Granulation

In the pharmaceutical industry, granulation refers to the act or process in which primary powder particles are made to adhere to form larger, multiparticle entities called granules. Granulation is extensively used in the manufacturing of tablets and pellets.[1]

Types of granulator

1. Fluid bed spray granulation
2. Double cone mixer dryer processor
3. Nauta processor

1. Fluid bed spray granulation: Fluid bedspray drying is a method of producing dry powder from a liquid or slurry by rapidly drying with a hot gas.

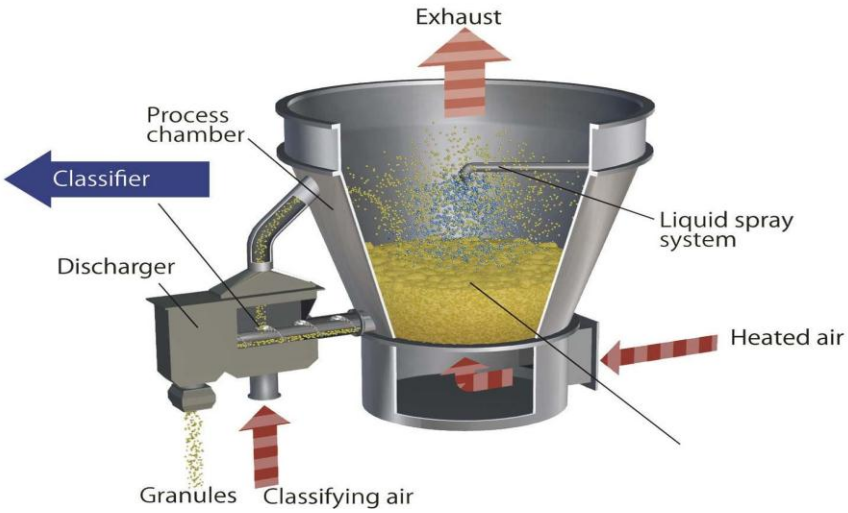

Fig.1: Fluid bed spray granulation.

2. Double cone mixer dryer processor: The double cone blender is used to producehomogeneous solid-solid mixture**.**

Fig.2: Double cone mixer dryer processor.

3. Nauta mixers: The Nauta Cone screw mixer is generally used in case of applications that require gentle mixing action and minimal heat generation without any product distortion.

Fig.3: Nauta mixer.

B. Compression process

Tablets are made by compressing a formulation containing a drug or drugs with excipients on stamping machine called compression prosses.[6]

Compression machine.

1. Single punch tablet machine
2. Double rotary machine.

1. Single punch tablet machine: The single station/single punch/eccentric press is a mechanical device which compresses the powder into tablets of uniform size with different shape and uniform weight.

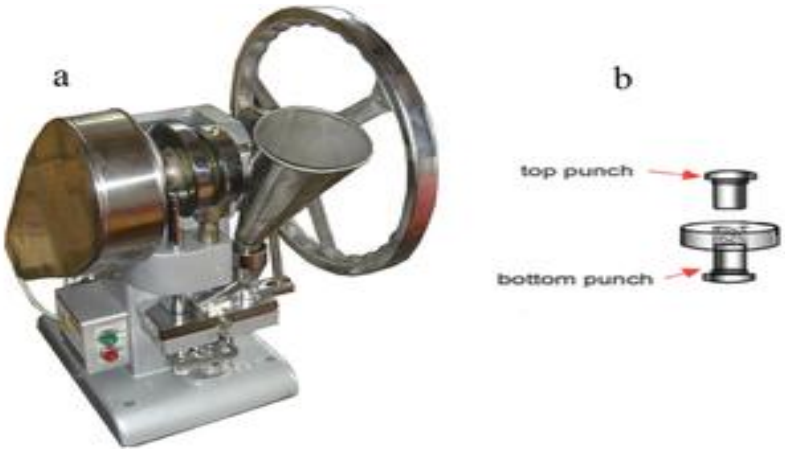

Fig.4: Single punch tablet machine.

2. Double rotary machine: It is a square model/double sided rotary tablet. It is compression machine which compressed powder into the tablet.

Fig 5: Double rotary machine.

C. Tablet preparation

There are three method of preparation of tablets which are as following:

1. Wet granulation method
2. Dry granulation method
3. Direct compression method

1. Wet granulation method: The process of adding a liquid solution to powders involves the massing of a mix of dry primary powder particles using a granulating fluid. The fluid

contains a solvent that must be volatile, so that it can be removed by drying, and be non-toxic.[2]

2. Dry granulation method: This method refers to the process steps of blending the ingredients followed by compaction and size reduction of the mix in order to produce a granular, free flowing blend of uniform size.[3]
3. Direct compression method: In the direct compression method of tablet production, dry ingredients are thoroughly mixed and then compressed into tablets. The method consists of compressing tablets directly from powdered material without modifying the physical nature of the material itself examples include chloride, bromide, iodide and nitrate.[4]

C. Coating process: A tablet coating is applied to make the tablet smoother and easier to swallow. A tablet coating colors and protects the tablet, and masks a bad taste.A tablet coating is a covering over a tablet or protect the active medication inside.

Types of coating.

1. Sugar coating.
2. Film coating.
3. Enteric coating.

1. Sugar coating: The sugar coating is generally water-soluble making it easier to dissolve quickly when it comes into contact with any liquid medium such as gastrointestinal fluids. One purpose of the sugar coating is to protect the drug inside the tablet and act as barrier to external contaminants.
2. Film coating: A film coating is a thin polymer-based coat applied to a solid dosage form such as a tablet, granule or other particle. The thickness of such a coating is usually between 20 and 100 μm.
3. Enteric coating: An oral dosage form in which a tablet is coated with a material to prevent or minimize dissolution in the stomach but allow dissolution in the small intestine. This type of formulation either protects the stomach from a potentially irritating drug (aspirin) or protects the drug (erythromycin) from partial degradation in the acidic environment of the stomach.[13]

EVALUATION OF TABLET

1. **General Appearance:** The general appearance of a tablet, its identity and general elegance is essential for consumer acceptance, for control of lot-to-lot uniformity and tablet-to-tablet uniformity.

2. **Size & Shape:** It can be dimensionally described & controlled. The thickness of tablet is only variables. Tablet thickness can be measured by micrometer or by other device.
3. **Unique identification marking:** These marking utilize some form of embossing, engraving or printing. These markings include company name or symbol, product code, product name etc.
4. **Organoleptic properties:** Color distribution must be uniform with no mottling. For visual color comparison compare the color of sample against standard color.
5. **Hardness:** Hardness of a tablet is expressed in term of load/ pressure required to crush it when placed on its edge. It indicates the tensile strength of a tablet.
6. **Weight Variation test:** Take weight of 20 tablets individually. Calculate average weight and compare the individual tablet weight to the average. The tablet pass the U.S.P. test if no more that 2 tablets are outside the percentage limit and if no tablet differs by more than 2 times the percentage limit.
7. **Content Uniformity Test:** Randomly select 30 tablets, 10 of these assayed individually. The Tablet pass the test if 9 of the 10 tablets must contain not less than 85% and not more than 115% of the labeled drug content and the 10th tablet may not contain less than 75% and more than 125% of the labeled content. If these conditions are not met, remaining 20 tablets assayed individually and none may fall outside of the 85 to 115% range.
8. **Disintegration Test:** The U.S.P. device to test disintegration uses 6 glass tubes that are 3" long; open at the top and 10 mesh screens at the bottom end. To test for disintegration time, one tablet is placed in each tube and the basket rack is positioned in a 1-L beaker of water, simulated gastric fluid or simulated intestinal fluid at 37 ± 20 C such that the tablet remain 2.5 cm below the surface of liquid on their upward movement and not closer than 2.5 cm from the bottom of the beaker in their downward movement.[1]

PACKING

Packing is the science, art and technology of encosing or Protecting products.Packing can be describe as a coordinated system of preparing goods for transport, warehousing, storage, sale, end use.[5]

Types of tablet packing.

1. Blister packing
2. Strip packing

1. Blister packing: Blister packs are commonly used as unit-dose packaging for pharmaceutical tablets or capsul. Blister packs are created by means of a form-fill-seal process at the pharmaceutical company or designated contract packer.
2. Strip packing: Strip packaging is a cost-effective packaging solution that enables small-sized tablets and capsules to be packed in unit doses for distribution. Strip packaging is the most popular because of its many unique advantages.

CONCLUSION

From the above compiled data it was concluded that pharmaceutical tablets can be produced by three methods viz. direct compression, dry granulation and wet granulation. Out of these three methods, direct compression is the most convenient and cheaper method. However, attributing to the few disadvantages of this method, wet and dry granulation methods are used now a day so as to produce quality tablets.

Tablet coating can be produce by four method Sugar coating, Film coating, Enteric coating, Compression coating However, attributing to the few disadvantages of this method, now a days so as to produce quality tablets.

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