

Review on Process Technology for Pharmaceutical Tablet

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ABSTRACT:- A tablet is defined as a solid pharmaceutical dosage form containing the active drug ingredient usually with appropriate diluents and prepared by compression or molding. Tablets remain a popular dosage form due to the advantages they provide to both the manufacturer (e.g., simplicity and economy of preparation, stability and convenience of packaging, transportation, and dosing) and the patient. Due to their composition, manufacturing method or function, tablets have different properties, so there are different categories of tablets. Tablet formulation and design can be described as the process by which the formulator ensures that the right amount of a drug is administered in the right form, at the right time, at the right rate and at the desired location, while maintaining the chemistry of the drug's active ingredients is protected. Integrity until then. Newer concepts and regulations focus on bioavailability, bioequivalence and validation, etc. They influence the design and manufacturing of formulations

KEYWORDS:- Systemic, pellets, granules, film-coated multiple units, diluents, compression, molding, tablet triturates.

I. INTRODUCTION:-

A tablet is a solid tablet unit dosage form containing medicines with or without excipients. According to the Indian Pharmacopoeia, drug tablets are solid, flat or biconvex containers prepared by compressing a drug or drug mixture with or without diluents.[1] They vary in shape and vary widely in size and weight depending on the amount of drug substances and the intended route of administration. This is the most popular dosage form and 70% of the medications are administered in tablet form. The tablets offer an advantage for both patients and manufacturers. Tablets are the most popular dosage form due to their simple and inexpensive production, relative stability and convenience in packaging, transportation and storage. For patients, it is a popular and versatile

dosage form due to ease of preparation, convenient administration, precise dosage and stability compared to oral liquids, tamper-proof compared to capsules and safety compared to parenteral dosage forms.[2]

Defination:-

According to the Indian Pharmacopoeia, pharmaceutical tablets are solid, flat or biconvex containers in unit dosage form prepared by compressing a drug or drug mixture with or without diluent. A tablet is defined as a solid tablet form containing medicine with or without excipients. They vary widely in shape, size and weight depending on the amount of drug and the intended route of administration.[3,4]

Properties of Tablets:-

- It must be an elegant product with its own identity while being free from defects such as chips, cracks, discoloration and dirt.
- Must be robust enough to withstand the harsh impacts encountered during manufacturing, packaging, shipping and distribution.
- It must have physical stability that allows it to maintain its physical properties over a long period of time.
- Must be able to deliver therapeutic agents into the body in a predictable and reproducible manner.
- Must have sufficient chemical stability over a long period of time to avoid drug changes[5]

The production of tablets requires a series of individual operations such as product weighing, grinding, granulating, drying, mixing, lubricating, compressing and coating

Advantage of Tablet:-

- They are unit dose form and offer the most prominent capabilities of all verbal measurement shape for the most prominent

dosage exactness and the slightest substance changeability.

- Taken a toll is least of all verbal dose frame.
- Lighter and compact.
- Least demanding and cheapest to bundle and strip.
- Simple to swallow with slightest inclination for hang-up.
- Supported discharge item is conceivable by enteric coating.
- Frightful scent and severe taste can be conceal by coating technique.
- Reasonable for huge scale generation.
- Most prominent chemical and microbial soundness over all verbal measurement shape⁶

Disadvantage of Tablet:-

- Troublesome to swallow in case of children and oblivious patients.
- A few drugs stand up to compression into thick compacts, owing to nebulous nature, moo thickness character.
- Drugs with destitute wetting, moderate disintegration properties, ideal retention tall in GIT may be troublesome to define or fabricate as a tablet that will still give satisfactory or full sedate bioavailability.
- Aggravation impacts on the GI mucosa by a few solids (e.g., ibuprofen).
- Plausibility of bioavailability issues coming about from moderate deterioration and disintegration⁶

Types of Tablets⁷

Tablets can be arranged either by compression or molding. Different sorts of tablets are as follows:

- Ø Molded tablets
- Ø Compressed tablet

MOLDED TABLETS:-

Whereas most commercially accessible tablets are essentially arranged by compression, tablets can moreover be arranged by molding. Molded tablets are arranged by tablet apparatus or physically by driving hosed tablet fabric into a shape of any shapethe molds are shown in fig 1. Molding is generally reserved for laboratory and small-scale production. Molded tablets are shown in fig 2. The commercial arrangement of tablets by molding has been supplanted by the tablet compression process.⁸

COMPRESSED TABLETS⁹

They are the foremost broadly utilized strong measurement frame so they must fulfill a number of physical prerequisites in terms of hardness, thickness, friability and weight consistency. The compressed tablet are shown in fig.3

. To supply these tablet characteristics in agreement with the chosen fixings, producers can utilize three distinctive preparing advances:

- coordinate compression, dry granulation and · damp granulation



Fig No.1 Molds Tablet



Fig no.2 Molded Tablet



Fig no.3 Compressed Tablet

DIRECTLY COMPRESSED TABLETS:-

Coordinate compression comprises of compressing tablets straightforwardly from powdered materials without adjusting physical nature of materials. This strategy is pertinent for crystalline chemicals having great compressible characteristic and stream properties such as: Potassium salt (chlorate, chloride, bromide), Sodium chloride, Ammonium chloride, Methenamine etc.

Compressed tablets are arranged by single compression utilizing tablet machines. After a amount of powdered or granulated tableting fabric stream into a pass on, the upper and lower punches of the tablet machine compress the fabric beneath a tall weight (~tons/in²).

Coordinate compression may be a well known choice since it gives the most limited, most successful and slightest complex way to deliver tablets. The producer can mix an API with the excipient and the grease, taken after by compression, which makes the item simple to prepare. No extra handling steps are required.¹¹

CHARACTERISTICS OF COMPRESSED TABLETS:-¹²

When compressed tablets are arranged, different physical details are inspected for quality control. They ought to be controlled to guarantee not as it were the outward appearance of the item but moreover its helpful adequacy. The shapes of the compressed tablets vary broadly. It can be circular, oval, or triangular. Tablets may be level or have changing degree of convexity depending on the forms of the punches, such as level confront, shallow glass, profound container or adjusted ball. A few tablets are scored or furrowed in parts,

thirds, or quadrants. This permits reasonably exact breaking of the tablet for the organization of a halfway sum. In common scored tablets are furrowed on a single side. Tablet shapes and estimate are decided by the pass on and punches utilized for the compression of the tablet. It may be a common hone in clinics and amplified care offices to pulverize tablets to blend with nourishment or drink for simple gulping. A few tablets, such as enteric coated tablets, controlled discharge tablets, and sublingual or buccal tablets ought to not be pulverized, since the discharge characteristics of the medicate from the measurement frame and hence the medicate assimilation seem antagonistically influence the patient's welfare.

Advantages:-

- Low labor input
- A dry handle
- Fewestpreparing steps

Disadvantages:-

- Stratification may happen due to contrasts in molecule measure and bulk thickness which comes about destitute substance uniformity.
- A huge dosage medicate may cause issue in coordinate compression. It requires diluents. The tablet gets to be expansive in estimate which is troublesome to swallow additionally exorbitant.
- Amid taking care of dry materials inactive charge may frame which may display uniform conveyance of sedate.
- Coordinate compression diluent may associated with the sedate. For case, amine sedate with Lactose deliver discoloration of tablet.

Challenges in Direct Compression Technology:-¹³

Like several other handle, coordinate compression has its own specialized issues, among which the foremost imperative are:

- Tall weight and dosage variety of the tablets.
- Low mechanical quality of the tablets
- Capping and cover of the tablets
- Attachment or staying of powder fabric punch tips
- Tall grinding amid tablet discharge

Such issues are related to the properties of the powder expecting to be shaped tablets, additionally to the plan and conditions of the press.

They ought to in this manner be maintained a strategic distance from by guaranteeing that the powder has adequate physical properties additionally that appropriate,conditioned tablet press is utilized, e.g. in terms of the utilize of forced-feed gadgets and cleaned and smooth kicks the bucket and punches

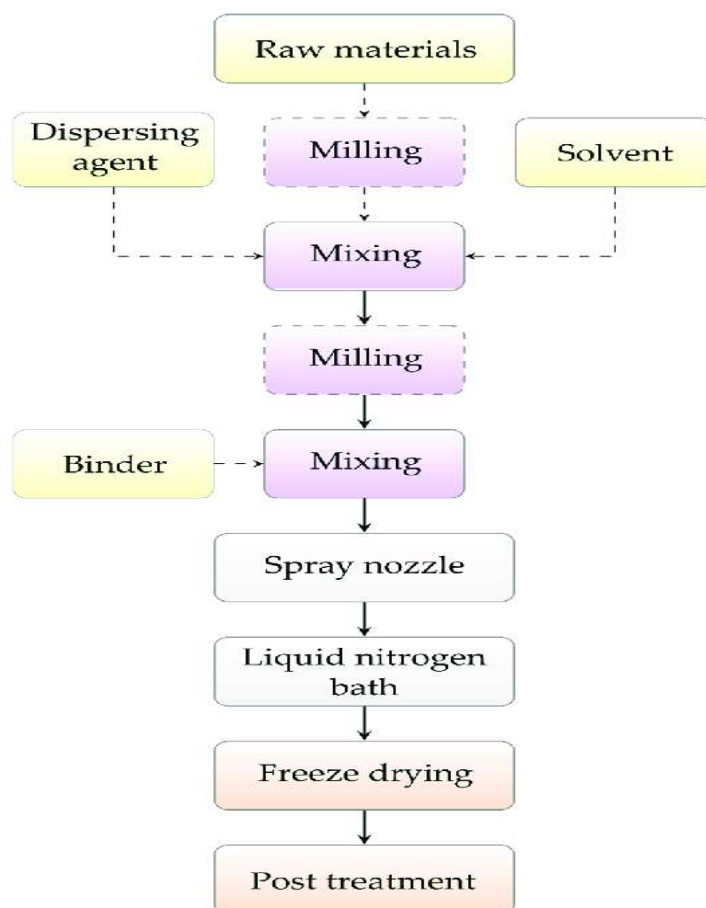
Granulation:-¹⁴

In case a powder blend's properties don't suit coordinate compression tableting, producers will turn to granulation processes to make the specified flowability and few dustability. These characteristics are required to play down tablet weight varieties, and guarantee tall thickness for tall tablet filling weight and tall moldability for difficult tablet make. Granulation limits the particle estimate conveyance of a tablet formulation's bulk powder, eliminatng segregation issues. This in turn

guarantees predominant compressibility within the tableting handle, allowing higher amounts of API to be used and guaranteeing great dynamic conveyance within the tablet. In any case, granulation could be a more time-consuming method compared with coordinate compression and there's too a chance of item cross-contamination and item misfortune amid the diverse preparing steps (granulation, drying, sieving).All of these components can increment costs compared with coordinate compression

Dry granulation:-¹⁵

It is characterized as the arrangement of granules by slugging, in the event that the tablet fixings are delicate to dampness and/or incapable to resist lifted temperature and drying.The processing steps involved in dry granulation are shown in flowchart 1.

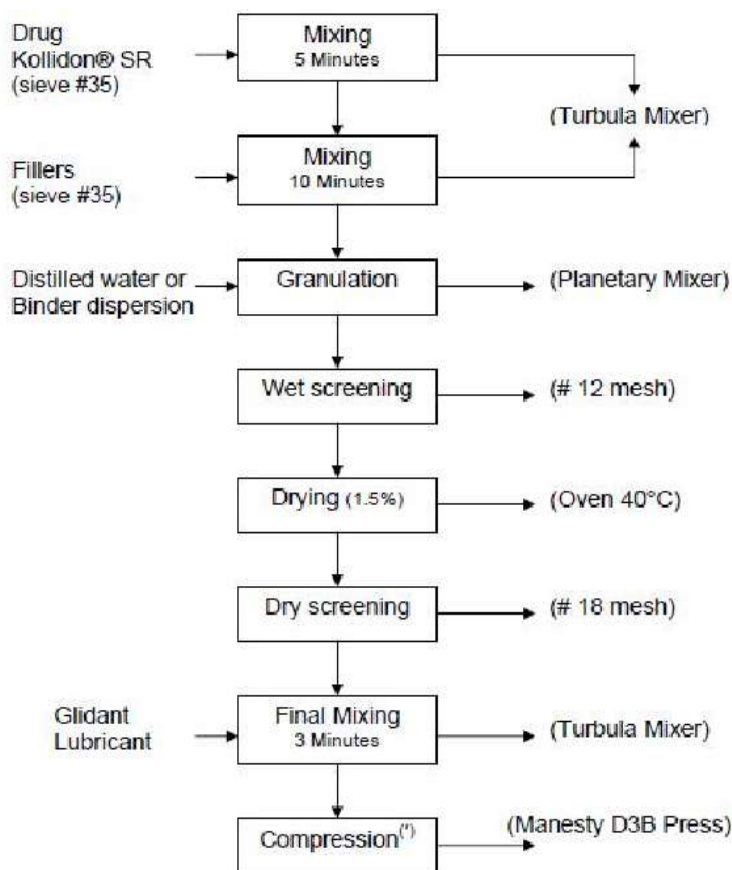


Flowchart 2: Processing steps in Dry Granulation
 Flowchart 1: Processing steps in Dry Granulation

Wet granulation:-¹⁶

In damp granulation the dynamic fixing, diluents and disintegrants are blended or mixed well in a quick blender granulator (RMG). The RMG may be a multi-purpose chopper which comprises of an impeller and a chopper and is utilized for tall speed scattering of dry powders and watery or dissolvable granulations.¹³ Moist materials from damp processing steps are put on

huge plate and put in drying chambers with a circulating discuss current and thermostable warm controller. Commonly utilized dryers are plate dryer, fluidized bed dryer. After drying, the granules is diminished in molecule measure by passing through littler work screen. After this, the oil or glidant is included as fine powder to advance stream of granules. The processing steps involved in wet granulation are shown in flowchart 2.



Flowchart 2: Processing Steps in Wet Granulation

Effect of Granule Properties on Tablet:-¹⁷

The granule properties play essential part within the last execution of a tablet; for illustration, granule estimate can influence the flowability and subsequently, the normal tablet weight.¹⁴ Having steady stream of a granulation gives the required roads to control weights. Steady tablet weights will result in repeatable tablet hardness. Made strides and homogeneous granulation will make strides mixture, its flowability, compressibility and so, progressed deterioration with acceptable disintegration rate.

II. CONCLUSION:-

From the over compiled information it was concluded that pharmaceutical tablets can delivered by three strategies viz. coordinate compression, dry granulation and damp granulation. Out of these three strategies, coordinate compression is the foremost helpful and cheaper strategy. In any case, ascribing to the few drawbacks of this strategy, damp and dry granulation strategies are utilized these days so as to create quality tablets. Film and sugar coatings are vital portion of the formulation of the tablet to attain predominant appealing quality like color,

surface, mouth feel, and taste masking. Film and sugar coatings have a few impediments; the most vital one is the utilization of watery or organic dissolvable leads to harmfulness. The Tablet in Tablet technique is the leading elective to overcome the above-mentioned issue. The advancement of a modified re-lease framework of comparable medicate or diverse drugs of a different category, or to realize the medicate discharge at different location assimilation can make conceivable by Tablet in Tablet strategy

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