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Mini Review

Fast Dissolving Tablets as an Ideal System for Immediate Drug Delivery: A Review

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ABSTRACT

Fast dissolving tablets (FDTs) are the formulations that dissolve within a few seconds when coming in contact with saliva. Superdisintegrants like Microcrystalline Cellulose, Cross-povidone, Cross Carmellose, and Sodium Starch Glycolate cause the easy breakup of the tablets. Direct compression, moulding, and lyophilisation are the common techniques used for the production of the tablets. Fast dissolution in the oral cavity makes a drug more suitable for geriatric and pediatric patients. It is most effective for those drugs which need quick onset of action. Also, it provides the benefits of both solid and liquid dosage forms.

INTRODUCTION

Fast dissolving tablets (FDTs) or Mouth dissolving tablets are those which disintegrate or dissolve rapidly in the mouth without the aid of water. Fast dissolving tablets imparts benefits mainly for the pediatric and geriatric patients who have hurdles in swallowing and chewing conventional dosage forms. The main feature of fast dissolving tablets is the ability to consume without water. A small amount of saliva is required for the tablet to disintegrate [1]. The drugs used in the preparation can be either hydrophilic or hydrophobic but the excipients used should be hydrophobic. Direct compression, moulding, and lyophilisation are the common techniques used for the production of the tablets. The easy breakup of the tablet is due to the incorporation of suitable disintegrants into the formulation. Commonly used disintegrants include Microcrystalline Cellulose, Cross-povidone, Cross-carmellose, and Sodium Starch Glycolate. Instead of these, various natural substances like Starch, Gum karaya, and Agar are also used. The natural substances are preferred over synthetic and semisynthetic substances due to the easy availability, low cost, and non-irritating nature [2].

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Ease of administration, the taste of medicament, hygroscopicity, friability, mouthfeel, etc. are the major characteristics of fast dissolving tablets [3]. FDTs are also called Oro-dispersible tablets, Fast disintegrating tablets, Quick disintegrating tablets, Rapid melt tablets, Porous tablets, and Quick melt tablets.

Significance

- It provides the benefits of solid dosage forms and liquid dosage forms.
- No need of water to swallow the tablets.
- Rapid absorption from the mouth itself and provides quick onset of action.
- Convenient for pediatric, geriatric, and institutionalized patients.
- Rapid absorption avoids first - pass metabolism and increases the bioavailability.
- Chocking and suffocation can be avoided.
- Useful for those who do not have ready access to water [4].

Requirements

- Tablets should dissolve or disintegrate in the mouth in seconds with saliva.
- Should have maximum mechanical strength.
- Low sensitivity to humidity and temperature conditions.
- Taste masking technologies must be chosen for masking the bitter taste.

Technologies Used for the Manufacture of FDTs

Nowadays, several modern technologies are being adopted for the manufacture of tablets. An ideal tablet should have less disintegration time and a pleasant feeling in the mouth. Freeze drying, Tablet moulding, Spray drying, Sublimation, Direct compression, and Mass extrusion are the major technologies adopted for the formulation of FDTs.

Freeze Drying or Lyophilisation

Lyophilisation is the process is in which water is removed from the product after it is frozen and placed under a vacuum, allowing the ice to change directly from solid to vapour without passing through the liquid phase. If the lyophilisation process is carefully controlled it can tailor the dispersion or disintegration properties which results in the palatable orally disintegrating tablets which disperse quickly with good mouthfeel.

Tablet Moulding

Moulded tablets are generally prepared by mixing the active drug with appropriate diluents which can serve as a base and the base used should be water-soluble. So the tablet will disintegrate and dissolve quickly. The different moulding processes include the solvent method, heat method, and no vacuum lyophilisation.

Sublimation

This process involves the addition of volatile substances to the other excipients and the removal of the volatile substances by sublimation results in the generation of pores in the tablet. These pores help in the sudden disintegration of the tablets when it comes in contact with the saliva.

Direct Compression

It's defined as the process by which the tablets are compressed directly from the powder mixture of API and suitable excipients. No pre-treatment of the powder blend by Wet or Dry granulation procedure is required and it is cost-effective. The dissolution and disintegrant properties of tablet depend upon the concentration of the disintegrants, soluble excipients, and also the effervescing agents. The addition of super disintegrants provides a faster break-up of the tablets. The important steps in direct compression include milling, sieving, mixing, and compression.

Mass Extrusion

Water-soluble ingredients are used for softening the mixed ingredients. The main advantage of these processes is to mask the unpleasant taste of the products and increasing bioavailability by making the products smaller. This process makes use of Polyethylene glycol, Methanol as the solvent and then passed through extruders and sliced by heat blades to produce small tablets [5-7].

Excipients Used in the Fast Disintegrating Tablets

Super disintegrants are the major excipient in an FDT formulation. Apart from that, the formulation includes diluents, binders, and antistatic agents.

Super Disintegrants

Nowadays the need for the fast dissolving formulations has increased. For the tablets to disintegrate faster, the super disintegrants are added to the formulation. The mechanism of action of the super disintegrants is swelling followed by bursting of the entire tablet due to the increased volume. The commonly used super-disintegrants are Crospovidone, Croscarmellose sodium, Sodium starch glycolate, Gellan gum, and Xanthan gum.

Diluents

Diluents act as fillers in the pharmaceutical tablets to increase the weight and to improve the content uniformity. Natural diluents include the Starch, hydrolysed starches, and partially pregelatinized starches. Common diluents include anhydrous lactose, lactose monohydrate, and sugar alcohols such as sorbitol, xylitol, and mannitol.

Binders

Common traditional binders include Sucrose, Gelatin, and Starch. More recently introduced binders include polymers such as Cellulose derivatives and Polyvinylpyrrolidone which have improved adhesive properties. Dry binders commonly used include the crosslinked polyvinylpyrrolidone and microcrystalline cellulose.

Antistatic Agents

Antistatic agents are compounds used for the treatment of materials or their surfaces to reduce or eliminate the build-up of static electricity generally caused by the triboelectric effect. The examples include colloidal silicas, precipitated silica, talc, Beta-Cyclodextrins [8, 9].

Evaluation of FDTs

Shape and Size

The dimensional measurements of tablets are monitored and recorded.

Tablet Thickness

It is an important parameter and ten tablets are taken for detecting hardness in micrometres.

Uniformity of Weight

The uniformity of the weight is determined based on the IP procedures where twenty tablets are taken. The individual weights of tablets are noted using the digital balance and the average weight is taken. The weight variation can be an ideal method for identifying the content uniformity.

Friability

The condition of being friable describes the tendency of solid substances to break into smaller pieces duress or contact. It is mainly carried out to determine the mechanical strength of tablets using a Roche friabilator. The tablets should be accurately weighed and placed in the drum. Rotate the drum 100 times and remove the tablets. Remove any loose dust from the tablets as before and accurately weigh. The test is run once.

Disintegration Time

The time required for the tablet disintegration is conducted in the apparatus specified in IP. Distilled water at 37°C±2 is used as disintegration media. Normally 6 tablets are taken. The disintegration time of individual tablets is noted and its average is recorded [10].

Marketed Products of Fast Dissolving Tablets [5, 9]

Brand Name	Drug	Manufacturer
Romilast	Montelukast	Ranbaxy Labs Ltd, New Delhi, India
Zyrofmeltab	Rofecoxib	Zydus Cadila, India
Feldene fast melt	Piroxicam	Pfizer Inc., NY USA
Pepcid RPD	Famotidine	Merck and Co, NJ, USA
Febrectol	Paracetamol	Prographarm, Chateauneuf, France
Zofran ODT	Ondansetron	Glaxo wellcome , Middle sex, UK

CONCLUSION

The fast-dissolving tablets are more preferred over the conventional solid dosage forms due to the increased patient compliance, rapid onset of action, enhanced bioavailability, and avoidance of first-pass metabolism. FDTs are highly effective for children and geriatric patients and also for the bedridden. The need for the easy disintegrating tablet will be tremendous in the future [5].

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