



FAST DISSOLVING TABLETS: A NOVEL APPROACH IN DRUG DELIVERY SYSTEM

Vaishali Wagh* and Rajendra Surwase

Loknete Dr. J. D. Pawar Collage of Pharmacy, Kalwan, Nashik.

*Corresponding Author: Vaishali Wagh

Loknete Dr. J. D. Pawar Collage of Pharmacy, Kalwan, Nashik.

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ABSTRACT

Fast dissolving drug delivery system (FDDS) is now gaining the popularity in pharmaceutical companies as they are the novel drug delivery technique in order to provide the patient with medicines without obstacles in swallowing. Theorem route is the most common and oldest method of administering a medicine. When compared to the parental route, it is widely used because to its simplicity of administration, self-medication, and lack of pain. Oral drug administration is still the favored method of drug administration. New technologies have emerged in recent years that have improved performance, patient compliance, and efficiency. Also, quality various strategies, like as the theorem route, can be used to create a fast-dissolving drug delivery system. Anionization, direct compression, tablet molding, freeze drying, and spray drying. The review discusses the many formulation features, including the use of Super disintegrates and technologies developed excipient, evaluation tests, marketed formulations, and medications were all utilized in this research.

KEYWORDS: Fast Dissolving Tablet, Super Disintegration, Drug Delivery System, Patented Technologies, Methodology.

INTRODUCTION

Solid dose forms are popular for a variety of reasons, including low cost, convenience of administration, accurate dosage self-medication, pain avoidance, and, most significantly, patient compliance. Tablets and capsules are the most often used solid dose forms.^[1,2] In most circumstances, a fast-dissolving drug-delivery system (FDDS) is a tablet that dissolves or disintegrates in the oral cavity without the use of water or chewing. Most fast-dissolving delivery system films must include chemicals to disguise the active ingredient's flavour. The masked active ingredient, combined with the soluble and insoluble excipients, is then ingested by the patient's saliva. Because of its ease of use, the tablet is still the most popular device on the market today.^[3,4]

Solid dose forms are widely used for a variety of reasons, including low cost, ease of administration, precise dosage self-medication, pain avoidance, and, most importantly, patient compliance. The most common solid dose forms are tablets and capsules. A fast-dissolving drug-delivery system (FDDS) is a tablet that dissolves or disintegrates. Chemicals are required in most fast-dissolving delivery system films to mask the active ingredient's flavour. The masked active component is then absorbed via the patient's saliva, together with the soluble and insoluble excipients. (sumita kumari et al.,2008)

The Centre for Drug Evaluation and Research (CDER), USFDA

"A solid dose form containing medicinal chemicals that disintegrates when placed up on the tongue, it disintegrates quickly, usually within a few seconds," according to the definition of oral disintegrating Tablets (ODT). FDTs quickly break down and/or dissolve in saliva without the use of water. Some pills, referred to as true fast-dissolving tablets, are designed to dissolve in saliva in seconds. Others, known as fast-disintegrating tablets because they can take up to a minute to completely dissolve, contain chemicals that speed up tablet breakdown in the oral cavity. This pill dissolves quickly when placed on the tongue, releasing the medication, which dissolves or disperse in the saliva.. As saliva descends into the stomach,(kuchechar et al..)

Criteria for fast dissolving drug delivery system

The tablets should

- It should melt or disintegrate in the mouth in a matter of seconds.
- Be tolerant of flavors masking.
- Be lightweight but not fragile.
- Have a lovely taste in your tongue.
- After oral administration, there should be little or no residue in the mouth.^(bhandhan.ac2003)

Advantages of fast dissolving tablets

- Improved patient's compliance

- No water required.
- No chewing is required.
- Improved stability
- Suitable for controlled as well as fast release active.(pahawa.r)

Limitations of fast dissolving tablets

The mechanical strength of the tablets is frequently insufficient.

As a result, extreme caution is essential.

If the tablet is not properly formed, they may leave unpleasant taste and/or grittiness in mouth. (panighrahi.d.2005)

Characteristics of fast dissolving delivery system

1. Ease of administration: Ease of use:

Fast Dissolving Delivery Systems are simple to use and administer, resulting in higher patient compliance. Because of tremors in their extremities, older persons often have difficulties swallowing traditional dosage forms (tablets, capsules, liquids, and suspensions).

2. Taste of the medicament:

Because most medications are unpleasant, they are frequently delivered in a taste-masked form by oral dissolving delivery methods. In the tongue, delivery methods dissolve or disintegrate, releasing active chemicals that

3. Hygroscopicity:

Several fast-acting dose forms are hygroscopic and cannot retain physical integrity in typical humidity conditions, necessitating specialized packaging.

4. Friability:

Fast dissolving tablets are formed of either very porous and soft-molded matrices or compacted into tablets with very low compression force, which renders the tablets friable and/or brittle and difficult to handle, necessitating the use of specialist peel-off blister packaging.

5. Mouth feel:

Patients should obtain a substance that feels good in their mouths. This can be avoided if the bulk of the particles are smaller than the detectable size limit. Even if the only change is the flavors, certain flavors can impart an enhanced mouth feel experience, resulting in a product that is seen as less gritty. By lowering the "dryness" of a product, effervescence can aid breakdown and improve mouth feel. (kamal.saroaha.2010)

Different methodology used for fastdissolving formulations

a) Lyophilization or Freeze-drying-

The formation of porous products during the freeze-drying process is used to create fast dissolving tablet. The elimination of solvent from a frozen suspension or solution of medication with structure-forming ingredients is known as lyophilization. The medicine is freeze-dried with additives, resulting in a glossy amorphous form that

is highly porous and lightweight. When placed on the tongue, the resulting pill has rapid disintegration and dissolution, and the freeze-dried unit dissolves instantaneously to release the medication. Deformedly lyophilization, on the other hand, has low mechanical strength, poor temperature and humidity stability. (Hirani.2009)

b) Tablet molding:

Compression at low pressures in molded plates to generate a wetted mass is one of two types of molding processes (compression). tablets with a porous structure that speeds up dissolving (making agar jelly at ambient temperature and drying it at 300°C under vacuum. Spray congealing a molten combination of hydrogenated cottonseed oil, sodium carbonate, lecithin, polyethylene glycol, and an active component into a lactose-based tablet triturate form produced the taste-masked drug particles. (Mukesh.p.2009)

Solvent and heat molding are the two types of molding techniques. Forming a wetted mass by compressing it in molded plates at low pressures (compression molding). This method produces less compact tablets with a porous structure that allows for faster disintegration than compressed tablets (For example, mannitol) (Mukesh.p.2009)

There are two sorts of molding processes: solvent and heat. Compressing it in molded plates at low pressures to form a wetted mass (compression molding). This method produces tablets that are less compact than compressed tablets and have a porous structure that speeds up dissolution. (e.g. mannitol or lactose), putting it into blister packaging wells, solidifying the agar at room temperature to create a jelly, and drying it at 300°C under vacuum. The mechanical strength of molded tablets is an issue that needs to be addressed. Agents that bind.^[14]

c) Spray drying:

Gelatin can be utilized as a matrix and a supporting agent, mannitol as a bulking agent, and sodium starch glycolate, croscarmellose, or cross providence as a super disintegrate in this method. In aqueous media, tablets made from spray-dried powder have been reported to disintegrate in less than 20 seconds. The formulation included bulking agents such as mannitol and lactose, a super disintegrant such as sodium starch glycolate& cross Carmel lose sodium, and acidic and/or alkaline substances (citric acid)(kaur.tejveer.)

d) Cotton candy process:

This method gets its name from the fact that it uses a special spinning mechanism to create floss-like crystalline structures. The cotton candy process 10 incorporates the simultaneous operation of flash melting and spinning to generate a matrix of polysaccharides or saccharides. To increase flow characteristics and compressibility, the matrix is partially re-crystallized.

After milling and blending with active chemicals and excipients, the candy floss matrix is compressed to FDT. (rishi.r.k.2004)

e) Disintegrant addition

In this process, super disintegrants are introduced in the right amount to promote rapid disintegration. Cross povidone (3 percent w/w) and croscarmellose (5 percent w/w) are used in the formulation of prochlorperazine maleate, for example. Compared to normal tablets, this method yields FDT with a higher percentage of disintegrants, lower hardness, and more friability.

As an example, super disintegrants

Croscarmellose is a cross-linked cellulose sugar replacement (Ac-Di-Sol).

M povidone crossed (Kallidin) PVP sodium glycated starch crosslinks (Primo gel) Soy polysaccharides help to crosslink starch.^[17]

f) Sublimation

which is then transformed into a porous matrix It is possible to compress highly ammonium bicarbonate, ammonium carbonate, benzoic acid, camphor, naphthalene, urea, urethane, and phthalic anhydride acid are all volatile compounds that can be put into tablets. Sublimation is a method of removing a volatile chemical from a porous matrix. This approach has been observed to dissolve tablets in 10-20 seconds. (kuchekar.b.s.2003)

g) Direct compression

Direct compression is the simplest and most cost-effective method of tablet production. Because of the availability of better excipients, such as super disintegrants and sugar-based excipients, this technique can now be used to prepare FDT.

(1) Super disintegrants

The inclusion of super disintegrants slows down in the disintegration process. and thus the dissolving in various orally disintegrating tablet technologies based on direct compression. Water-soluble excipients and effervescent compounds, for example, accelerate the disintegration process even more.

(2) Sugar based excipients

Another method for producing FDT by direct compression is this. The use of sugar-based excipients, particularly bulking agents such as Dextrose, Fructose, Isomaltose, Lactitol, Maltose, Mannitol, Sorbitol, Starch hydrolysate, Polydextrose, and Xylitol, which have a high aqueous solubility and sweetness and so offer a pleasant test. Manumitted all classified sugar-based excipients into two types based on mounding and dissolving rate Saccharides (Lactose and Mannitol) are low-modulable yet have a high dissolving rate.

Saccharides (Maltose and Maltitol) have a high mouldability and a slow dissolving

h) Mass extrusion

The active blend is softened with a solvent mixture of water-soluble polyethylene glycol and methanol in this technique. Extrusion of softened substance through a syringe or extruder to produce cylindrical tablets with even segments. It can be used to coat bitter-tasting medication granules, disguising their harsh flavors. (kaur.t.2011)

Important patented technologies for fast dissolving tablets

1) Zydis technology:

In Zydis, a breakthrough freeze-dried tablet, the medicine is physically entrapped or dissolved within a matrix of quick dissolving carrier substance. The freeze-dried structure of Zydis units dissolves fast in the mouth, allowing for wallowing without the use of water. The Zydis matrix is made up of many components that work together to accomplish various objectives. To enhance strength and resilience during handling, polymers such as gelatin, dextran, and alginates are employed. These come together to form a lustrous amorphous structure that is strong (19) To achieve crystallinity, beauty, and other benefits, saccharides such as mannitol or Sorbitol are used. water is utilized in the manufacturing process to guarantee porous units disintegrate fast, and various gums are used to avoid dispersed particles. (Wilson.c)

2) Durasolv technology:

Durasolv is CIMA labs' proprietary technology. This method produces tablets with a medicine, filler, and lubrication. Tablets are made with traditional tableting equipment with good moldability and low cost. These can be used in common packaging techniques like blisters Durnacol is a good technology for products that only need a little amount of active chemicals (.bhupendra.g.2009)

3) Ora Quick:

Micro Mask microsphere technology, according to KV Pharmaceutical, has a better mouthfeel than traditional taste masking products. Because no solvents are utilized in the flavor masking process, the process can be completed faster and more efficiently. Because it produces less heat than other fast-dissolving/disintegrating technologies, OraQuick is appropriate for heat-sensitive drugs. The matrix that surrounds and protects the pharmaceutical powder in microencapsulated particles is also more flexible, according to KV Pharmaceutical, allowing tablets to be broken for significant mechanical strength without sacrificing taste masking. OraQuick claims to disintegrate in a couple of seconds and hide flavor effectively. Although KV Pharmaceutical offers analgesics, prescription drugs, cough and cold remedies, psychotropics, and other products, there are presently no items on the market that use the OraQuick technology.(kuno.y.2005)

4) Orasolv technology:

Orasolv Technology was created by CIMA labs. The flavors of this system active medication is disguised. It also includes an effervescent dissolving agent. Tablets are made utilizing a direct compression process with a modest compression force to decrease oral dissolution time. Traditional blenders and tablets machine are used to make the tablets. Soft and friable tablets are manufactured.^[22]

Excipients used in the formulation of fdt (Rajashri. cpunogreeti.mizumoto)

Excipients in fast-melting tablets help to balance the qualities of the active ingredients. To avoid interactions with the actives, a thorough understanding of the chemistry of these excipients is required. Another challenge faced by formulators is establishing the cost of these chemicals. Excipient are important in the production of fast-melting tablets. When included into the formulation, these inert food-grade substances provide the appropriate organoleptic qualities and product performance. Except for some actives that require masking agents, excipients are generic and can be utilized for a wide spectrum of actives.

1) Bulking agents:

Bulking agents improve the textural characteristics of the composition, which improves disintegration in the mouth. Bulking agents also reduce the concentration of the active ingredient in the composition. For greater aqueous solubility and sensory perception, sugar-based bulking agents such as mannitol, polydextrose, lactitol, DCL (direct compressible lactose), and starch hydrolysate should be using. Mannitol has a high-water solubility and excellent sensory perception. Bulking agents are used in amounts ranging from 10% to 90% of the final composition's weight.

2) Emulsifying agents:

Emulsifying agents are key excipients in the formulation of fast-melting tablets because they help with quick disintegration and drug release without the need to chew, swallow, or tears to drink. Incorporating emulsifying agents is also beneficial for stabilizing immiscible mixtures and increasing bioavailability. Alkyl sulphates, propylene glycol esters, lecithin, sucrose esters, and other emulsifiers are all recommended for fast-tablet formulate.

3) Lubricants:

They help the medication transport mechanism from the mouth to the stomach by removing grittiness.

4) Flavors and Sweeteners:

Patients will find the goods more edible and delightful thanks to flavors and taste masking agents. Both natural and synthetic tastes can improve the organoleptic qualities of fast-melting tablets. Sweeteners such as sugar, dextrose, and fructose, as well as nonnutritive sweeteners such as aspartame, sodium saccharin, sugar alcohols, and sucralose, are available. Sweeteners provide flavors and substance to the mix.

5) Gas producing disintegrates:

Gas-producing disintegrants are utilized when exceptionally speedy disintegration or a quickly soluble composition is required. They've also been useful when other methods for increasing disintegration properties have failed. The moisture level should be monitored closely during tab letting. Citric and tartaric acids, as well as carbonates or bicarbonates, are the most prevalent ingredients, comparable to those found in effervescent pills.

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