



Review Article On Fast Dissolving Tablet

¹Parul Saini, ²Dr. Shami chaddha, ³Sunita Rani

¹Research scholar, ²Principal, ³Associate Professor

¹Pharmacy Department

¹Smt. Yarawati Institute of Biomedical & Allied Sciences, Roorkee, India

Abstract;

Fast-dissolving tablets are becoming one of the most common and widely recognized dosage forms, particularly for juvenile patients due to their immature neurological and muscular systems and elderly patients with hand tremors or Parkinson's disease. There are currently few solid dose forms, such as tablets and capsules, that do not have issues like dysphagia, which makes the therapy inefficient and leads to numerous instances of non-compliance. In addition to being the most popular method of administering many medications, oral dosage forms and routes have drawbacks, such as first-pass metabolism, mental patients, immobile patients, and difficult patients. Real fast-dissolving pills are made to dissolve in saliva amazingly quickly—within a few seconds, that is, less than 60 seconds. FDTs formulations contain super disintegrants to enhance the disintegration rate of a tablet in the buccal cavity. FDT formulations contain super disintegrants, which increase a tablet's disintegration rate in the buccal cavity. FDTs have several advantages, including easy mobility and manufacture, accurate dosing, strong chemical and physical stability, and are an excellent choice for elderly and pediatric patients. FDTs dissolve swiftly and absorb faster, reducing in vitro drug release time and increasing bioavailability. FDT formulations combine the benefits of both traditional tablet formulation and liquid dose form. Several conventional or patented technologies for FDT production have been developed, including spray drying, cotton candy process, sublimation, melt granulation, direct compression freezing drying/lyophilization, phase transition process, mass extrusion, and so on. This review contains brief information regarding FDTs, including definitions and advantages. This review contains basic information regarding FDTs, such as their definition, advantages, needs or requirements, noteworthy features, limits, obstacles in developing FDTs, marketed formulations of fast dissolving tablets.

Keywords: Fast dissolving tablets, FDTs, Superdisintegrants, marketed products

Introduction

Mouth Dissolving Tablet (MDT): A tablet that disintegrates and dissolves quickly in saliva, within a few seconds, without the need for water or chewing. Most MDTs contain specific super disintegrants and taste masking chemicals. There are very few patients who have suffered from 'Dysphagia', and they may exhibit symptoms of other conditions such as Parkinson's disease or motion sickness. Mouth dissolving pills are developed so that they can be consumed without the need for water or drink. It dissolves in saliva within 60 seconds. This type of dose form was beneficial to pediatric, geriatric, bedridden, and busy patients, as well as persons who are traveling and do not have the ability to carry water with them.

Oral methods of medication administration are widely accepted, accounting for 50-60% of all dose forms. Solid dosage forms are popular due to their ease of administration, precise dosing, self-medication, pain avoidance, and, most importantly, patient compliance. The most common solid dosage forms are tablets and capsules; nevertheless, one significant disadvantage of these dosage forms for some individuals is difficulty swallowing. Drinking water helps you swallow oral dose forms better. People frequently find it difficult to

swallow conventional dosage forms such as tablets when water is not available, when motion sickness (kinetosis) is present, and when coughing occurs during a common cold, allergy disease, or bronchitis. For this reason, tablets that may rapidly dissolve or disintegrate in the oral cavity have received a lot of attention.

Swallowing difficulties are widespread in senior patients due to fear of choking, hand tremors, dysphasia, in young people due to underdeveloped muscular and neurological systems, and in schizophrenia patients, all of which contribute to poor patient compliance. Approximately one-third of the population (mostly children and the elderly) has swallowing difficulties, resulting in poor compliance with oral tablet drug therapy and reduced overall therapeutic effectiveness. For this reason, tablets that may rapidly dissolve or disintegrate in the oral cavity have received a lot of attention.

Requirements of fast dissolving tablets

Patient factors

Fast dissolving dosage forms are appropriate for patients (especially children and the elderly) who are unable to swallow regular tablets and capsules with an 8-oz glass of water. This includes the following:

1. Patients experiencing difficulties swallowing or chewing solid dosage forms.
2. Patients are compliant owing to fear of choking.
3. Solid dose forms may be difficult to swallow for elderly patients with depression.
4. An eight-year-old patient with allergies prefers a more convenient dosing form than antihistamine syrup.
5. A middle-aged patient receiving radiation therapy for breast cancer may have nausea and be unable to swallow their H2-blocker.
6. A schizophrenic patient may attempt to avoid taking an atypical antipsychotic by hiding a conventional pill under the tongue.
7. A patient experiencing recurrent nausea who may be traveling or have limited access to water.

Advantages

1. Improved safety by preventing physical blockage during oral delivery of traditional formulations.
2. FDTs facilitate additional commercial opportunities, including product diversification, promotion, patent extension, and life cycle management.
3. FDTs are routinely developed for current medications to extend their patent life through product differentiation.
4. Tablets can be swallowed without water.
5. More accurate dosing compared to liquids.
6. The medicine dissolves and absorbs quickly, resulting in a rapid commencement of effect.
7. Effective for fast-acting conditions like motion sickness, allergic reactions, and coughing..
8. Bioavailability of drugs is increased as some drugs are absorbed from mouth, pharynx and esophagus through saliva passing down into the stomach.
9. Advantages over liquid medication in terms of administration as well as.
10. Offering improved safety.

Disadvantages

Formulating large-dose drugs into FDTs can be challenging.

2. Patients on anti-cholinergic medicines may not be appropriate candidates for FDTs.
3. Tablets often lack sufficient mechanical strength. As a result, it needs to be packaged and handled with care.
4. Improperly manufactured tablets might cause unpleasant taste and grittiness in the tongue.
5. High humidity and temperature might cause deterioration.
6. Keep fast dissolving tablets dry as they are hygroscopic.
7. Larger drug dosages are challenging to incorporate into FDT.

Drug Used in Fast Dissolving Drug Delivery System: Examples: some of drug candidates best for FDTs,

1. **Anti-inflammatory and analgesic medications include** ibuprofen, proxicam, and mefenamic acid.
2. **Antibacterial agents include** erythromycin, tetracycline, doxycycline, and rifampicin.
3. **Anti-fungal agents include** Griseofulvin and Miconazole.
4. **Anti-malarial agents include** chloroquine and amodiaquine.
5. **Anti-Gout Agents:** Allopurinol and Probenecid.
6. **Anti-Hypertensive Agents:** Amlodipine and Nefidipine.
7. **Anti-Coagulant Agents:** Tolbutamide and Glipizide.
8. **Anti-protozoal agents:** Benznidazole and Tinidazole.
9. **Carbimazole is an** anti-thyroid agent.
10. **Cardiac Inotropic Agents:** Digitoxin and Digoxins.
11. **Gastro-intestinal agents include** omeprazole, ranitidine, and fomatidine.
12. **Nutritional agents include** vitamins A, B, and D.
13. **Oral vaccines** for Influenza, Hepatitis, Polio, Tuberculosis, etc.

Super disintegrants

Main components used in the production of fast dissolving tablets. Important chemicals utilized in FDT formulations should enable for rapid drug release, resulting in quicker dissolving. This contains both the active ingredients and the excipients. Tablet disintegration and solubility are affected by disintegrants, water-soluble excipients, and effervescent agents, either individually or in combination.

Super disintegrants. The use of disintegrants is the fundamental strategy of MDT development. Disintegrants play an important part in the disintegration and dissolution of MDT. It is critical to select an appropriate disintegrant in the proper concentration to achieve rapid disintegration and high dissolving rates. Super

disintegrants produce fast disintegration as a result of the formulation's swelling and water absorption. The swelling of superdisintegrants increases the wetted surface of the carrier, which boosts the system's wettability and dispersibility, hence improving disintegration and dissolution. The optimum concentration of super disintegrants can be chosen based on the critical concentration of disintegrant.

Types of superdisintegrants

1. Natural super disintegrants
2. Synthetic super disintegrants
3. Co-processed super disintegrants

1.Natural superdisintegrants

Ispaghula husk mucilage (*plantago ovata*)

Ispaghula husk contains dried seeds of the plant *plantago ovata*, as well as mucilage found within the seeds' skin. *Plantago ovata* mucilage serves several functions, including binding, disintegration, and property maintenance. Mucilage is a super disintegrating agent utilized in rapid dissolving tablets due to its high swelling index ($89 \pm 2.2\%$ v/v) compared to other superdisintegrants.

Xanthan gum

Xanthan gum produced from *xanthomonas campestris* is an approved USP with high hydrophilicity and low gelling properties. It has low water solubility and high swelling characteristics, resulting in quicker disintegration.

Gellan Gum

Tablet disintegration may be caused by gellan gum's on-the-spot swelling qualities when in contact with water, as well as its high hydrophilic nature. The tablet completely dissolves in 4 minutes with gellan gum at a concentration of 4% w/w.

Chitin/chitosan-silicon di oxide

Chitin is naturally derived from the shell wastes of shrimp, crab, lobster, krill, and squid used in the production of chitosan via a deacetylation reaction in an alkaline media. Chitosan is a well-known herbal polysaccharide with a wide range of applications in the pharmaceutical business.

2. Synthetic super disintegrants

Modified starch (sodium starchglycolate, primojel)

Sodium starch glycolate is the sodium salt of the carboxymethyl ether of starch. These are modified starches created through the crosslinking of potato starch, which provides the product with enhanced disintegration qualities.

cross-linked polyvinyl pyrrolidone (crospovidone)

Crospovidone quickly wicks saliva into the tablet, generating the volume expansion and hydrostatic pressure required for rapid disintegration within the mouth.

Modified celluloses (croscarmellose sodium)

It is insoluble in water, while rapidly swelling to 4-8 times its original volume when in contact with it. Croscarmellose sodium has a specific surface area of 0.81-0.83 m²/g and a swelling index of 65±1.7% v/v. It can be used in tablet formulations either direct compression or wet-granulation.

3. Co-processed super disintegrants

That is principally based on the innovative idea that 2-3 excipients interact at the particle level; the goal is to provide a synergy of functionality growth and change the taste of people' undesirable features. Co-processing excipients produces excipient granules with enhanced characteristics. In comparison to physical combinations of additives, such as better flow and compressibility. Improved dilution capacity, complete homogeneity, and decreased lubricant sensitivity

Mechanism of action of disintegrants

The tablet breaks to primary particles by one or more of the mechanisms listed below,

1. By capillary action
2. By swelling
3. Because of heat of wetting
4. Due to release of gases
5. By enzymatic action
6. Due to disintegrating particle/particle repulsive forces
7. Due to deformation

1. By capillary action : Disintegration by capillary action is always the first stage. When we immerse the tablet in an appropriate aqueous medium, the medium enters the tablet and replaces the air adsorbed on the particles, weakening the intermolecular link and breaking the tablet into small particles. Water uptake by tablets is determined by the hydrophilicity of the drug/excipient and the tableting parameters.

2. By swelling : Swelling is perhaps the most commonly understood general mechanism for tablet breakdown. Tablets with high porosity disintegrate poorly due to insufficient swelling force. In contrast, the tablet with little porosity exerts considerable swelling force. It is worth noting that if the packing percentage is very high, fluid cannot penetrate the tablet, causing disintegration to slow down.

3. Because of Heat of Wetting (Air Expansion): When exothermic disintegrants are wetted, capillary air expansion produces localized stress, which aids in tablet breakdown. This explanation, however, is restricted to a few types of disintegrants and does not reflect the action of the majority of modern disintegrating agents.

4. Due to Release of Gases: Carbon dioxide is generated when tablets are wetted as a result of the interaction of bicarbonate and carbonate with citric or tartaric acids. The tablet disintegrates due to the pressure generated within it. This effervescent combination is utilized when a pharmacist has to create very quickly dissolving or fast disintegrating tablets. Because these disintegrants are particularly sensitive to slight variations in humidity and temperature, rigorous environmental controls are essential during tablet manufacture. The effervescent blend can be applied immediately before compression or divided into two fractions of the formulation.

5. By enzymatic reaction Enzymes found in the body act as disintegrants. These enzymes disrupt the binding function of the binder and aid in breakdown. Actually, swelling, pressure applied in the outer or radial direction causes the tablet to rupture, or the faster absorption of water leads to an enormous rise in the volume of granules, promoting disintegration.

6. Due to Disintegrating: Repelling forces between particles Another method of disintegration explains the swelling of tablets produced with 'non-swellable' disintegrants. Guyot-Hermann presented a particle repulsion theory, using the evidence that non-swelling particles can cause tablet disintegration. The mechanism of disintegration is based on electric repulsive interactions between particles, and it requires water. The researchers discovered that wicking comes first, followed by repulsion.

7. Due to deformation: Hess demonstrated that during tablet compression, fragmented particles are deformed, and these deformed particles return to their normal structure when they come into touch with watery medium or water. Starch's swelling capacity was occasionally increased when granules were substantially distorted during compression. The increased size of the distorted particles causes the tablet to break up. This may be a starch mechanism that is only now being examined.

CONCLUSION

Fast dissolving tablets are unique dosage forms that were developed and specifically designed to address some of the issues associated with traditional solid dosage forms, such as difficulties swallowing the pill in geriatric and juvenile patients. Fast dissolving tablets are intended to dissolve or disintegrate quickly in saliva, typically in less than 60 seconds. Fast dissolving tablets have higher patient compliance and acceptance, which may increase biopharmaceutical characteristics, bioavailability, efficacy, convenience, and safety when compared to traditional oral dosage forms. The popularity of FDTs has skyrocketed during the last decade. FDTs must be developed for psychotic patients, bedridden, geriatric, and pediatric patients, as well as patients who may not have access to water or who are traveling frequently. Some of these conventional and patent technologies are used to synthesize FDTs, which have sufficient mechanical strength and disintegrate/dissolve quickly in the buccal cavity without the use of water. The newest technologies used for the formulation of the FDTs provide more effective dosage forms with greater advantages and minimal downsides.

REFERENCE

1. Tejvir Kaur., Bhawandeep Gill., Sandeep Kumar., Gupta G D., "Mouth Dissolving Tablets". Int J. Cur Pharm Res. 2011;3(1):1-7.
2. Ujjwal Nautiyal., Satinderjeet Singh., Ramandeep Singh., Gopal., Satinder Kakar., "Fast Dissolving Tablets as a Novel Boon". J. Pharm. Chem. Bio. Sci. 2014;2(1):5-26.
3. Alok Kumar Gupta., Anuj Mittal., Jha K K. "Fast Dissolving Tablets". J.Pharm. 2012;1(1):1-8.
4. Gupta DK, Bajpai M, Chatterjee DP. Fast mouth is dissolving disintegrating tablet and patient counselling points for FDDTS-a review. Int J Res Dev Pharm L Sci 2014;3:949-58.
5. Nautiyal U, Singh S, Singh R, Gopal, Kakar S. Fast dissolving tablets as a novel boon: a review. J Pharm Chem Biol Sci 2014;2:5-26.
6. Kaur T, Gill B, Kumar S, Gupta GD. Mouth dissolving tablets: a novel approach to drug delivery. Int J Curr Pharm Res 2011;1:1-7.
7. Patel TS, Sengupta M. Fast dissolving tablet technology. World J Pharm Sci 2013;2:485-508.

8. Ashish P, Harsoliya MS, Pathan JK, Shruti S. A review: formulation of mouth dissolving tablet. *Int J Pharm Res* 2011;1:1-8
9. Sharma R, Rajput M, Prakash M, Sharma S. Fast dissolving drug delivery system. *Int Res J Pharm* 2011;2:21-9.
10. Pagar R, Ahirrao S, Yallatikar T, Wagh M. Review on orodispersible tablets. *Int J Res Dev Pharm L Sci* 2014;3:949-58.
11. Mishra US, Prajapati SK, Bhardwaj P. A review on formulation and evaluation for mouth dissolving tablet. *World J Pharm Pharm Sci* 2014;8:1778-810.
12. Kuchekar BS, Badha AC, Mahajan HS. Mouth dissolving tablets: a novel drug delivery system. *Pharmatimes* 2003;35:7-9.
13. Sharma S. New generation of the tablet: fast dissolving tablet. *Latest Rev Pharmainfo Net*; 2008. p. 6.
14. Kumari S, Visht S, Sharma PK, Yadav RK. Fast dissolving drug delivery system: a review article. *J Pharm Res* 2010;3:1444-9.
15. Mohanachandran PS, Sindhumol PG, Kiran TS. Superdisintegrants: an overview. *Int J Pharm Sci Rev Res* 2011;6:105-9.
16. Deshmukh VN. Mouth dissolving drug delivery system: a review. *Int J Pharm Tech Res* 2012;4:412-
17. Kumaresan C. Orally disintegrating tablet-mouth dissolving, sweet taste and target release profile. *Pharm Rev* 2008;6:1.
18. Parkash V, Maan S, Deepika, Yadav SK, Hemlata, Jogpal V. Fast disintegrating tablets: opportunity in drug delivery system. *J Adv Pharm Technol Res* 2011;2:223-35.
19. Nagar P, Singh K, Chauhan I, Verma M, Yasir M, Khan A. Orally disintegrating tablets: formulation, preparation techniques and evaluation. *J Appl Pharm Sci* 2011;4:35-45.
20. Velmurugan S, Vinushitha S. Oral disintegrating tablets: an overview. *Int J Chem Pharm Sci* 2010;1:1-12.
21. Sri KV, Raj GB, Ravishanker D, Kumar CA. Preparation and evaluation of montelukast oral dispersible tablets by direct compression method. *Int Res J Pharm* 2012;7:315-8.
22. Yang D, Kulkarni R, Behme RJ, Kotiyan PN. Effect of the melt granulation technique on the dissolution characteristics of griseofulvin. *Int J Pharm* 2007;329:72-80.
23. Khan AB, Tripuraneni A. Fast dissolving tablets—a novel approach in drug delivery. *Rguhs J Pharm Sci* 2014;1:7-16.
24. Chowdary YA, Soumya M, Madhubabu M, Aparna K, Himabindu P. A review on fast dissolving drug delivery systems-A pioneering drug delivery technology. *BEPLS* 2012;1:8-20