



A REVIEW ON FAST DISINTEGRATING TABLETS

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ABSTRACT

Tablet formulations are preferred primarily because of their lower manufacturing costs, packaging, shipping and increased stability. Recently fast dissolving drug delivery system are starting to become popular and are being acceptances as new drug delivery system. Some tablets are designed to dissolve very quickly in saliva within seconds and are actually fast dissolving tablets. Others contain agents that increase the rate of disintegration of tablets in the mouth and can take up to a minute to completely disintegrate, which is why they are better known as fast disintegrating tablets. Older people usually have difficulty in swallowing conventional dosage forms (tablets, capsules, solutions and suspensions) due to tremors in the limbs and impaired speech (dysphasia). A fast-disintegrating drug dissolution system can solve this problem. FDTs formulations contain super disintegrant to increase the speed of tablet disintegration in the oral cavity. FDT is rapidly disintegrated and absorbed faster. In this review contain brief information about FDTs including definition, advantages, disadvantages, limitation, ideal properties, quiet characteristics, drug selection criteria, mechanism, requirement, excipient selection, methodologies, and FDT evaluation, etc.

KEYWORDS: Fast dissolving tablets, Fast disintegrating tablets, FDT, Superdisintegrants.

INTRODUCTION

Introduction Over the last decade, demand for disintegrating tablets has surged, and this subject has become a rapidly rising segment of the pharmaceutical industry. Tablet formulations are preferred mainly because of their low factory price, packaging, transportation and increased stability, while pure formulations are the main requirement and need today. A dosage form is a means of a drug delivery system used to deliver a drug to a living organism. Various types of dosage forms are available such as tablets, syrups, suspensions, suppositories, injectable, transdermal and patches with different drug delivery mechanisms. To achieve the desired effect, the drug must be delivered to the workplace in certain quantities and concentrations to achieve maximum therapeutic effect and minimum side effects. Superdisintegrants such as croscarmellose sodium, sodium starch glycolate, and crospovidone are used to make oral dissolution tablets in two ways. Another method is to maximize the pore structure of tablets by lyophilization and vacuum drying. For all methods, direct compression is preferred because it is reliable, fast, and economical. The oral route of drug administration is widely used up to 50-60% of all dosage forms. Solid dosage forms are very popular because easy administration, accurate dosing, self-medication, pain Avoidance and most importantly patient compliance.

Most popular solid dosage forms are tablets and capsules; an important disadvantage of this dosage form for some patients are difficulty in swallowing. Drinking water plays an important role in swallowing an oral dosage form. People often experience Discomfort when taking conventional dosage forms such as tablets when there is no water. (Ashish et al., 2017)

Definition

A solid dosage form containing a medical material or active ingredient that disintegrates quickly, when placed upon the tongue usually within seconds" according to the United States Food and Drug Administration (USFDA). (Siddiqui et al., 2010).

Fast dissolving tablets include orodispersible tablets, Rapi melts, porous tablets, and quick dissolving tablets. (Garima et al., 2012)

Types of tablets:**1. Oral tablets for ingestion**

- **Compressed tablets**
- **Multiple compressed tablets**
- **Layered tablets**
- **Compression-coated tablets**
- **Repeat-action tablets**
- **Delayed-action and enteric-coated tablet**
- **Sugar coated tablets**
- **Film coated tablets**
- **Chewable tablets**

2. Tablets used in oral cavity

- **Buccal tablets**
- **Sublingual tablets**
- **Troches and lozenges**
- **Dental cones**

3. Tablets Administered by Other Routes

- **Implantation tablets**
- **Vaginal tablets**

4. Tablets Used to Prepare Solution

- **Effervescent tablets**
- **Dispensing tablets**
- **Hypodermic tablets**
- **Tablet triturates**

Advantages

- ❖ No need of drinking agent such as water to swallow tablets.
- ❖ FDT can be easily administered to paediatric patients, geriatric patients, and patients with mental disorders.
- ❖ Accurate dosage as compared to liquid.
- ❖ Dissolution and absorption of the drug is rapid, which offers a rapid onset of action.
- ❖ The bioavailability of drugs is increased because some drugs are absorbed from the mouth, pharynx and esophagus via saliva flowing through the stomach.

- ❖ Advantages over liquid medication in terms of administration and transportation.
- ❖ First pass metabolism is reduced thus offering increased bioavailability and therefore reduced dosage and side effects.
- ❖ Offering enhance safe.(kaur et al.,2011, Patel et al.,2013)

Disadvantages

- ❖ The main disadvantage of FDT is related to the mechanical strength of the tablet.
- ❖ FDT is a highly porous and soft matrix, that why tablets with low compression.

- ❖ Drugs that taste bad are difficult to formulate by FDT.
- ❖ This tablet formulation may not be suitable for people who have a dry mouth due to decreased saliva production.
- ❖ Overall bioavailability and rate of absorption from the saliva solution.
- ❖ Stability of drug and dosage form.(Bhowmik et al. 2009 ,saptatshi et al.,2021,Tarique et al., 2011)

Limitations

1. Tablets are sometimes of lower mechanical quality. Therefore, it requires careful handling during the manufacturing process.
2. The tablets can leave an unpleasant taste and abrasion in the mouth if not allowed to grow properly.
3. Larger drug products are difficult to formulate in FDT e. G. Rifampicin (600 mg), Ethambutol (1000 mg) and others.(Kalindi et al.,2018, Harish et al.,2014, Patil et al.,2011)

Ideal properties

They should

- ✓ Not require water to swallow and dissolves or disintegrates in the mouth in seconds.
- ✓ Be good with taste covering and various excipients.
- ✓ Grant high medicine stacking.
- ✓ Have a magnificent mouth feel.
- ✓ Leave almost no deposit inside the mouth.
- ✓ Have sufficient strength to resist the preliminaries of the producing Method and
- ✓ Post producing, handling with.
- ✓ Exhibit low affectability to natural circumstances like sticking and temperature.
- ✓ Be versatile and pleasant to existing method.
- ✓ Grant the formulation of tablets utilizing standard process and equipment at low cost. (Nand et al.,2010, Shukla et al.,2009).

Salient features

- 1) Ease of use in patients who refuse to swallow tablets, such as: pediatric, geriatric and psychiatric patients.
- 2) Convenience of use and accurate dosage compared to Fluid.
- 3) No water is required to intake the dosage form, which is very convenient, especially for patients who are travelling and do not have direct access to water.
- 4) The good mouth feels properties of MDDS help change the basic perception of the drug as a "bitter pill", especially for paediatric patients.
- 5) Rapid dissolution and absorption of the drug, which can lead to a rapid onset of action.
- 6) Some drugs are absorbed from the mouth, throat and esophagus when saliva enters the stomach; in such cases, the bioavailability of the drug increases. Ability to convey the benefits of liquid medicine in solid form.

- 7) Pregastric absorption may lead to increased bioavailability and, as a result of dose reduction, increased clinical efficacy by reducing side effects.(Panigrahy et al.,2010)

Criteria for drug selection

- There should be no bitter taste.
- The dose should be less than 20 mg.
- The molecular weight should be low to moderate.
- Must be easily soluble in water and saliva.
- There must be an oral pH that is not partially ionized.
- It must be able to diffuse and partition into the epithelium of the upper GIT (log p> 1, or preferably > 2)
- There must be extensive first-pass metabolism.
- Oral tissues must be permeable. (Ajoy et al.,2013)

Mechanism of FDT

FDT includes the following mechanisms to achieve the desired rapid dissolution properties.

1. Water must penetrate rapidly into the matrix of the tablet to cause rapid disintegration and immediate dissolution of the tablet.
2. Incorporation of suitable disintegrants or highly water-soluble excipients into tablet formulations.
3. There are several mechanisms mentioned below by which the tablet is broken down into smaller particles and then a solution or suspension of the drug is obtained.

The mechanism is

- High source decay
- Chemical reaction
- Capillary action(Priyanka et al., 2011)

Requirements for rapidly disintegrating tablets

1) Patient factor

The rapidly disintegrating dosage form is useful for patients (particularly pediatric and geriatric patients) who cannot swallow traditional 8-ounce glass tablets and capsules.

This includes the following:

- Patients who have difficulty swallowing or chewing solid dosage forms.
- The patient obeys the rules for fear of choking.
- Many elderly patients with depression may not be able to swallow solid dosage forms
- An 8-year-old patient with allergies wants a more convenient way of administering antihistamine syrup.
- A middle-aged patient receiving radiation therapy for breast cancer may be unable to take his H2 blocker due to nausea.
- A patient with schizophrenia who may try to hide a simple pill under his tongue to avoid daily doses of atypical antipsychotics.

- A patient with persistent nausea who may be travelling or have little or no access to water.(siddhiqui et al., 2010)

2) Efficiency factor

Improved bioavailability and faster onset of action are the main claims for this formulation. The distribution of saliva in the oral cavity causes pregastric absorption of some of the ions formulated in cases where the drug dissolves rapidly. The Buccal, pharyngeal, and gastric regions are sites for absorption of many drugs. Any pregastric absorption avoids first-pass metabolism and can be particularly beneficial for drugs undergoing hepatic metabolism. In addition, the safety profile can be improved for drugs that produce large amounts of toxic metabolites mediated by first-pass metabolism in the liver and gastric metabolism, and for drugs that have a significant absorption ion fraction in the oral cavity and in the pregastric segment. (Nautiyal et al., 2014)

3) Factors of Production and Marketing

As a drug nears the end of its patent term, it is common for pharmaceutical manufacturers to develop drug entities in new and improved dosage forms. The new dosage form allows Manufacturers to expand market exclusivity, differentiate unique products and expand patent protection. For example, Eisai Inc. introduced Aricept FDT, an extension of the donepezil line for Alzheimer's disease, in Japan in 2004 and in the United States in 2005 in response to the American Ranbaxy generic challenge.(Mishra et al., 2014)

Selection of excipients

Excipients balance the properties of the active substances in fast-dissolving tablet

Bulk agents

Fast dissolving tablets that accumulate in large quantities are essential. It improves physical properties, improves disintegration in the mouth and reduces the convergence of dynamic compounds in the composition. Specialists in the construction of these transport frames have to rely on added sugars such as polydextrose, Mannitol, lactitol, DCL and starch hydrolysate for higher liquid solubility and good sensory perception. Above all, Mannitol has high solubility in liquids and excellent sensory perception. Fillers are also included in the range of 10 to 90% by weight of the final composition. The other ingredients may be listed in order of friability: crystalline polysaccharide > spray-dried lactose > beta-lactose > alpha-lactose > alpha-lactose monohydrate > dicalcium phosphate dihydrate. Sugar-based excipients commonly used as special assembly carriers (such as dextrose, fructose, maltose, Mannitol, sorbitol, hydrolysed starch, polydextrose and xylitol) has a high solubility and sweetness in liquids, resulting in a sugar-like Excipients depending on moulding and dissolution costs. One type of saccharide (lactose and Mannitol) has a limited moulding capacity but a high dissolving rate. Maltose and malitol, two saccharides with great moldability but low dissolution, are introduced .(Panigrahi et al.,2010)

Lubricants

This will formulate the tablet more palatable once it dissolves in the mouth. mouth. Grittiness and edges are removed using lubricants. In drugs, the mechanism is transmitted from the mouth to the stomach. Some lubricants are stearic acid, magnesium stearate, zinc stearate, talc, polyethylene glycol, liquid paraffin, magnesium lauryl sulphate, colloidal silicon oxide. (Chowdary et al., 2012)

Flavors and Sweetener

When added to the product, the aroma and flavor-hiding active ingredients create a pleasant and pleasant taste for the patient. The addition of these ingredients has the benefit of overcoming the spiciness and inconsistent taste of some of the active ingredients. Every natural and synthetic fragrance is often used to enhance the organoleptic properties of FDT. Peppermint oil, clove oil, laurel oil, anise oil, eucalyptus oil, thyme oil, sour almond oil, FDT.Mint fragrance, aromatic fragrance oil, peppermint oil, clove oil, laurel oil, anise oil, eucaly. Flavors include vanilla, citrus oil, fruit essence. Formulators can choose from a good variety of sweeteners, in addition to sugar, dextrose and fructose, as well as non-food sweeteners such as aspartame, sodium saccharin, sugar alcohol, and sucralose.

Superdisintegrants

Tablet formulations and disintegrant in capsule formulations are substances that are usually incorporated to enhance moisture perforation and dispersion of the dosage form matrix in the dissolution liquid. Superdisintegrants are usually used at low concentrations, usually 1-10% by weight by weight of the total unit dose. Ideally, these materials should cause the tablet to disintegrate not only into granules from which the tablet is fully compressed, but also into powder particles from which the granules are formulated. Commonly used super crushing agents are cross-linked polymers and cross-linked starch or microcrystalline cellulose, croscarmellose sodium (Ac-Di-Sol), crospovidone (CP), sodium starch glycolate (SSG), modified corn starch, pregelatinized starch, i.e., gelatinized starch. Carboxymethyl cellulose, calcium carboxymethyl cellulose. Sodium starch glycolate has a high fluidity of croscarmellose sodium. Crospovidone are naturally tough and very compact.

Mechanism of superdisintegrant

The use of super disintegrants improves the appropriateness of solid dosage forms. This can be achieved through various mechanisms. The mechanism by which tablets are broken into small pieces to form a homogeneous suspension is based on:

• Swelling

Although the influx of water may be a necessary disintegration initiative, flatulence is probably the most common mechanism of action for tablet crushers. Matched with a suitable medium, the explosive particles swell when returned and a swelling force develops which

causes the matrix to dissolve. High consistency tablets show poor degradation due to lack of sufficient swelling power. Instead, the swelling power is applied inside the pill with a low consistency. It should be noted that with a very high pressing section, the liquid cannot penetrate the inside of the pill and the decomposition is reversed again.

- **Porosity and Surface tension (wicking)**

Effective explosives that do not expand exhibit their explosive effect through porosity and surface tension. The porosity of the pill provides room for the liquid to penetrate the tablet. When we put the pill in a suitable liquid medium, the medium penetrates into the pill and replaces the air which is absorbed by the particles, which weakens the intermolecular bonds and breaks the pill into fine particles. The water absorption per tablet is determined by the hydrophilicity of the active substance/excipient. The hydrophilic network around the active ingredient particles aids degradation. Particle Repelling Power The disintegration system explains that the disintegrant “does not swell” causing the pill to swell. The molecular avoidance hypothesis asserts that non-swelling molecules lead to further degradation of the tablet. Its main component is the electric repulsion between particles.

- **Deformation**

During tablet compression, crushed particles are twisted, and once these distorted particles are removed, available for contact with liquid or water, they return to their traditional structure. The pressure increases the starch's ability to swell, causing the enlargement of the particles to distort causing the pill to disintegrate. (Pahwa et al., 2011)

Surface active agents

Sodium doecylsulfate, sodium lauryl sulphate, polyoxy ethylene Sorbitan fatty acid esters (Tweens), sorbitan fatty acid esters (Spans), polyoxy ethylene stearates

Binder

Polyvinyl pyrrolidone (PVP), polyvinyl alcohol (PVA), hydroxy Propyl methyl cellulose (HPMC).

Colour

Sunset yellow, Amaranth etc.

Techniques for preparation of fdt

The techniques used to manufacture FDTs can be classified as: -

- 1) Conventional techniques
- 2) Patented techniques

1) Conventional techniques

Various conventional technologies have been developed to produce oral disintegration systems for drug delivery, namely freeze drying, spray drying, compression molding, phase change process, melt granulation,

sublimation, bulk extrusion, cotton candy process, direct compression.

Freeze-Drying or lyophilization

Freeze drying is the process of sublimation of water from a product after freezing. This technique creates an amorphous porous structure that can be rapidly disintegrated. The active ingredient is dissolved or dispersed in an aqueous polymer/carrier solution. Mixing is done based on weight and pour into the walls of the pre-formed blister pack. The tray containing the blister pack is passed through a liquid nitrogen tunnel freezer to freeze the drug solution or dispersion. Then put in the frozen blister pack continuous freeze-drying refrigerator. After freeze drying, the aluminium foil carrier is applied to the blister sealing machine. The blisters are then packaged and dispatched. Freeze drying technique showed increased absorption and increased bioavailability.

Moulding method

The tablets are designed using a hydrophilic material to achieve maximum dissolution of the drug. The powder is moistened with a hydroalcoholic solvent and compressed into a dosage form. The solvent system is then allowed to evaporate. The taste of the drug particles was developed by spraying a liquid mixture of hydrogenated cottonseed oil, sodium carbonate, lecithin, polyethylene glycol with the active ingredients in a trituration of lactose-based tablets. The characteristics of the molding process are: Highly porous as drying removes solvent leaving a porous mass that promotes rapid dissolution.

Spray drying

In this technique gelatin can be used as a carrier and as a matrix, mannitol as a filler and sodium starch glycolate or croscarmellose or crospovidone are used as super disintegrants. It has been reported that spray-dried powder tablets disintegrate in aqueous media in less than 20 seconds. The formulation contains disintegrants such as mannitol and lactose, super-dissolving agents such as sodium starch glycolate and croscarmellose sodium, and acidic components (citric acid) and/or basic components (e.g., sodium bicarbonate). This spray-dried powder, compressed into tablets, exhibits fast disintegration and better dissolution.

Sublimation

To make a porous matrix, volatile materials are introduced into the formulation, which then undergoes a sublimation process. Volatile materials such as ammonium bicarbonate, ammonium carbonate, benzoic acid, camphor, naphthalene, urea, urethane and phthalic anhydride can be compressed into tablets together with other excipients. This fugitive material is then removed by sublimation, leaving a highly porous matrix. Tablets made with this method are said to dissolve in 10-20 seconds on average. Also, solvents such as cyclohexane; Benzene Can be used as a pore builder.

Direct compression

This is the simplest and most cost-effective technique for tablet manufacturing. In this process, tablets are produced directly by compressing a mixture of drug and excipient without pre-treatment. The mixture to be

compacted must have good flow properties. The procedure is carried out in 3 steps, viz.

- a. Digestion of drugs and excipients
- b. Mixing drugs and excipients
- c. Tablet compression

Process of direct compression



Nanonization

The recently developed Nanomelt technology involves reducing the particle size of the medication is ground to nano size using a proprietary wet milling method. Surface adsorption of chosen stabilisers onto the drug nanocrystals prevents agglomeration, which is then integrated into the FDT. This technique is very advantageous for drugs that are poorly soluble in water. Further advantages of this technology are the rapid breakdown/dissolution of nanoparticles, leading to increased absorption and thus higher bioavailability and dose reduction, cost-effective manufacturing process, conventional packaging due to excellent shelf life and wide dosage range (up to 200 mg of active substance per unit). (Sunita et al., 2010, Sahoo et al., 2010)

Patented technique

The fast dissolution property of ODT is usually attributed to the rapid penetration of water into the tablet matrix, leading to its rapid disintegration. Several technologies have been developed based on different aspects of formulation and process, and the obtained dosage forms vary in several parameters such as mechanical strength, porosity, dosage, stability, taste, mouthfeel, dissolution rate and overall bioavailability.

Zydus technology

The Zydus formula is a unique frozen tablet in which the drug is physically trapped or dissolved in a fast-dissolving carrier matrix. When the Zydus unit is placed in the mouth, the lyophilized structure disintegrates immediately and no water is required for easy swallowing. The Zydus Matrix is made up of many materials designed to accomplish a variety of purposes. Polymers such as gelatin, dextran or alginate are included to provide strength and elasticity during handling. They form a shiny amorphous structure that gives strength. (Keshari et al., 2015)

Orasolv technology

Orasolv technology was developed by the CIMA laboratory. The active ingredient is disguised by the flavour in this system. It also contains bubbly explosives. The tablets were prepared using a direct compression technique at low compressive strength to minimize oral dissolution time. For the manufacture of tablets, blenders

and tablets are commonly used. Tablets produced are soft and brittle, packaged in a specially designated place. (Pagar et al., 2014)

Durasolv technology

Durasolv is a patented technology from CIMA Labs. Tablets made with its technology consist of drugs, fillers and lubricants. Tablets are made using conventional tablet equipment and have good hardness. They can be packaged in blisters in conventional packaging systems. Durasolv is a suitable technology for products that require very few active ingredients. (Gupta et al., 2014)

Wow tab technology

Wow tab technology is patented by Yamanouchi Pharmaceutical Co. WOW means "Waterless". In this method, a combination of low-form saccharides and high-form saccharides is used to obtain a fast-melting solid mass. A combination of high and low pressure is used to produce tablets of suitable hardness (Acosta et al., 1998).

Flash dose technology

Streak portion innovation has been protected by Flash. Nurofen liquefy let is a form of Ibuprofen that comes in soft in-mouth pills utilizing Flash portion innovation is the principal business item sent off by Biovail Corporation. Streak portion tablets comprise of self-restricting shear Form framework named as floss. Shear form frameworks are ready by Flash intensity handling. (Khan et al., 2014)

Oraquick technology

K.V.S. Pharmaceutical have a patent over this innovation. It uses Taste concealing microsphere innovation called as micromask, which Gives better mouth feel over taste covering options, huge mechanical strength, and fast breaking down/Disintegration of the item. Any sort of solvents is not used by Taste concealing interaction. Along these lines it prompts unrivaled and quick effective item. (Mohan et al., 2011)

Dispersible tablet technology

Lek in Yugoslavia was given licenses for dispersible tablets of Dihydroergotamine and cimetidine, which were professed to break down in under brief when in touch

with water at room temperature. Dihydroergotamine is ineffectively dissolvable in water in the free base structure. A Superior disintegration pace of dihydroergotamine methane sulphonate was seen with dispersible tablets containing 0.8-10%, ideally around 4% by weight, of natural acids. One of the fundamental excipients in the cimetidine plan particle a crumbling specialist. It gives fast Expanding and additionally great wetting ability to the tablets and accordingly a Speedy breaking down. The crumbling specialists incorporate starch or Changed starches, microcrystalline cellulose, alginic corrosive, cross-connected Sodium carboxymethylcellulose, and cyclodextrin polymers. A Blend of at least two breaking down specialists created better Crumbling result. (Nautiyal et al., 2014)

Advatab technology

Advatab tablets deteriorate quickly in the mouth, normally in under 30 seconds, to take into consideration helpful oral medication organization without water. These tablets are particularly fit to those patients that experience trouble in gulping cases and tablets. Advatab is particular from other FDT advancements as it tends to be joined with Eurand's free molecule innovations like its reality driving microcaps taste veiling innovation and its diffucaps, controlled release technology. (Diviate et al., 2011)

Nanocrystal technology

For quick disintegrating tablets, spirit's exclusive nanocrystal innovation can empower detailing and work on compound movement and end result qualities. Diminishing molecule size builds the Surface region, which prompts an expansion in disintegration rate. This can be achieved typically and proficiently utilizing nanocrystal Innovation. Nanocrystal particles are little particles of medication Substance, ordinarily under 1000 nanometers (nm) in distance across, which are delivered by processing the medication substance utilizing a restrictive wet processing strategy. (Kuchekar et al., 2003)

Pharmaburst technology

Pharmaburst innovation is being licensed by SPI pharma. The tablet Fabricated by this interaction includes a dry mix of a medication, flavors, and oil then, at that point, trailed by pressure into tablets which then Disintegrate inside 30-40 seconds. Tablets made by this System have adequate strength can be pressed in rankle pack and jugs. (Nautiyal et al., 2014)

Frosta technology

Innovation is licensed by Akina. Frosta innovation uses the canter idea of formulating plastic granules and compressing at low strain to create strong tablets with high Porosity. The cycle includes blending the porous plastic Material in with water penetration enhancer and followed by Granulating with a folio. (Sharma et al., 2008)

Lyo (pharmalyoc)

Oil In water emulsion is get ready d and set straightforwardly into rankle Holes followed by freeze – drying. Non-homogeneity during Freeze-drying is kept away from by consolidating latent filler to build the thickness at long last the sedimentation. A high extent of filler Decreases

The porosity of tablet because of which crumbling is brought down.

Sheaform technology

The innovation depends on the arrangement of floss that is otherwise called, shear from framework, which is delivered by oppressing a feed stock containing a sugar transporter by streak heat handling. In this Cycle, the sugar is at the same time exposed to radial power and to a temperature angle, which raises the temperature of the Mass to make an interior, stream condition, which allows part of it to move with deference of the mass. (Nautiyal et al., 2014)

Evaluation of FDT'S

Preformulation study

1. Angle of repose

Angle of repose is determined by using funnel method. The accurately weighed blend is placed in a funnel. The height of the funnel is adjusted so that the tip of the funnel only touches the apex of the heap of blend. The drug excipient mixture was allowed to flow through the funnel freely on to the surface. The diameter of the powder cone was measured and angle of repose was calculated using the following formula:

$$\tan \Theta = h/r$$

Here;

H = Height of pile

R = Radius of pile

Θ = Angle of repose

Angle of Repose less than 30 ° indicates the free flowing of the material.

2. Bulk density

The apparent density is determined by placing a weighed amount of the blend into a measuring cylinder and measuring Volume and weight. Bulk Density can be calculated using the following formula:

$$\text{Bulk density} = \text{Total mass} / \text{Bulk volume}$$

3. Tapped density

It is determined by setting up a measuring cylinder, contain a certain mass of the drug excipient blend. Tapped density is ratio of mass of tablet blend to tapped volume of tablet. Precisely weighed amount of tablet blend poured in measuring cylinder and height is measured. Then, cylinder was permitted to 100tap under its own load onto a hard surface. The tapping was continued until no further change in height was noted. Tapped density can be calculated using the following formula:

$$\text{Tapped Density} = \text{Total mass} / \text{Tapped Volume}$$

4. Compressibility index

Compressibility is the ability of blend to reduce in volume under Pressure using bulk density and tapped density Percentage compressibility of blend was Determined, which is defined as the compressibility index. This is indirectly related to Relative flow rate. The compressibility index is determined by the given formula Compressibility Index (%) = $[(TD-BD) \times 100] / TD$

5. Hausner's ratio

Hausner's ratio shows the flow properties of powder and measured by the ratio of tapped density to bulk density. Hausner's ratio was determined by the given formula:

Hausner's ratio = Tapped density / Bulk density (Priyanka et al., 2011)

Post compression evaluation

1. Appearance

The appearance of a tablet is determined directly by observation of tablet. Appearance includes elegance, shape, color, surface texture. All these parameters are essential for suitability and consumer acceptance.

2. Weight variation test

Weigh 20 tablets individually which are selected at randomly then calculate the average weight.

3. Hardness of tablet

To determine the crushing strength by Monsanto Hardness Tester.

4. Tablet friability

Weigh 20 tablets of the formulation and subject them to abrasion by employing a roche friabilator then compare with their initial weight of tablets obtained % friability.

% Friability = $(W1-W2) \times 100 / W1$

Where,

W1 = Weight of tablets before test (Initial weight)

W2 = Weight of tablets after test (Final weight)

5. Thickness

The diameter and size of the tablet punch depends on the die and punch selected to make the tablet. The tablet thickness was measured with a screw gauge. The tablet thickness should be controlled within $\pm 5\%$ of the standard deviation. Also, the thickness should be controlled for easy packing. The thickness is measured in millimeters (mm).

6. In vitro disintegration time

For this test, six tablets are placed in water at 37°C using a tablet disintegration tester. The time required for the tablet disintegration and passing completely through the sieve is recorded.

7. In vitro dissolution study

The rate of drug release from FDT is determined using the USP dissolution test Apparatus 2 (paddle method). The dissolution test was carried out using 900 ml 0.1N HCl at $37 \pm 0.5^\circ\text{C}$ at 100 rpm.

8. Wetting time

Use a piece of tissue paper (10.75×12 mm), fold it twice and place it in a culture dish (d= 6.5 cm) containing 6 ml of water. Put a tablet on the paper and record the time required for complete wetting.

9. Water absorption coefficient (R)

Record the weight of the tablet before placing it in a Petri dish (Wb) using a digital weighing balance. Record the weight of the tablet after wetting (Wa). The water absorption coefficient R can be determined according to the following equation, where Wb and Wa are the weight of the tablet before and after water absorption. (Priyanka et al., 2011).

CONCLUSION

Due to the increasing demand of novel drug delivery, the fast-disintegrating drug delivery system has become one of the most important building blocks in the novel drug delivery system. The introduction of fast disintegrating drug delivery system has encountered the delivery of conventional dosage form. Fast disintegrating tablets are an innovative dosage form that is designed and specifically designed to overcome some of the problems observed with traditional solid dosage forms, which is difficulty in swallowing tablets in geriatric and pediatric patients. Fast disintegrating tablets are designed to dissolve or disperse rapidly in saliva, usually in less than 60 seconds (range 5-60 seconds). Fast disintegrating tablets have better patient compliance and can improve biopharmaceutical properties, bioavailability, increased efficacy, convenience and safety compared to traditional oral dosage forms. The popularity of FDT has increased greatly over the last decade. FDT should be formulated for psychotic, bedridden patients, geriatric patients, pediatric patients, patients who may not have access to water, and patients are busy in travelling. This FDT formulation is formulated by several conventional and patented technologies and FDT has sufficient mechanical strength and rapid disintegration/dissolution in the oral cavity without water. Newer technologies for formulating FDT that offer more potent dosage forms with more benefits.

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