INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com ISSN 2230 – 8407

Review Article

FAST DISSOLVING TABLETS: NEEDS TO ENHANCE BIOAVAILABILITY

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Article Received on: 12/03/13 Revised on: 01/04/13 Approved for publication: 02/05/13

DOI: 10.7897/2230-8407.04512

IRJP is an official publication of Moksha Publishing House. Website: www.mokshaph.com

ABSTRACT

Oral route is the most important and preferred route for drug administration due to the convenience, ease of administration and patient compliance. Tablet is the most preferred conventional oral unit dosage form. During tablet administration dysphasia is the main problem. Fast dissolving tablets can reduce this problem by dissolving and disintegrating rapidly within few seconds in mouth without water. Fast dissolving tablets become advantageous for those patients which have swallowing problem for example pediatric, geriatric and mentally ill patients. This review describes the introduction, advantages, disadvantages, excipients used, various techniques used in formulation and evaluation parameters.

Keywords: Fast Dissolving Tablets, Exicipients, Superdisintegrant, Disintegration, Dissolution, Bioavailability.

INTRODUCTION

Despite the tremendous advancement in drug delivery, the oral route remains the perfect route for administration of therapeutic agents because of low cost of therapy, ease of administration that leads to increase in patient compliance. Drugs administered by oral route like solid oral dosage forms particularly tablets, are the preferred class of product. Fast dissolving tablets (FDT) is known to be one of the most innovative methods in oral drug delivery which is also known as melt in mouth tablet (MMT). This kind of melt in mouth tablet is good for those patients who have difficulty to swallow oral dosage forms, especially geriatric, pediatric patients. These dosage forms are also suitable for the mentally ill, bedridden, developmentally disabled patients and in patients with underlying diseases which disrupts swallowing ability e.g., migraine, parkinsonism, throat cancer, mouth ulcers, and throat infections, the patients with persistent nausea and vomiting, who are in traveling, and who do not have easy access to water. [1]

Fast dissolving tablets show good stability, ease of manufacturing and ease of handling by patient [2]. The main criteria for fast dissolving tablet is to disintegrate or dissolve rapidly in oral cavity with saliva in 15 to 60 seconds, without need of water and should have pleasant mouth feel. [3] Fast dissolving tablet is shown in figure 1.

Ideal Properties of Fast Dissolving Tablets [4,5]

- It does not require water to swallow and should dissolve or disintegrate in the mouth within a few seconds.
- It should allow high drug loading.
- It should be compatible with taste masking and other excipients.
- It should have a pleasing mouth feel.
- It should leave minimal or no residue in the mouth after oral administration.
- It should have sufficient strength to withstand the rigors of the manufacturing process.
- It should exhibit low sensitivity to environmental conditions such as humidity and temperature.
- It should be adaptable and amenable to existing processing and packaging machinery.
- It should allow the manufacture of tablets using conventional processing and packaging equipment at low cost.

Advantages of Fast Dissolving Tablets [6,7]

- Administration to the patients who cannot swallow, such as the elderly, bedridden patients, patients affected by renal failure and patients who refuse to swallow such as pediatric, geriatric & psychiatric patients.
- Rapid drug therapy intervention.
- Achieve increased bioavailability/rapid absorption through pre-gastric absorption of drugs from mouth, pharynx and esophagus as saliva passes down.
- Convenient for administration and patient compliant for disabled, bedridden patients and for travelers and busy people, who do not always have access to water.
- Good mouth feel property helps to change the perception of medication as bitter pill particularly in pediatric patients.
- The risk of chocking or suffocation during oral administration of conventional formulations due to physical obstruction is avoided, thus providing improved safety.

Disadvantages [8,9]

- The tablets usually have insufficient mechanical strength. Hence, careful handling is required.
- The tablets may leave unpleasant taste and grittiness in mouth if not formulated properly.
- Patients who concurrently take anticholinergic medications may not be the best candidates for FDTs and patients with Sjogren's syndrome or dryness of mouth due to decreased saliva production may not be the good candidates for these tablet formulations.
- FDTs are hygroscopic in nature, so must be kept in dry place.
- FDTs require special packaging for proper stabilization and safety of stable product.

Various Techniques Used in Fast Dissolving Tablet Formulation

Freeze drying technology:

It is also known as Lyophilization. It can be used to prepare tablets that have very porous open matrix network into which saliva rapidly moves to disintegrate lyophilized mass after it is placed in mouth. The drug is entrapped in a water soluble matrix which is freeze dried to produce a unit which rapidly disperses when placed in mouth. The preferred drug characteristics for freeze drying formulations are water insoluble, low dose, chemically stable, small particle size and tasteless. It is relatively expensive and time consuming manufacturing process. [10,11] Freeze dryer is shown in Figure 2.

Tablet moulding technology:

Moulded tablets are designed to facilitate fast absorption of drugs through the mucosal lining of mouth by inclusion of water-soluble ingredients. The advantage of this system is that it has a porous structure which enhances dissolution thereby enhanced bioavailability and decreased first pass metabolism of certain drugs. Moulding process is employed usually with soluble ingredient like saccharides, which offers improved mouth feel and disintegration of tablets. However, moulded tablets have low mechanical strength, which results in erosion and breakage during handling. Different moulding techniques which can be used to prepare fast dissolving tablets are as follow:

Compression moulding: The powder mixture previously wetted with a solvent like ethanol/water is compressed into mould plates to form a wetted mass.

Heat moulding: A molten matrix in which drug is dissolved or dispersed can be directly moulded into fast dissolving tablets. [12]

Spray drying technology:

It is used in pharmaceutical industries to produce highly porous powders. The processing solvent is evaporated rapidly by spray drying, which renders the product highly porous and thus can be used in manufacturing mouth dissolving tablets. Tablets manufactured from the spray-dried powder have been reported to disintegrate in less than 20 seconds in aqueous medium. [13,14] Spray drying technique is shown as in Figure 3.

Direct compression method:

It is a process by which tablets are compressed directly from mixtures of the drug and excipients, without any preliminary treatment. [15] It offers advantages over the other manufacturing processes for tablets, such as wet granulation and provides high efficiency. The mixture to be compressed must have adequate flow properties and should cohere under pressure. Superdisintegrants play a major role in the disintegration and dissolution process of fast dissolving tablets. The choice of a suitable type and an optimal amount of disintegrants is paramount for ensuring a high disintegration rate. The addition of other formulation components such as water soluble excipients or effervescent agents can further enhance dissolution or disintegration properties.[16] The disintegrant addition technology is the most preferred technique to manufacture the tablets due to certain advantages: high doses can be accommodated, cost-effectiveness, easiest way to manufacture the tablets, conventional equipments and commonly available excipients can be used. Hard and large tablets exhibit more disintegration time whereas very soft and small tablets show low mechanical strength. So, an optimum type and concentration of disintegrant should be chosen to achieve quick disintegration and high dissolution rates. [16, 17]

Sublimation technology:

It is the key to rapid disintegration for mouth dissolving tablets is the presence of a porous structure in the tablet matrix. Conventional compressed tablets that contain highly water-soluble ingredients often fail to dissolve rapidly because of low porosity of the matrix. Hence, to generate porous matrix, volatile ingredients are used that are later subjected to a process of sublimation.[18] Sublimation is a process in which water passes directly from solid state to vapor state without passing through liquid state. This process involves addition of some inert volatile substances like urea, urethane, naphthalene, camphor, etc to other excipients and the compression of blend into tablet. Removal of volatile material by sublimation creates pores in tablet structure, due to which tablet dissolves when comes in contact with saliva. Additionally several solvents like cyclohexane, benzene etc can also be used as pore forming agents. [19] Schematic diagram of sublimation technique is shown as in Figure 4.

Mass-extrusion technology:

This technology involves softening the active blend using the solvent mixture of water soluble polyethylene glycol using methanol and expulsion of softened mass through the extruder or syringe to get a cylinder of the product into even segments using heated blade to form tablets. The dried cylinder can also be used to coat granules of bitter tasting drugs and there by masking their bitter taste. [20]

Melt granulation technology:

This is a process by which pharmaceutical powders are efficiently agglomerated by a meltable binder. The advantage of this technique compared to a conventional granulation is that no water or organic solvents is needed. Because there is no drying step, the process is less time consuming and uses less energy than wet granulation. It is a useful technique to enhance the dissolution rate of poorly water-soluble drugs, such as griseofulvin. [21] This approach to prepare MDT with sufficient mechanical integrity, involves the use of a hydrophilic waxy binder such as superpolystate, PEG-6-stearate. [22]

Cotton candy process:

It is also known as the “candy floss” process. The FDT is formed using a candy floss or shear form matrix, the matrix is formed from saccharides or polysaccharides processed into amorphous floss by a simultaneous action of flash melting and centrifugal force. The matrix is then cured or partially recrystallised to provide a compound with good flow properties and compressibility. The candy floss can then be milled and blended with active ingredients and other excipients and subsequently compressed into FDT. However the high processing temperature limits the use of this technology to thermostable compounds only. [23]

Nanonization:

A recently developed nanomelt technology involves reduction in the particle size of drug to nano size by milling the drug using a proprietary wet-milling technique. The nanocrystals of the drug are stabilized against agglomeration by surface adsorption on selected stabilizers, which are then incorporated into FDTs. This technique is especially

advantageous for poorly water soluble drugs. Other advantages of this technology include fast dissolution of nanoparticles leading to increased absorption and hence higher bioavailability and reduction in dose, cost effective manufacturing process.

Disintegrant addition:
Disintegrant addition is one popular technique for formulating FDTs because of its easy implementation and cost-effectiveness. The basic principles involve addition of superdisintegrants in optimum concentration so as to achieve mouth dissolving along with the good mouth feel. [23] Mechanism of superdisintegrants by swelling is shown in Figure 5.

Patented Technologies for Fast Dissolving Tablets Formulation

Zydis technology:
Zydis, the best known of the fast dissolving preparations was the first marketed new technology tablet. The tablet dissolves in the mouth within seconds after placement on the tongue. Zydis tablet is produced by lyophilizing or freeze drying the drug in a matrix usually consisting of gelatin. [24]

Durasolv technology:
The tablets made by this technology consist of a drug, fillers and a lubricant. Tablets are prepared by using conventional tabletting equipment and have good rigidity. Durasolv is an appropriate technology for products requiring low amounts of active ingredients. [25]

Orasolv technology:
This technology uses an effervescent disintegration pair that releases gas upon contact with water. The widely used effervescent disintegration pairs usually include acid sources like include citric acid, tartaric acid, malic acid, fumaric acid, adipic acid and a carbonate source include sodium bicarbonate, sodium carbonate, potassium bicarbonate and potassium carbonate The amount of effervescent agent is in general about 20–25% of the total weight of the tablet. [25, 26]

Flashtab technology:
It is yet another fast dissolving/disintegrating tablet formulation. Prographarm laboratories have patented the Flashtab technology. It utilizes most of the same excipients as in conventional compressed tablets. A disintegrating agent and a swelling agent are used in combination with coated drug particles in this formulation to produce a tablet that disintegrates in the mouth in less than one minute. [27]

Advatab technology:
Advatab tablets disintegrate rapidly in the mouth, typically in less than 30 seconds, to allow for convenient oral drug administration without water. These tablets are especially suited to those patients that experience difficulty in swallowing capsules and tablets. Advatab is distinct from other FDTs technologies as it can be combined with Eurand's complimentary particle technologies like its world leading Microcaps® taste masking technology and its Diffucaps®, controlled release technology. [28, 29, 30]

Wowtab technology:
The Wowtab fast dissolving tablet formulation has been on the Japanese market for a number of years. The Wowtab technology utilizes sugar and sugar-like mannitol which display high aqueous solubility and sweetness and hence, imparts taste masking and a pleasing mouth feel. Sugar-based excipients are classified based on their mouldability and dissolution rate. [31]

Flash dose technology:
This technology utilizes a unique spinning mechanism to produce a floss-like crystalline structure, much like cotton candy. This crystalline sugar can then incorporate the active drug and be compressed into a tablet. This procedure has been patented by Fuisz and is known as Shearform. Instead of a floss-like material, small spheres of saccharides can be produced to carry the drug. [32]

Quicksolv technology:
This technology is patented by Janssen Pharmaceuticals. It utilizes two solvents in formulating a matrix, which disintegrates instantly. Methodology includes dissolving matrix components in water and the solution or dispersion is frozen. Then dry the matrix by removing water using an excess of alcohol. Thus the product formed has uniform porosity and adequate strength for handling. [33]

Lyoc technology:
Lyoc technology is patented by Pharma Lyoc. Oil in water emulsion is prepared and placed directly into blister cavities followed by freeze-drying. Nonhomogeneity during freeze-drying is avoided by incorporating inert filler to increase the viscosity finally the sedimentation. High proportion of filler reduces porosity of tablets due to which disintegration is lowered.[34]

Ziplets technology:
Recently Eurand developed the Ziplets technology, which can be used with water insoluble compounds as both bulk actives and as coated microparticles. As the soluble components dissolve on the tablets outer layer, the rate of the water diffusion into the tablet core decreases because of the formation of concentrated viscous solutions. [35]

Oraquick technology:
The Oraquick fast dissolving tablet formulation utilizes a patented taste masking technology. The taste masking process does not utilize solvents of any kind, and therefore leads to faster and more efficient production. Lower heat of production than alternative fast dissolving technologies makes Oraquick appropriate for heat-sensitive drugs. Oraquick claims quick dissolution in a matter of seconds, with good taste masking. [36]

Frosta technology:
Akina patents this technology. It utilizes the concept of formulating plastic granules and compressing them at low pressure to produce strong tablets with high porosity. Plastic granules composed of porous and plastic material, water penetration enhancer, and binder. The process involves mixing the porous plastic material with water penetration enhancer followed by granulating with binder. The tablets obtained have excellent hardness and rapid disintegration time ranging from 15 to 30 sec depending on size of tablet. [37]

Ceform technology:
In this technology microspheres containing active ingredient are prepared. The essence of ceform microsphere manufacturing process involves placing a dry powder,

containing substantially pure drug material or a special blend of drug materials plus other pharmaceutical compounds, and excipients into a precision engineered and rapidly spinning machine. The centrifugal force of the rotating head of the ceform machine throws the dry drug blend at high speed through small heated openings. The microspheres are then blended and compressed into the pre-selected oral delivery dosage format. The ability to simultaneously process both drug and excipient generates a unique microenvironment in which materials can be incorporated into the microsphere that can alter the characteristics of the drug substance. [38]

Pharmaburst technology:
It is a "Quick Dissolve" delivery system patented by SPI Pharma. Pharmaburst is a co-processed excipient system with specific excipients, which allows rapid disintegration and low adhesion to punch faces mouldability saccharine are used to obtain rapid melting strong tablet. The active ingredient mixes with low mouldability saccharides. [39]

Quick-Dis technology:
Lavipharm Laboratories Inc. has invented an ideal intraoral fast-dissolving drug delivery system, which satisfies the unmet needs of the market. The novel intraoral drug delivery system, trademarked Quick- Dis, is Lavipharm's proprietary patented technology and is a thin, flexible, and quick-dissolving film. The film is placed on the top or the floor of the tongue. It is retained at the site of application and rapidly releases the active agent for local and systemic absorption. The Quick-Dis drug delivery system can be provided in various packaging configurations, ranging from unit dose pouches to multiple-dose blister packages. The typical disintegration time, which is defined as the time at which the film begins to break when brought into contact with water, is only 5 to 10 seconds for the Quick-Dis film with a thickness of 2 mm. The dissolving time, which is defined as the time at which not less than 80% of the tested film is dissolved in aqueous media, is around 30 seconds for Quick Dis film with a thickness of 2 mm. The typical release profile of an active ingredient exhibited by a Quick-Dis drug delivery system is 50% released within 30 seconds and 95% within 1 minute. [40]

Excipients Used in Preparation of Fast Dissolving Tablets
The excipients used in the preparation of fast dissolving tablets are given in the table 1.

Factors to be considered for Selection of Superdisintegrants[11]

- It should produce mouth dissolving when tablet meets saliva in the mouth
- It should be compactable enough to produce less-friable tablets.
- It can able to produce good mouth feel to the patient. Thus, small particle size is preferred to achieve patient compliance.
- It should have good flow since it improve the flowability of the total blend.

Preformulation Studies [41,42,43]
Angle of Repose:
The angle of repose (θ) can be measured by the friction forces in a loose powder. It is defined as the maximum angle possible between the surface of the pile of the powder and the horizontal plane. The angle of repose is determined by the funnel method suggested by Newman. The weighed amount is taken in a funnel. The height of funnel is adjusted in such a way that the tip of the funnel just touches the apex of the heap of blend. The blend is allowed to flow through the funnel freely on the surface. The diameter of the powder cone can be determined and Angle of repose is determined by the following formula:-

$$\text{Tan}(\theta) = h/r$$

Where θ = angle of repose
h = height of the cone
r = radius of the cone base

Flow of property based on angle of repose is shown in table 2.

Bulk Density (Db):
Bulk density (Db) is defined as the mass of the powder divided by the bulk volume and is expressed as gm/ cm^3 .The bulk density is then obtained by dividing the weight of sample in grams by final volume in cm^3.

$$Db = M/Vb$$

Where M = mass of powder in gram
Vb = bulk volume of the powder

Tapped Density (Dt):
Tapped density is the ratio of total mass of the powder to the tapped volume of the powder. It can be determined by placing a graduated cylinder containing a known mass of drug-excipients blend. The cylinder is allowed to fall under its own weight onto a hard surface from the height of 10 cm at 2 second intervals. The tapping is continued until the difference between successive volumes is less than 2%. It is expressed in gm/ml.

$$Dt = M/Vt$$

Where M = mass of powder
Vt = volume of the tapped packing

Hausner's Ratio: Hausner's ratio is a indirect index of ease of powder flow and is given as:

$$\text{Hausner's ratio} = Dt/Db$$

Where Dt = tapped density
Db = bulk density

Flow of property based on Hausner's ratio is shown in table 3.

Porosity: The porosity € of powder is defined as the ratio of void volume (V_p) to the bulk volume (V_b) of the packaging.
The porosity of the powder is given by:

$$€ = Vb - Vp/ Vp = 1 - Vp/ Vb$$

Porosity is frequently expressed in percentage and is given as:

$$\% € = (1 - Vp/ Vb) \times 100$$

Carr's Index: Carr's index is expressed in percentage and indicates powder flow properties and is given by-

$$C.I. = Dt - Db / Dt \times 100$$

Where, Dt = tapped density of the powder;
Db = bulk density of the powder

Flow of property based on Carr's index is shown in table 4.

Formulation of Fast Dissolving Tablets [44]
FDTs can be formulated by the following methods:

Preparation of FDTs by Direct Compression Method:
FDTs can be prepared by direct compression method by using co-processed superdisintegrants like crosspovidone, sodium starch glycolate, mannitol, microcrystalline cellulose etc. as a diluents, sweetening agent, flavor, magnesium

stearate, talc used as a lubricant and glidants. All the ingradients are sieved separately and then weighed and mixed in geometrical order after sufficient mixing of drug as well as other components compressed into tablets.

Preparation of FDTs by Wet Granulation Method:
This process involves the wet massing of powders, wet sizing, milling and drying. Wet granulation forms the granules by binding the powder together with an adhesive, instead of by compaction. This process employs a solution, suspension and slurry containing a binder, which is usually added to the powder mixture.

Evaluation of Fast Dissolution Tablets [45,46]
Tablets from all the formulation were subjected to following quality control tests:

General Appearance:
The general appearance of a tablet, its visual identity and over all "elegance" is essential for consumer acceptance and tablet's size, shape, color, presence or absence of an odor, taste, surface texture, physical flaws and consistency and legibility of any identifying marking.

Size and Shape:
The size and shape of the tablet can be dimensionally described, monitored and controlled.

Tablet Thickness:
Tablet thickness is an important characteristic in reproducing appearance and also in counting by using filling equipment. Some filling equipment utilizes the uniform thickness of the tablets as a counting mechanism. Micrometer or Vernier Calipers were used to measure the thickness of the tablet as done in case of conventional tablets. Ten tablets can be taken and their thickness is recorded using micrometer.

Weight Variation:
Twenty tablets are selected randomly from the lot and weighted individually to check for weight variation. Weight variation specification as per Indian Pharmacopoeia is shown in table 5.

Hardness:
Hardness of tablet is defined as the force applied across the diameter of the tablet in the order to break the tablet. The resistance of the tablet to chipping, abrasion or breakage under condition of storage transformation and handling before usage depends on its hardness. Hardness can be determined by using Monsanto, Erweka, Pfizer, Schleuniger hardness tester

Friability:
Friability can be determined using Roche friabilator. This device subjects the tablet to the combined effect of abrasion and shock in a plastic chamber revolving at 25 rpm and dropping a tablet at height of 6 inches in each revolution. Pre weighed sample of tablets are placed in the friabilator and are subjected to the 100 revolutions. The friability (F) is given by the formula:

$$F = \frac{W_{int.} - W_{fin}}{W_{int.}}$$

Where, Wint = Initial Weight of tablets before friability;
Wfin = Final Weight of tablets after friability.

Wetting Time:
Wetting time of dosage form is related to the contact angle. It needs to be assessed to give an insight into the disintegration properties of the tablets; a lower wetting time implies a quicker disintegration of the tablet. For this purpose, a tablet is placed on a piece of tissue paper folded twice and kept in a small Petri dish internal diameter of 6.5 cm containing 6 ml of water, and the time for complete wetting is measured.

Disintegration Test:
Disintegration time for fast dissolving tablets needs to be modified as disintegration is required without water, thus the test should mimic disintegration in salivary contents. For this purpose, a petridish of 10 cm diameter is filled with 10 ml of water. The tablet is carefully put in the center of petridish and the time for the tablet to completely disintegrate into fine particles can be noted.

Water Absorption Ratio:
A piece of tissue paper folded twice can be placed in a small Petridish containing 6 ml of water. A tablet is put on the paper and the time required for complete wetting can be measured. The wetted tablet is then weighed. Water absorption ratio, R, can be determined using following equation:

$$R = 10\ (wa/wb)$$

Where, wa = weight of tablet before water absorption;
wb = weight of tablet after water absorption.

***In vitro* Dispersion Time:**
In vitro dispersion time is measured by dropping a tablet in a beaker containing 50 ml of media. Three tablets from each formulation are randomly selected and in vitro dispersion time can be performed. Time required for complete dispersion of a tablet is measured.

***In vitro* Dissolution Test:**
The *In vitro* dissolution studies are carried out using USP paddle method at 50 rpm in 900 ml of dissolution media, maintained at 37 ± 0.5°C. Dissolution media is selected as per monograph. Aliquots were withdrawn at the specified time intervals, filtered through whatmann filter paper and assayed spectrophotometrically at specific wavelength. An equal volume of fresh medium, which was pre-warmed at 37°C is replaced into the dissolution media after each sampling to maintain the constant volume throughout the test. Dissolution studies are performed with n=6.

Stability Testing of Drug (Temperature Dependent Stability Studies):
The fast disintegrating tablets should be packed in suitable packaging and stored under the following conditions for a period as prescribed by ICH guidelines for accelerated studies.

Conditions for long term testing : 25 ± 2 °C/60 ± 5% RH
Conditions for accelerated testing : 40 ± 2 °C/75 ± 5% RH

Tablets are withdraw after a period of 15 days and analyze for physical characterizations like visual defects, hardness, friability, disintegrations, dissolution and drug content etc. The data obtained is fitted into first order equations to determine the kinetics of degradation. Accelerated stability data are plotting according Arrhenius equation to determine the shelf life at 25°C.[47]

Packaging: Packaging is one of the important aspects in manufacturing FDT. The products obtained by various technologies vary in some of the parameters especially in mechanical strength to a good extent. The products obtained by lyophilization process including various technologies such as Zydis, Lyoc, Quicksolv, and Nanocrystal are porous in nature, have less physical resistance, sensitive to moisture, and may degrade at higher humidity conditions. For the above reasons products obtained require special packing. Zydis units are generally packed with peelable backing foil. Paksolv is a special packaging unit, which has a dome-shaped blister, which prevents vertical movement of tablet within the depression and protect tablets from breaking during storage and transport, which is used for Orasolv tablet. Some of the products obtained from Durasolv. WOW Tab, Pharmaburst, Oraquick, Ziplets technologies etc. have sufficient mechanical strength to withstand transport and handling shock so they are generally packed in push through blisters or in bottles**.**

Table 1: List of excipients used in preparation of fast dissolving tablets

Excipient Used	Examples
Superdisintegrants	Crospovidone, Microcrystalline Cellulose, Sodium Starch Glycollate, Sodium Carboxy Methyl Cellulose, Pre-Gelatinzed Starch, Calcium Carboxy Methyl Cellulose, Modified Corn Starch
Flavours	Peppermint Flavour, Cooling Flavor, Flavoring Aromatic Oil, Peppermint Oil, Clove Oil, Bay Oil, Anise Oil, Eucalyptus Oil Thyme Oil, Oil of Bitter Almonds
Sweeteners	Aspartame, Sugars Derivatives
Fillers	Mannitol, Sorbitol, Xylitol, Calcium Carbonate, Magnesium Carbonate, Calcium Phosphate, Calcium Sulfate, Pregelatinized Starch, Magnesium Trisilicate, Aluminium Hydroxide
Surface active agents	Sodiumdoecylsulfate, Sodiumlaurylsulfate, Polyoxyethylene Sorbitan Fatty Acid Esters (Tweens), Sorbitan Fatty Acid Esters (Spans), Polyoxyethylene Stearates
Binder	Polyvinylpyrrolidone(PVP), Polyvinylalcohl(PVA), Hydroxypropyl Methylcellulose(HPMC)
Lubricants	Stearic Acid, Magnesium Stearate, Zinc State, Calcium State, Talc, Polyethylene Glycol, Liquid Paraffin, Magnesium Laury Sulfate, Colloidal Silicon Dioxide
Colour	Sunset Yellow, Amaranth

Table 2: Flow property based on angle of repose

Flow Property	Angle of Repose (degrees)
Excellent	25 – 30
Good	31 – 35
Fair-aid not needed	36 – 40
Passable – may hang up	41 – 45
Poor – must agitate, vibrate	46 – 55
Very poor	56 – 65

Table 3: Flow property based on Hausner's ratio

Flow Property	Hausner's Ratio
Excellent	1.00 – 1.11
Good	1.12 – 1.18
Fair	1.19 – 1.25
Passable	1.26 – 1.34
Poor	1.35 – 1.45
Very poor	1.46 – 1.59
Very, very poor	>1.60

Table 4: Flow property based on Carr's index

Flow Property	Carr's Index (%)
Excellent	≤10
Good	11 – 15
Fair	16 – 20
Passable	21 – 25
Poor	26 – 31
Very poor	32 – 37
Very, very poor	>38

Table 5: Limits of weight variation

Average Weight of Tablets	% Deviation
80 mg or less	±10
80 mg or 250 mg	±7.5
250 mg or more	±5

Figure 1: Fast dissolving tablet

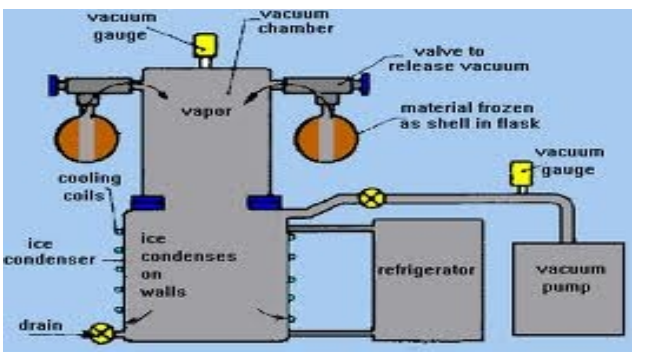

Figure 2: Freeze dryer

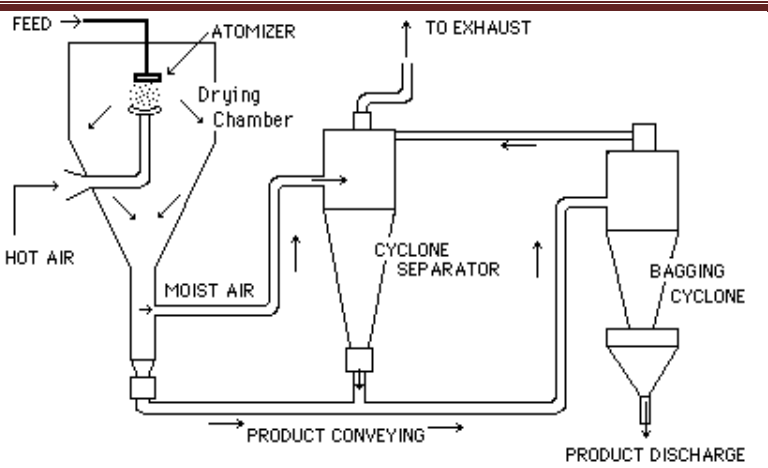

Figure 3: Spray drying technique

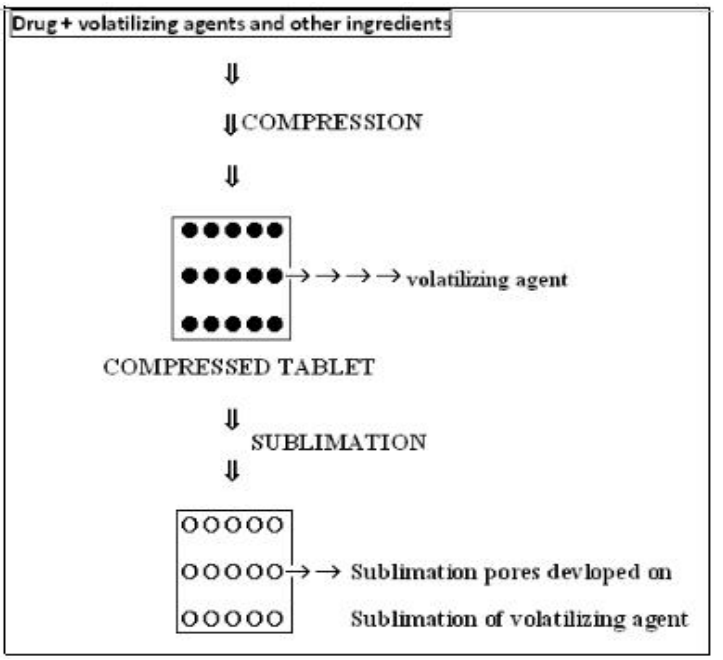

Figure 4: Schematic diagram of sublimation technique

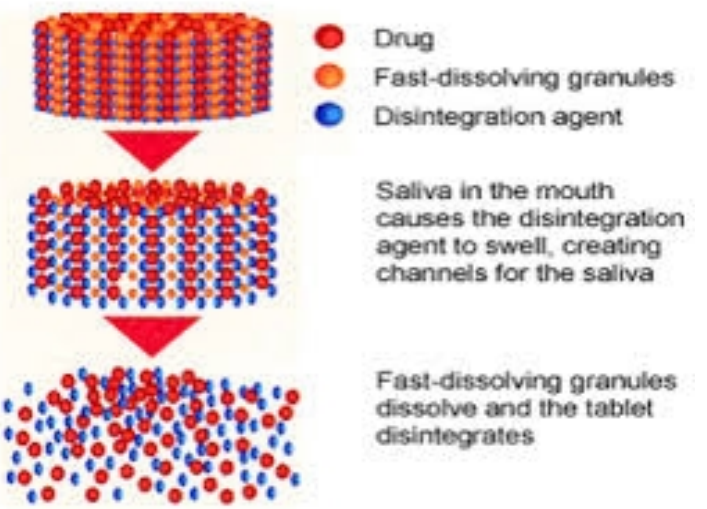

Figure 5: Mechanism of superdisintegrant by swelling

CONCLUSION

This review includes the various patented or non patented techniques by which fast dissolving tablets can be prepared and also includes the advantages, hurdles, preformulation, formulation and evaluation parameters. Hence FDT overcome the dysphasia faced by patients thus enhances the bioavailability.

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Cite this article as:
Raj Kumari, Chandel Priya, Kapoor Ankita. Fast dissolving tablets: needs to enhance bioavailability. Int. Res. J. Pharm. 2013; 4(5):51-58

Source of support: Nil, Conflict of interest: None Declared