1. Introduction

Drug delivery system is an efficient tool for enhancing market, extending product life cycles and creating opportunities. Drug delivery system (DDS) makes a significant contribution to global pharmaceutical sales through market segmentation, and is moving rapidly[1]. Despite of tremendous innovations in drug delivery, the oral route remains the preferred route for administration of therapeutic agents because of accurate dosage, low cost therapy, self medication, non invasive method and ease of administration leading to high level of patient compliance[2]. Difficulty in swallowing (Dysphasia) is common among all age groups, especially in elderly, and is also seen in swallowing of conventional tablets and capsules. One study showed that 26% out of 1576 patients experienced difficulty in swallowing tablets due to their large size, followed by their surface, shape and taste[3]. In case of liquid dosage forms there is an issue of drug stability as compared to solid dosage forms such as tablets. Also storage and transportation difficulties are faced in case of liquid dosage forms. Nowadays for the above mentioned reasons tablets that disintegrate or dissolve rapidly in oral cavity have attracted a lot of attention of the researchers. The solid dosage forms that disintegrates or dissolves rapidly in the oral cavity, resulting in solution or suspension without the need of administration of water is known as oral fast dispersing/disolving tablets (FDT”s) or mouth dissolving tablets (MDT) or fast melt tablet (FMTs). Drug dissolution and absorption as well as onset of clinical effect and drug bioavailability may be significantly greater than those observed from conventional dosage forms. The chains of events that occur following administration of a tablet dosage form until its absorption into systemic circulation are depicted in figure 1[4].

![Figure 1.0: Series of events after administration of tablet till its absorption into systemic circulation.](image)

According to European Pharmacopoeia, the ODT should disperse/disintegrate in less than three minutes[5]. The basic approach used in mouth dissolving tablets is that they include Super disintegrants which disintegrate the MDT within seconds after putting the tablet on the tongue. The bioavailability of some drugs may be increased due to absorption of drugs in oral cavity and also due to pregastric absorption of saliva containing...
dispersed drugs that pass down into the stomach. Moreover, the amount of drug that is subject to first pass metabolism is reduced as compared to standard tablets[6-8]. The US Food and Drug Administration Center for Drug Evaluation and Research (CDER) defines, in the „Orange Book”, an ODT as “a Solid dosage form containing medicinal substances, which disintegrates rapidly, usually within a matter of seconds, when placed upon the tongue”.

1.1 Ideal Properties of Orodispersible Tablets[9]

I. It should not require water to swallow and should dissolve or disintegrate in the mouth within a few seconds.

II. It should allow high drug loading.

III. It should be compatible with taste masking and other excipients.

IV. It should have a pleasing mouth feel.

V. It should leave minimal or no residue in the mouth after oral administration.

VI. It should have sufficient strength to withstand the rigors of the manufacturing process and post manufacturing handling.

VII. It should exhibit low sensitivity to environmental conditions such as humidity and temperature.

VIII. It should be adaptable and amenable to existing processing and packaging machinery.

IX. It should allow the manufacture of tablets using conventional processing and packaging equipment’s at low cost.

1.2 Advantages of ODTs[10-12]

Oral Fast disintegrating tablets offers dual advantages of solid dosage forms and liquid dosage forms along with special features which includes-

I. Accurate dose formulation: Being unit solid dosage forms, provides luxury of accurate dosing, easy portability and manufacturing, good physical and chemical stability and an ideal alternative for pediatric and geriatric patients.

II. Enhanced bioavailability: Bioavailability of drugs is enhanced due to absorption from mouth, pharynx and oesophagus.

III. Rapid action: Fast onset of therapeutic action as tablet gets disintegrated rapidly along with quick dissolution and absorption in oral cavity.

IV. Patient compliance: No need of water to swallow the dosage form. Hence, it is convenient for patients who are travelling and do not have immediate access to water.

V. Ease of administration: Convenient to administered especially for geriatric, pediatric, mentally disabled and bed ridden patients who have difficulty in swallowing.

VI. Obstruction free: No risk of suffocation in airways due to physical obstruction when swallowed, thus providing improved safety and compliance.

VII. Enhanced palatability: Good mouths feel, especially for pediatric patients as taste masking technique is used to avoid the bitter taste of drug.

VIII. Simple packaging: No specific packaging required. It can be packaged in push through blisters.

IX. Business Avenue: Provide new business opportunities in the form of product differentiation, line extension, uniqueness and life cycle management.

X. Good Drug Loading Capacity: Large amount of drug can be loaded.

XI. Quick Disintegration: Fast action in comparison to conventional drugs.

Figure 1.1: Advantages of ODT

1.3 Limitation of Fast Disintegrating Tablets

I. The tablets usually have insufficient mechanical strength. Hence, careful handling is required.

II. The tablets may leave unpleasant taste and/or grittiness in mouth if not formulated properly.

III. Drugs with relatively large doses are difficult to formulate into FDTs.

IV. Patients who concurrently take anti-cholinergic medications may not be the best candidate’s for FDTs.

1.4 Biopharmaceutical consideration[13]

When new drug delivery system put on, it is must that to consider Biopharmaceutical factor like metabolism and excretion.

1.4.1 Pharmacokinetics

Study has done on absorption, distribution, metabolism and excretion in this consideration. Drug attains therapeutic level after absorption and therefore elicits pharmacological effect, so both rate and extend of absorption is important. There is delay in disintegration and therefore dissolution in conventional dosage form while FDTs is rapidly disintegrates in oral cavity and dissolution is rapid. Due to disintegration of FDTs in mouth absorption in started from mouth, pharynx and oesophagus. Some factors like age, GI pH, and blood flow through GI are taken into consideration, because elders may be considered as separate unique Medicare population. There are many factors on
which drug distribution depends like tissue permeability, perfusion rate, binding of drug to tissue, disease state, drug interaction etc. In geriatric patients, decrease in body mass and total body water result in decreased volume of distribution of water-soluble drugs and increased volume of distribution (Vd) of lipid soluble drugs. Duration and intensity of action depends upon rate of drug removal from the body or site of action i.e. biotransformation. Decrease in liver volume, regional blood flow to liver reduces the biotransformation of drug through oxidation, reduction and hydrolysis. Excretion by renal clearance is slowed, thus half-life of renal excreted drugs increase.

1.4.2 Pharmacodynamics

- Drug receptor interaction impaired in elderly as well as in young adult due to undue development of organ.
- Decreased ability of the body to respond baro reflexive stimuli, cardiac output, and orthostatic hypotension may see in taking antihypertensive like prazosin.
- Decreased sensitivity of the CVS to β-adrenergic agonist and antagonist. Immunity is less and taken into consideration while administered antibiotics.
- Altered response to drug therapy-elderly show diminished bronchodilator effect of theophylline shows increased sensitivity to barbiturates.
- Concomitant illnesses are often present in elderly, which is also taken into consideration, while multiple drug therapy prescribed.

1.5 Desired Characteristics of Fast Dissolving Tablets[14]

1.5.1 Fast Disintegration

These tablets should disintegrate in the mouth without additional water or with a very small amount of water. The disintegration fluid is provided by the saliva of the patient. The disintegrated tablet should become a soft paste or liquid suspension, which can provide smooth swallowing and good mouth feel.

1.5.2 Drug Properties

Many drug properties could potentially affect the performance of FDTs. For example, the solubility, crystal morphology, particle size, hygroscopicity, compressibility, bioavailability, flow property and bulk density of a drug can significantly affect the final tablets characteristics, such as disintegration and tablet strength.

1.5.3 Taste of Active Ingredients

FDTs dissolve or disintegrate in the patient’s mouth, the drug will be partially dissolved in close proximity to the taste buds. After swallowing, there should be minimal or no residue in the mouth. An ideal taste-masking technology should provide drugs with good mouth feel and without grittiness.

1.5.4 Moisture Sensitivity

These tablets should have low sensitivity to humidity. This problem can be especially challenging because many highly water soluble excipients are used in formulation to enhance fast dissolving properties as well as to create good mouth feel. Those highly water soluble excipients are susceptible to moisture; some will even deliquesce at high humidity.

1.5.5 Tablet strength and porosity

The tablet porosity is usually maximized to ensure fast water absorption into the tablets. The key properties of the tablets are fast absorption or wetting of water into the tablets and disintegration associated particles into individual components for fast dissolution. This requires that excipients should have high wettability, and the tablet structure should also have a highly porous network. Because the strength of a tablet is related to compression pressure, and porosity is inversely related to compression pressure, it is important to find the porosity that allows fast water absorption while maintaining high mechanical strength.

1.6 Drug Selection Criteria

I. Have better solubility. E.g. Promethazine
II. Low dose E.g. Terazosin HCL
III. Have better availability to permeate oral mucosal tissue.
IV. Less or not bitter in taste.
V. Good stability in water as well as in saliva. E.g. Rizatriptine benzoate.

1.7 Tablet manufacturing

Tablets are compressed powders and their manufacturing is a complex, multistep process. The ultimate aim of these compressed solids is to easily disperse in gastrointestinal fluid, aid in complete absorption of API and, at the same time, offer stability to the formulation. The tablet manufacturing process can be broadly classified as granulation (wet granulation or dry granulation) and direct compression.

Granulation is an agglomeration process to improve the flow, density and compressibility of particulate material by size enlargement and densification. Granulation can be achieved by the use of binder solution (wet granulation) or dry binder (dry granulation).

Wet granulation is often chosen over dry granulation because of dust elimination, single pot processing, uniformity of API content (low dose API) and obtaining predictable granulation end point determination. Examples of wet granulation methods include fluid bed, high shear, pelletization techniques, such as extrusion-spheronization, spray drying, etc. The quality of this solid oral dosage form is, as a general rule, primarily governed by the physicochemical properties of the powder/granulation from which the tablets are composed.

Dry granulation (roll compaction or slugging) involves the compaction of powders at high pressures into large, often poorly formed tablets or compacts. These compacts are then milled and...
screened to form a granulation of the desired particle size. The advantage of dry granulation is the elimination of heat and moisture in the processing. Dry granulations can be produced by extruding powders between hydraulically-operated rollers to produce thin cakes that are subsequently screened or milled to give the desired granule size.

Direct compression avoids many of the problems associated with wet and dry granulations. However, the inherent physical properties of the individual filler materials are highly critical, and minor variations can alter flow and compression characteristics, so as to make them unsuitable for direct compression. Excipients are now available that allow production of tablets at high speeds without prior granulation steps. These directly compressible excipients consist of special physical forms of substances, such as lactose, sucrose, dextrose, or cellulose, which possess the desirable properties of fluidity and compressibility. Some of the most widely used direct compression fillers are cellulose derivatives (e.g. microcrystalline cellulose), saccharides (e.g. lactose and mannitol), mineral salts (e.g. dicalcium phosphate, calcium carbonate), and partially pre-gelatinized starch (Starch 1500®). Table 1 provides the advantages and limitations of different tablet manufacturing methods.

<table>
<thead>
<tr>
<th>Methods</th>
<th>Advantages</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Compression</td>
<td>• Simple Economic Process</td>
<td>• Not suitable for all API generally limited to lower dose compounds</td>
</tr>
<tr>
<td></td>
<td>• No heat or moisture, so Good for unstable compounds</td>
<td></td>
</tr>
<tr>
<td>Wet Granulation</td>
<td>• Imparts flow ability to a formulation</td>
<td>• Expensive: time &amp; energy consuming process</td>
</tr>
<tr>
<td></td>
<td>• Coating surface with hydrophilic polymer can improve wettability</td>
<td>• Specialized equipment required</td>
</tr>
<tr>
<td>Wet Granulation (Non-Aqueous)</td>
<td>• Suitable for moisture sensitive API</td>
<td>• Expensive equipment</td>
</tr>
<tr>
<td>Dry Granulation (Slugging or Roll Compaction)</td>
<td>• Vacuum Drying techniques can remove/reduce need for heat</td>
<td>• Solvent recovery issues</td>
</tr>
<tr>
<td></td>
<td>• Eliminates exposure to moisture and drying</td>
<td>• Dusty procedure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Slow process</td>
</tr>
</tbody>
</table>

1.8 Tablet components

Tablet dosage form is composed of two main ingredients:
I. API
II. Inactive ingredients also termed as excipients.

The different physicochemical properties of API and manufacturing process selected dictates addition of different types of excipients, depending on the specific function they provide to aid in manufacture of tablets, efficacy and stability of the product.

1.9 Disintegrants

An important excipients of the tablet formulation, are always added to tablet to induce breakup of tablet when it comes in contact with aqueous fluid and this process of desegregation of constituent particles before the drug dissolution occurs, is known as disintegration process and excipients which induce this process are known as disintegrants. The objectives behind addition of disintegrants are to increase surface area of the tablet fragments and to overcome cohesive forces that keep particles together in a tablet.

1.9.1 The Role of Disintegrants in Solid Oral Dosage Manufacturing

Bioavailability of a drug depends in absorption of the drug, which is affected by solubility of the drug in gastrointestinal fluid and permeability of the drug across gastrointestinal membrane. The drugs solubility mainly depends on physical – chemical characteristics of the drug. However, the rate of drug dissolution is greatly influenced by disintegration of the tablet.

The drug will dissolve at a slower rate from a non-disintegrating tablet due to exposure of limited surface area to the fluid. The disintegration test is an official test and hence a batch of tablet must meet the stated requirements of disintegration.

1.9.2 Mechanism of tablet Disintegrants

The tablet breaks to primary particles by one or more of the mechanisms listed below:-
I. By capillary action
II. By swelling
III. Because of heat of wetting
IV. Due to disintegrating particle/particle repulsive forces
V. Due to deformation
VI. Due to release of gases
VII. By enzymatic action
**By Capillary Action**

Disintegration by capillary action is always the first step. When we put the tablet into suitable aqueous medium, the medium penetrates into the tablet and replaces the air adsorbed on the particles, which weakens the intermolecular bond and breaks the tablet into fine particles. Water uptake by tablet depends upon hydrophilicity of the drug/excipients and on tableting conditions. For these types of disintegrants maintenance of porous structure and low interfacial tension towards aqueous fluid is necessary which helps in disintegration by creating a hydrophilic network around the drug particles.

![Figure 1.2: Porosity and capillary action (Wicking)](image1.png)

**Figure 1.2:** Porosity and capillary action (Wicking)[15-17] (Disintegrants pull water into the pores and reduces the physical bonding forces between the particles)

**By Swelling**

Perhaps the most widely accepted general mechanism of action for tablet disintegration is swelling. Tablets with high porosity show poor disintegration due to lack of adequate swelling force. On the other hand, sufficient swelling force is exerted in the tablet with low porosity. It is worthwhile to note that if the packing fraction is very high, fluid is unable to penetrate in the tablet and disintegration is again slows down.

![Figure 1.3: Disintegration of Tablet by Swelling][17]

**Figure 1.3:** Disintegration of Tablet by Swelling[17]

Because of heat of wetting (air expansion)

When disintegrants with exothermic properties gets wetted, localized stress is generated due to capillary air expansion, which helps in disintegration of tablet. This explanation, however, is limited to only a few types of disintegrants and cannot describe the action of most modern disintegrating agents.

**Due to disintegrating particle/particle repulsive forces**

Another mechanism of disintegration attempts to explain the swelling of tablet made with non-swellable disintegrants. Guyot-Hermann has proposed a particle repulsion theory based on the observation that non swelling particle also cause disintegration of tablets. The electric repulsive forces between particles are the mechanism of disintegration and water is required for it. Researchers found that repulsion is secondary to wicking.

![Figure 1.4: Repulsion Theory][15,16]

**Figure 1.4:** Repulsion Theory[15,16] (Water is drawn into the pores and particles repel Each other due to the resulting electrical force)

**Due to Deformation**

Hess had proved that during tablet compression, disintegrated particles get deformed and these deformed particles get into their normal structure when they come in contact with aqueous media or water. Occasionally, the swelling capacity of starch was improved when granules were extensively deformed during compression. This increase in size of the deformed particles produces a breakup of the tablet. This may be a mechanism of starch and has only recently begun to be studied.

![Figure 1.5: Disintegration][17]

**Figure 1.5:** Disintegration[17] by deformation.
**Due to release of gases**

Carbon dioxide released within tablets on wetting due to interaction between bicarbonate and carbonate with citric acid or tartaric acid. The tablet disintegrates due to generation of pressure within the tablet. This effervescent mixture is used when pharmacist needs to formulate very rapidly dissolving tablets or fast disintegrating tablet. As these disintegrants are highly sensitive to small changes in humidity level and temperature, strict control of environment is required during manufacturing of the tablets. The effervescent blend is either added immediately prior to compression or can be added in to two separate fraction of formulation.

**By enzymatic reaction**

Here, enzymes present in the body act as disintegrants. These enzymes destroy the binding action of binder and helps in disintegration. Actually due to swelling, pressure exerted in the outer direction or radial direction, it causes tablet to burst or the accelerated absorption of water leading to an enormous increase in the volume of granules to promote disintegration.

**Table 2: Disintegrating Enzymes**

<table>
<thead>
<tr>
<th>Enzymes</th>
<th>Binder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amylase</td>
<td>Starch</td>
</tr>
<tr>
<td>Protease</td>
<td>Gelatin</td>
</tr>
<tr>
<td>Cellulose</td>
<td>Cellulose &amp; its Derivatives</td>
</tr>
<tr>
<td>Invertase</td>
<td>Sucrose</td>
</tr>
</tbody>
</table>

**1.9.2 Types of Disintegrants**

**Starch**

Starch was the first disintegrating agent widely used in tablet manufacturing. Before 1906 potato starch and corn starch were used as disintegrants in tablet formulation.

**Pregelatinized starch**

Pregelatinized starch is produced by the hydrolyzing and rupturing of the starch grain. It is a directly compressible disintegrants and its optimum concentration is 5-10%. The main mechanism of action of Pregelatinized starch is through swelling.

**Modified starch**

To have a high swelling properties and faster disintegration, starch is modified by carboxy methylation followed by cross linking, which is available in market as cross linked starch. One of them is Sodium Starch Glycolate.

**Cellulose and its derivatives**

Sodium carboxy methylcellulose (NaCMC and Carmellose Sodium) has highly hydrophilic structure and is soluble in water.

**Microcrystalline cellulose (MCC)**

MCC exhibit very good disintegrating properties because MCC is insoluble and act by wicking action. The moisture breaks the hydrogen bonding between adjacent bundles of MCC.

**Alginate**

Alginate are hydrophilic colloidal substances which has high sorption capacity. Chemically, they are alginic acid and salts of alginic acid. Alginic acid is insoluble in water, slightly acidic in reaction. Hence, it should be used in only acidic or neutral granulation.

**Ion-exchange resin**

Ion exchange resin (Ambrelite®IPR-88) has highest water uptake capacity than other disintegrating agents like starch and Sodium CMC. It has tendency to adsorb certain drugs.

**2.0 Super Disintegrants**

In recent years, several newer agents have been developed known as “Superdisintegrants”. A “Superdisintegrant” is excipients, which is added to tablet or capsule blend to aid in the breakup of the compacted mass, when put into a fluid environment. This is especially important for immediate release product where rapid release of the product is required [18]. These newer substances are more effective at lower concentrations with greater disintegrating efficiency and mechanical strength. The use of superdisintegrants is the basic approach in the development of fast disintegrating tablets (FDTs). Superdisintegrants plays a major role in the dissolution and disintegration of the tablets. It is essential to choose an optimum concentration of superdisintegrants so as to ensure rapid disintegration and high dissolution rates of tablets [19]. Superdisintegrants provide rapid disintegration due to combined effect of swelling and water absorption by the formulation. Due to swelling of superdisintegrants, the wetted surface of the carrier increases, this promotes the wettability and dispersibility of the system, thus enhancing the disintegration and dissolution [20, 21].

**Figure 1.6: Mechanism of Action of Superdisintegrants**

---

221
The optimum concentration of the superdisintegrants can be selected according to the critical concentration of the disintegrants. Below this concentration, the tablet disintegration time is inversely proportional to the concentration of the superdisintegrants, where as above this concentration the disintegration time remains almost constant or even increases [22].

2.1 Types of Superdisintegrants

I. Natural
II. Synthetic

Natural

These are various plant based material. Plant based material serve as an alternative to synthetic products because of following reasons:

- Local accessibility
- Eco-friendly

Synthetic

Advantages of synthetic superdisintegrants:

- Effective in lower concentrations than starch.
- Less effect on compressibility and flow ability.
- More effective intragranularly

Common super disintegrants used in formulation are croscarmellose sodium (Vivasol, Ac-Di-Sol), crospovidone (Polyplasdone), carmellose (NS-300), carmellose calcium (ECG-505), sodium starch glycolate (SSG) etc. Recently few ion exchange resins (e.g. Indion 414) are found to have superdisintegrants property and are widely used in pharmaceutical industry.

Table 3: Synthetic Superdisintegrants

<table>
<thead>
<tr>
<th>Superdisintegrants</th>
<th>Example</th>
<th>Mechanism of Action</th>
<th>Special comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crosscarmellose®</td>
<td>Crosslinked</td>
<td>Swells 4-8 folds in &lt; 10 seconds</td>
<td>Swells in two dimensions.</td>
</tr>
<tr>
<td>Ac-Di-Sol®</td>
<td>cellulose</td>
<td>Swelling and Wicking both.</td>
<td>Direct compression or granulation</td>
</tr>
<tr>
<td>Nymce ZSX®</td>
<td></td>
<td></td>
<td>Starch free</td>
</tr>
<tr>
<td>Primellox® Solutab®</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vivasol® L-HPC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crosspovidone</td>
<td>Crosslinked PVP</td>
<td>Swells very little And returns to original size after compression but act by capillary action</td>
<td>Water insoluble and spongy in nature so get porous tablet</td>
</tr>
<tr>
<td>Crosspovidon M®</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kollidon®</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyplasdone®</td>
<td>Crosslinked</td>
<td>Swells 7-12 folds in &lt; 30 seconds</td>
<td>Swells in three dimensions and high level serve as sustain release matrix</td>
</tr>
<tr>
<td>Sodium starch glycolate</td>
<td>starch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explotab®</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primogel®</td>
<td>Crosslinked</td>
<td>Rapid swelling in aqueous medium or wicking action</td>
<td>Promote disintegration in both dry or wet granulation</td>
</tr>
<tr>
<td>Alginic acid NF</td>
<td>Crosslinked alginic acid</td>
<td>Rapid swelling in aqueous medium or wicking action</td>
<td>Promote disintegration in both dry or wet granulation</td>
</tr>
<tr>
<td>Satialgine®</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.2 Techniques to Prepare Orodispersible Tablets

Freeze-Drying or Lyophilization

Freeze drying is the process, which includes removal of solvent from frozen suspension or solution of drug with structure forming additives. Freeze drying is a pharmaceutical technology which allows drying of heat sensitive drugs and biological at low temperature under conditions that allow removal of water/solvent by sublimation. Freeze drying of drug along with additives imparts glossy amorphous structure resulting in highly porous and light weight product. The product such formed has rapid disintegration and dissolution properties when placed on tongue[23]. However, high cost of equipment and processing limits the use of this process. Other disadvantages include lack of mechanical strength necessary for standard blister packaging of the final dosage forms[24].

Moulding

Moulding process involves moistening, dissolving or dispersing the drug with a solvent, then moulding the moist mixture into tablets, followed by evaporation of the solvent by air drying[25]. Following are the different tablet moulding techniques:
Compression Moulding Process

This manufacturing process involves moistening the powder blend with a hydroalcoholic solvent followed by pressing into mould plates to form a wetted mass (compression moulding). The solvent is then removed by air drying, a process similar to the manufacture of tablet triturates. Such tablets are less compact than compressed tablets and possess a porous structure that hastens dissolution[26].

Heat-Moulding Process

Heat-moulding process involves setting the molten mass containing a dispersed drug[27]. This process uses agar solution as a binder and a blister packaging well as a mould to manufacture the tablet. A suspension containing drug, agar and sugar is prepared followed by pouring the suspension into the blister packaging well, solidifying the agar solution at room temperature to form a jelly and finally drying at approximately 30 °C under vacuum.

Moulding by Vacuum Evaporation without Lyophilization[28]

This process involves pouring of the drug excipients mixture (in the form of a slurry or paste) into a mould of desired dimension, freezing the mixture to form a solidified matrix and finally subjecting it to vacuum drying at a temperature within the range of its collapse temperature and equilibrium freezing temperature. This results in the formation of a partially collapsed matrix. This method differs from the lyophilization technique, as in the former the evaporation of free unbound solvent occurs from a solid through the liquid phase to a gas, under controlled conditions, instead of the sublimation which takes place in the latter process. Unlike lyophilization, vacuum drying helps to densify the matrix and thereby improves the mechanical strength of the product. Pebbley et al. evaporated the frozen mixture containing a gum (e.g., acacia, carrageenan, guar, tragacanth orxanthan), a carbohydrate (e.g., dextrose, lactose, maltose, mannitol or malt dextrin) and solvent in a tablet-shaped mould to design a MDT with a disintegration time of about 20-60 sec.

Spray Drying

Spray drying technique produces highly porous and fine powders as the processing solvent is evaporated during this process. Spray drying process was employed by Allen and Wang to prepare ODT. The formulations contained hydrolyzed and unhydrolyzed gelatin as a supporting agent for the matrix, mannitol as a bulking agent and sodium starch Glycolate/crosscarmelllose as a disintegrants. Disintegration and dissolution were further enhanced by adding an acid (e.g., citric acid) or an alkali (e.g., sodium bicarbonate). The suspension of above excipients was spray-dried to yield a porous powder which was compressed into tablets. Tablets manufactured by this method disintegrated in < 20 sec in an aqueous medium[29].

Sublimation

Sublimation has been used to produce MDTs with high porosity. A porous matrix is formed by compressing the volatile ingredients along with other excipients into tablets, which are finally subjected to a process of sublimation. Inert solid ingredients with high volatility (e.g., ammonium bicarbonate, ammonium carbonate, benzoic acid, camphor, hexamethylenetetramine, napthalene, phthalic anhydride, urea and urethane) have been used for this purpose[30].
Solvents such as cyclohexane and benzene were also suggested for generating the porosity in the matrix. Makino et al. reported a method using water as a pore-forming material [31]. Tablets manufactured by this technique have reported to usually disintegrate within 10-20 sec [32].

**Mass-Extrusion**

This technology involves softening of the active blend using the solvent mixture of water-soluble polyethylene glycol and methanol and expulsion of softened mass through the extruder or syringe to get a cylindrical shaped extrude which are finally cut into even segments using heated blade to form tablets. This process can also be used to coat granules of bitter drugs to mask their taste [33].

**Nanomization**

A recently developed Nanomelt technology involves reduction in the particle size of drug to nanosize by milling the drug using a proprietary wet-milling technique [34]. The nanocrystals of the drug are stabilized against agglomeration by surface adsorption on selected stabilizers, which are then incorporated into MDTs. This technique is especially advantageous for poorly water soluble drugs. Other advantages of this technology include fast disintegration/dissolution of nanoparticles leading to increased absorption and hence higher bioavailability and reduction in dose, cost effective manufacturing process, conventional packaging due to exceptional durability and wide range of doses (up to 200mg of drug per unit).

**Direct Compression (DC)**

DC is the simplest and most cost effective technique for Or dispersible tablets as they can be fabricated using conventional tablet manufacturing and packaging machinery and also due to availability of tableting excipients with improved flow, compressibility and disintegration properties, especially tablet disintegrants, effervescent agents and sugar based excipients. Some excipients used for the production of Orodispersible tablets by DC technique are enlisted below.

**Effervescent Agents**

Carbon dioxide released within tablets on wetting due to interaction between bicarbonate and carbonate with citric acid or tartaric acid causes disintegration of the tablet [35]. The tablet disintegrates due to generation of pressure within the tablet. This effervescent mixture is used when pharmacist needs to formulate Orodispersible tablets in order to get quick disintegration for fast action. But, these disintegrants are highly sensitive to small changes in humidity level and temperature therefore strict control of environmental conditions is required during manufacture of these tablets. The effervescent blend is either added immediately prior to compression or can be added in to two separate fraction of formulation.

**Sugar-Based Excipients**

Another approach to manufacture MDTs by DC is the use of sugar-based excipients (e.g., dextrose, fructose, isomalt, lactitol, maltitol, mannitol, sorbitol, starch hydrolysate, polydextrose and xylitol) which display high aqueous solubility and sweetness and hence, imparts taste masking and a pleasing mouth feel.

Mizumoto et al. [36] have classified sugar-based excipients into two types based on their mould ability and dissolution rate.

**Type I saccharides** (e.g., lactose and mannitol) exhibit low mouldability but high dissolution rate.

**Type II saccharides** (e.g., maltose and maltitol) exhibit high mouldability but low dissolution rate.

Mouldability is defined as the capacity of the compound to be compressed/ moulded and to dissolve. It does not refer to the formation of a true mould by melting or solvent wetting process. The mouldability of Type I saccharide can be improved by granulating it with a Type II saccharide solution.

**Table 4:** Summary of advantages and disadvantages of different technologies for preparing Fast Disintegrating dosage form

<table>
<thead>
<tr>
<th>Technology</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeze-drying</td>
<td>Immediate dissolution (&lt;5 sec.)</td>
<td>Very poor physical resistance, High cost of production, Low dose of water soluble drugs</td>
</tr>
<tr>
<td>Moulding</td>
<td>Very rapid disintegration (5-15 sec)</td>
<td>Very rapid disintegration (5-15 sec), High dose, High cost of production, Weak mechanical strength, Possible limitation in stability</td>
</tr>
<tr>
<td>Tableting (Standard)</td>
<td>Low cost of production</td>
<td>Use of standard equipment/materials, High dose, Good physical resistance, Disintegration capacity markedly limited by the size and hardness of the tablet</td>
</tr>
<tr>
<td>Tableting (Effervescent)</td>
<td>High dose, Good physical resistance, Pleasant effervescent mouth feel</td>
<td>Operating in controlled low humidity, Need specialized packaging i.e. Totally impermeable blister</td>
</tr>
</tbody>
</table>
2.3 Patented technologies to prepare Orodispersible tablets

Various patented technologies are available to prepare Orodispersible tablets. Some of them are enlisted as follows:

**Zydis (Cardinal Health Inc.)**

Zydis was first marketed technology and introduced by R. P. Scherer Corporation (Cardinal Health, Inc.) in 1986. Zydis tablet is produced by lyophilizing the drug in a matrix usually consisting of gelatin. The product is very lightweight and fragile and must be dispensed in a special blister pack. Zydis formulation is also self-preserving because the final water concentration in the freeze-dried product is too low to allow for microbial growth[37].

But, Zydis technology suffers from following disadvantages:

I. Relatively expensive & time consuming manufacturing process.
II. Formulation is very lightweight and fragile.
III. Poor stability at higher temperatures and humidity & stress conditions.
IV. A water insoluble drug can be incorporated only upto 400 mg per tablet or less. On the other hand water soluble drug can be incorporated only upto 60 mg.

The preferred drugs are water insoluble, low dose, chemically stable, small particle size and tasteless. The two most commonly used structural additives are gelatin and mannitol. Some other structural additives (e.g., starches, gums etc.) may be used depending on the properties of the active ingredient. The best physical characteristics are achieved by using a mixture of a water-soluble polymer and a crystalline sugar, alcohol or amino acid. The polymer gives the strength and flexibility while the crystalline component gives the hardness and texture. Polymers such as gelatin, dextran or alginate are added to impart strength during handling. These form a glossy and amorphous structure. Mannitol or sorbitol is added to impart crystallinity, elegance and hardness. Various gums may be added to prevent sedimentation of dispersed drug particles. Water is used as a medium to ensure the formation of a porous dosage form. Collapse protectants like glycine may be used to prevent shrinkage of dosage form during freeze drying and long-term storage. If necessary, suspending agents and pH adjusting agents may be used.

**Wowtab (Yamanouchi Pharma Technologies, Inc.)**

Wowtab technology was developed by Yamanouchi Pharma Technologies. ‘Wow’ means ‘without water’. The active ingredients may constitute upto 50% w/w of the tablet. Here, saccharides of both low and high mouldability are used to prepare the granules. Mouldability is the capacity of a compound to be compressed. Highly mouldable substance has high compressibility and thus slow dissolution. The combination of high and low mouldability is used to produce tablets of adequate hardness & a rapidly melting strong tablet. Active ingredients are mixed with low mouldability saccharides and then granulated with high mouldability saccharides and then compressed into tablet. Wowtab product dissolves quickly in 15 s or less. Wowtab product can be packed in both into conventional bottle and blister packs. This technology utilizes conventional granulation and tableting methods and used for both water-soluble and insoluble drugs. The manufacturing process involves granulating low-mouldable sugars (e.g. mannitol, lactose, glucose, sucrose, and erythritol) that show quick dissolution characteristics with high mouldable sugars (e.g. maltose, maltitol, and sorbitol). The result is a mixture of excipients that have fast-dissolving and highly mouldable characteristics[39,40].

**Flashtab (Prographarm)**

Flashtab was developed by Prographarm. A disintegrating agent and a swelling agent are used in combination with coated taste-masked micro granules of drug. Flashtab involves coating a drug with an Eudragit polymer to provide rapid release of the drug in the stomach, and formulating this microencapsulated drug with an effervescent couple to produce a flash dispersal tablet. This technology includes granulation of excipients by wet or dry granulation method followed by compression into tablets. Disintegrating agents include polyvinylpyrrolidone or carboxy methyl cellulose and Swelling agents include carboxymethylcellulose, starch, modified starch, microcrystalline cellulose, carboxy methylated starch etc. These tablets have satisfactory physical resistance. Tablets containing hygroscopic materials can also be blister packed using high quality polyvinyl chloride or aluminum foils for providing the higher degree of moisture protection than normal polyvinyl chloride or polypropylene foils[40].

**Durasolv (Cima Labs, Inc.)**

DuraSolv is Cima's second-generation fast-dissolving/disintegrating tablet formulation. DuraSolv has much higher mechanical strength than Orasolv due to the use of higher compaction pressures during tableting. DuraSolv product is thus produced in a faster and more cost-effective manner. DuraSolv is so durable that it can be packaged in either traditional blister packaging or vials. This technology is not compatible with larger doses of active ingredients, because the
Disintegrating tablet technologies as it can be combined with capsules and tablets. AdvaTab is distinct from other orally suited to those patients that experience difficulty in swallowing typically in less than 30 seconds. These tablets are especially mouth cavity. AdvaTab tablets disintegrate rapidly in the mouth, mask the taste along with restriction of drug dissolution in coating the drug particles with gastro soluble polymer so as to

In this technology, microencapsulation process is used for coating the drug particles with gastro soluble polymer so as to mask the taste along with restriction of drug dissolution in mouth cavity. AdvaTab tablets disintegrate rapidly in the mouth, typically in less than 30 seconds. These tablets are especially suited to those patients that experience difficulty in swallowing capsules and tablets. AdvaTab is distinct from other orally disintegrating tablet technologies as it can be combined with Eurand’s complimentary particle technologies like its

Orasolv (Cima Labs, Inc.)

Orasolv is Cima’s first orally disintegrating dosage form. It based on direct compression of an effervescent agent and taste masked drug. The use of effervescence causes a tablet to disintegrate rapidly in less than 1 min on contact with water or saliva leaving coated drug powder. This technique is frequently used to develop over the counter formulations. This technology can accommodate a wide range of active ingredient from 1 mg to 500 mg. The effervescence occurs due to chemical reaction between organic acid such as citric acid, fumaric acid or maleic acid and a base such as sodium bicarbonate, potassium bicarbonate, magnesium bicarbonate, which result in generation of CO\textsubscript{2}\[42\]. Effervescent disintegration agents evolve gas by means of chemical reaction called effervescent couple. Carbonates such as sodium bicarbonate, sodium carbonate, potassium bicarbonate and potassium carbonate, magnesium carbonate, and acids like citric, tartaric, fumaric, adipic and succinic are used. Micro particles, effervescent agents and other ingredient such as flavors, sweeteners, colorants and lubricants are blended and compressed at a low degree of compaction\[43\].

Frosta (Akina)

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\[44\].

AdvaTab (Eurand)

In this technology, microencapsulation process is used for coating the drug particles with gastro soluble polymer so as to mask the taste along with restriction of drug dissolution in mouth cavity. AdvaTab tablets disintegrate rapidly in the mouth, typically in less than 30 seconds. These tablets are especially suited to those patients that experience difficulty in swallowing capsules and tablets. AdvaTab is distinct from other orally disintegrating tablet technologies as it can be combined with Eurand’s complimentary particle technologies like its

NanoCrystal Technology (Elan Corporation)

This technology is based on concept that decreasing particle size increases the surface area, which leads to an increase in dissolution rate. NanoCrystal particles are small particles of drug substance, typically less than 1000 nm in diameter, which are produced by wet milling the drug. NanoCrystal fast dissolving technology provides for:

- Pharmacokinetic benefits of orally administered nanoparticles (<2 microns) in the form of a rapidly disintegrating tablet matrix.
- Product differentiation based upon a combination of proprietary and patent-protected technology elements.
- Cost-effective manufacturing processes that utilize conventional, scalable unit operations.
- Exceptional durability, enabling use of conventional packaging equipment and formats (i.e., bottles and/or blisters).

NanoCrystal colloidal dispersions of drug substance are combined with water-soluble GRAS (Generally Regarded as Safe) ingredients, filled into blisters, and lyophilized. The resultant wafers are remarkably robust, yet dissolve in very

Flashdose (Fuisz Technologies, Ltd.)

This technology is patented by Fuisz. This uses the combination of Shear form and Ceform technologies in order to mask the bitter taste of the drug. A sugar based matrix, called ‘Floss’, which is made up of a combination of crystalline sugars alone or in combination with drugs, is used. Floss is self-binding shearform matrix, which is prepared by flash heat processing. Flashdose 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. It disperses and dissolves quickly. The method has certain drawbacks like the dosage form can accommodate only up to 600 mg of drug and tablets required specialized packing as highly friable, soft and moisture sensitive nature.

Instead of a floss-like material, small spheres of saccharides can be produced to carry the drug. The process of making microspheres has been patented by Fuisz, and is known as Ceform and serves as an alternative method of taste masking. Ceform technology involves preparation of microspheres of the active drug. Drug material alone or in combination with other pharmaceutical substances, and excipients is placed into a rapidly spinning machine. The centrifugal force comes into action, which throws the dry drug blend at high speed through small heated openings. Due to the heat provided by carefully controlled temperature, drug blend liquefies to form a sphere, without affecting the drug stability. The formed microspheres are compressed into tablet. This technique effectively masked the taste of product\[45,46\].

Corporate Office: 123 Main St, Anytown USA

Contact: sales@corporateoffice.com

Phone: (123) 456-7890

Worldwide distribution: USA, Canada, Europe, Asia, Australia

Product differentiation based upon a combination of nanoparticle technology and unique packaging options.

Unbeatable value for money: Our products are competitively priced to meet the needs of all our customers.

Exceptional quality control: We ensure the highest standards of quality and consistency in all our products.

Confidentiality: Your data is safe with us and we respect your privacy.

NanoCrystal colloidal dispersions of drug substance are combined with water-soluble GRAS (Generally Regarded as Safe) ingredients, filled into blisters, and lyophilized. The resultant wafers are remarkably robust, yet dissolve in very

The result is a product that is easy to use, convenient, and effective.


226
small quantities of water in seconds. This approach avoids manufacturing operations (e.g., granulation, blending, and tableting) that generate large quantities of aerosolized powder and present much higher risk of exposure. The freeze-drying approach also enables small quantities of drug to be converted into orally disintegrating dosage forms because manufacturing losses are negligible[47].

Quick-Dis Technology (Lavipharm)

Lavipharm Laboratories Inc. has invented an ideal intraoral fast-dissolving drug delivery system called as Quick-Dis. This 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/or 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. Disintegration time 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[48].

EFVDAS (Elan Corporation)

EFVDAS or Effervescent Drug Absorption System is a drug delivery technology that has been used in the development of a number of both OTC and prescription medications. This is particularly advantageous for conditions such as colds and flu, for which Elan has modified its EFVDAS technology to develop hot drink sachet products that combine medicines and vitamins for OTC use. The granular contents of the sachets can be added to boiling water to produce pleasant-flavoured solutions. In these cases the effervescence of the granulate mixture is modified to accommodate the use of heated water. Examples of products that Elan has developed include effervescent ibuprofen, acetaminophen, cimetidine, naproxen, and acetaminophen and codeine combination product[49].

Fast Melt (Elan Corporation)

It is a highly porous, microfine matrix tablet. Once placed on the tongue, this matrix rapidly absorbs liquid and disintegrates. The drug, in a stabilized, size-reduced form to ensure optimal solubility, dissolves rapidly. The combination of a mild effervescent base and drug processing ensures that the dosage form goes into solution in approximately 15 to 30 seconds. The drug is released rapidly within the oral cavity, where it dissolves to form a drug solution that is then swallowed. This is particularly advantageous in cases like migraine where a fast onset of clinical effect is required. A portion of the drug solution may be absorbed locally in the oral cavity and therefore may avoid first-pass metabolism in the liver that limits the bioavailability of many drugs. The fast-melt system rapidly disintegrates in the oral cavity; hence, patients do not have to swallow a large cumbersome dosage form, which discourages many from taking their medication. Thus, the fast-melt dosage form combines the benefits of liquid formulations with those of a solid oral dosage form[50].

Multiflash (Prographarm)

Multiflash is a multi-unit tablet composed of coated micro granules and fast-disintegrating excipients. This multiparticulate tablet quickly disintegrates in the oesophagus after being swallowed with a minimum amount of water. This tablet avoids mucosal adhesion, and coated pellets can match various dissolution rates[51].

2.4 List of Patented technologies based branded Products

The list of patented technologies and their brand products are given in Table 5[52].

Table 5: Patented Technology and their Brand Products

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Technology</th>
<th>Process Involved</th>
<th>Patent Owner</th>
<th>Drugs Used (Brand Name)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Zydus</td>
<td>Lyophilization</td>
<td>R.P. Scherer Inc.</td>
<td>Loratidine (Claritin RediTab and Dimetapp Quick Dissolve)</td>
</tr>
<tr>
<td>II.</td>
<td>Quicksolv</td>
<td>Lyophilization</td>
<td>Janssen Pharmaceutical</td>
<td>Cisapride monohydrate (Propulsid Quicksolv), Risperidone (Risperdal M-tab)</td>
</tr>
<tr>
<td>III.</td>
<td>Flashtab</td>
<td>Lyophilization</td>
<td>Ethypharm</td>
<td>Ibuprofen (Nurofen Flashtab)</td>
</tr>
<tr>
<td>IV.</td>
<td>Lyoc</td>
<td>Multiparticulate Compressed tablets</td>
<td>Farmlyoc</td>
<td>Phloroglucinol Hydrate (Spasfon Lyoc)</td>
</tr>
<tr>
<td>V.</td>
<td>Orasolv</td>
<td>Compressed Tablets</td>
<td>Cima Labs Inc.</td>
<td>Paracetamol (Tempra Quicklets), Zolmitriptan (Zolmitriptan)</td>
</tr>
<tr>
<td>VI.</td>
<td>Durasolv</td>
<td>Molding</td>
<td>Cima Labs Inc.</td>
<td>Hyoscyamine Sulfate (NuLev), Zolmitriptan (Zolmitriptan)</td>
</tr>
<tr>
<td>VII.</td>
<td>Ziplets</td>
<td>Molding</td>
<td>Eurand</td>
<td>Ibuprofen (Cibalgina Due Fast)</td>
</tr>
<tr>
<td>VIII.</td>
<td>Oraquick</td>
<td>Micromask taste Masking</td>
<td>KV Pharm. Co., Inc.</td>
<td>Hyoscyamine Sulfate ODT</td>
</tr>
<tr>
<td>IX.</td>
<td>AdvaTab</td>
<td>Microcaps &amp; diffuscap CR Technology</td>
<td>Eurand International</td>
<td>AdvaTab cetirizine, AdvaTab Paracetamol</td>
</tr>
</tbody>
</table>
Table 6: List of some ODT products available in market

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>API</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cibalginadue FAST</td>
<td>Ibuprofen</td>
<td>Novartis</td>
</tr>
<tr>
<td>Feldene melt</td>
<td>Piroxicam</td>
<td>Pfizer</td>
</tr>
<tr>
<td>Zyprex</td>
<td>Olanzapine</td>
<td>Eli lilly</td>
</tr>
<tr>
<td>Imodium Instant melts</td>
<td>Loperamide HCL</td>
<td>Janssen</td>
</tr>
<tr>
<td>Febrectol</td>
<td>Paracetamol</td>
<td>Prographarm</td>
</tr>
<tr>
<td>OlanexInstab</td>
<td>Olanzapine</td>
<td>Ranbaxy</td>
</tr>
<tr>
<td>Romilast</td>
<td>Montelukast</td>
<td>Ranbaxy</td>
</tr>
<tr>
<td>Nimulid MD</td>
<td>Nimesulide</td>
<td>Panacea</td>
</tr>
<tr>
<td>Mosid MT</td>
<td>Mosapride</td>
<td>Torrent</td>
</tr>
<tr>
<td>Domray MD</td>
<td>Domperidone</td>
<td>Ray Remedies</td>
</tr>
<tr>
<td>Benadryl Fastmelt</td>
<td>Diphenhydramine and Pseudoephrine</td>
<td>Warner Lambert</td>
</tr>
</tbody>
</table>

2.5 Natural excipients

Plant products nowadays are widely used as an alternative to synthetic products due to ease of local accessibility, lower prices as compared to synthetic products, biocompatible, biodegradable and environment friendly nature[53]. Of increasing importance is the fact that plant resources are renewable and if cultivated or harvested in a sustainable manner, they can provide a constant supply of raw material[54]. Present day consumers look for natural ingredients in food, drugs, and cosmetics as they believe that anything natural will be more safe and devoid of side effects[55]. Synthetic and semi-synthetic polymers are expensive, toxic, have environment related issues and need long time for synthesis[56]. Many researchers have explored the usefulness of plant-based materials as pharmaceutical excipients. Ability to produce a wide range of material based on their properties and molecular weight, natural polymers became a thrust area in majority of investigations in drug delivery systems[57]. Natural gums can also be modified to meet the requirements of drug delivery systems and thus can compete with the synthetic excipients available in the market[58]. Till now natural polymers have been utilized for different purposes including controlled release[59], sustained release[60,61], superdisintegrants[62], mucoadhesive[63,64], suspending agent[65], binder[66], sweeteners[67,68] etc.

2.6 Future prospective for FDTs

Now there are various products available commercially in market which is produced by fast dissolving tablet technologies. Still there is wide area for research on this technology. Some of the challenges like formulating a drug of bitter taste and moisture absorbing nature create problems for formulation scientist. When the dose of drug is large it causes problem of increased disintegration time. The two points to be considered in case of FDTs are shortening the disintegration time at the same time keeping other parameters like friability, taste, and mouth feel and tablet strength within the accepted range. Using taste masking agents and super-disintegrating without significant increase in the weight and volume of final dosage forms. Also there is a scope to develop better packaging system to make FDTs more stable during handling.

2.7 Conclusion

Fast disintegrating tablets technology gained more popularity in last decade. It emerged as a New Drug Delivery system for treating various patients and diseases. FDT offers advantages of both solid and liquid oral dosage forms. This system allows easy self administration without the need of water to swallow. It has provided new area for research and development both for industries and academics.

Acknowledgement

The authors are thankful to, the Chairman and Director, Principle & HOD of Himachal Institute of Pharmacy, Paonta Sahib (H.P) India for providing necessary facilities to write a review article in the form of priceless advices and Institutional facilities.

Conflict of interest statement

We declare that we have no conflict of interest.

References


[32]. Debjit B., Jyoti J., Vinod D., Margret C., Fast dissolving tablet: A review on revolution of novel drug
Delivery system and new market opportunities, Der Pharmacia Lettre 2009;:2:262-276.


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

All © 2014 are reserved by International Journal of Pharmaceutical and Medicinal Research