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Review Article

FAST DISSOLVING TABLETS: A NOVEL APPROCH TO DRUG DELIVERY – A REVIEW

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ABSTRACT

Oral delivery is currently the gold standard in the pharmaceutical industry where it is regarded as the safest, most convenient and most economical method of drug delivery having the highest patient compliance. Yet, Dysphagia is a common problem encountered in all age groups in concern to solid dosage forms. To overcome such problems, certain innovative drug delivery systems, like Fast dissolving tablets (FDT) have been developed. Fast dissolving tablets have received ever – increasing demand during the last decade and the field has become a rapidly growing area in the Pharmaceutical industry. These are novel dosage forms which will rapidly disintegrate or dissolve in the saliva without the need of water. FDT's have been formulated for pediatric, geriatric, bedridden patients and for active patients who are busy and traveling and may not have access to water.This review depicts the various aspects of FDT formulation,superdisintegrants and technologies developed for FDT, along with various drugs explored, evaluation tests and marketed formulations of FDT's.

Key words: Fast dissolving tablets, Superdisintegrants, Evaluation of fast dissolving tablets, Fast dissolving technologies.

INTRODUCTION

The oral route of administration is considered as the most widely accepted route because of its convenience of self medication, compaction, ease of manufacturing, ease of administration, accurate dose, safest and economical route [1-3]. It is the duty of the health care provider to administer bitter drugs orally with acceptable level of palatability especially with pediatric and geriatric patients [4]. The most evident drawback of the commonly used oral dosage forms like tablets and capsules is swallowing, particularly in case of pediatric and geriatric patients [2]. To fulfill these medical needs, pharmaceutical technologists have developed a novel oral dosage forms known as orally disintegrating tablets (ODTs) or Fast disintegrating tablets (FDTs) or mouth melting tablets(MMTs) or mouth dissolving tablets(MDTs) which disintegrate rapidly in saliva, usually in a matter of seconds, without the need to take water. 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 [5,6]. When such tablets are placed in oral cavity, saliva quickly penetrates into the pores to cause rapid tablet disintegration [7]. Recent market studies indicate that more than half of the patient population prefers FDTs to other dosage forms. Mouth dissolving tablets are formulated mainly by two techniques first use of superdisintegrants like croscarmellose sodium, sodium starch glycolate and crosspovidone. Another method is maximizing pore structure of the tablets by freeze drying and vacuum drying. 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 subjected to first pass metabolism is reducedas compared to standard tablets [8,9].

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Salient Features of Fast Dissolving Drug Delivery System

- Easy administration to the patients who cannot swallow, such as the elderly, stroke victims, bedridden patients, patient affected by renal failure and patients who refuse to swallow such as pediatric, geriatric and mentally retarded patients.
- Bioavailability of drugs is increased as some drugs are absorbed from mouth, pharynx and esophagus through saliva passing down into the stomach.
- Rapid drug therapy intervention.
- Bitter taste can be masked by use of flavor and sweetener to produce good mouth feel particularly for pediatric patients.
- The risk of chocking or suffocation during oral administration of conventional formulation due to physical obstruction is avoided, thus providing improved safety.
- This is beneficial for travelling patients and busy people, who do not have easy access to water.
- Pregastric absorption can result in improved bioavailability and as a result reduced dosage, improve clinical performance through a reduction of unwanted effects [10-12].

Desired criteriafor FDTs

- FDT should leave minimal or no residue in mouth after oral administration, compatible with pleasing mouth feel.
- Effective taste masking technologies should be adopted for bitter taste drugs.
- Exhibit low sensitivity to environment condition such as humidity and temperature.
- FDTs should dissolve/ disintegrate in the mouth in matter of seconds without water.
- Have sufficient mechanical strength and good package design.
- The drug and excipients property should not affect the FDTs.
- Be portable and without fragility concern [13,14].

Drug selection criteria

The ideal characteristics of a drug for FDT include:

- Ability to permeate oral mucosa.
- At least partially non-ionized at the oral cavity.
- Have the ability to diffuse and partition into the epithelium of the upper GIT.
- Small to moderate molecular weight.
- Low dose drugs preferably less than 50 mg.
- Short half-life and frequent dosing drugs are unsuitable for FDT.
- Drug should have good stability in saliva and water.
- Very bitter or unacceptable taste and odor drugs are unsuitable for FDT [15].

Challenges in formulation of FDTs

Mechanical strength and disintegration time:

FDTs are formulated to obtain disintegration time usually less than a minute. While doing so, maintaining good mechanical strength is a prime challenge. Many FDTs are fragile and there are many chances that such a fragile tablet will break during packaging, transport or handling by the patients. Tablets based on technologies like zydis need special type of packaging. It is very natural that increase in the mechanical strength will delay disintegration time.

1. Taste masking:

Many drugs are bitter in taste. A tablet of better drug dissolving, disintegration in mouth will seriously affect patient compliance and acceptance for the dosage form. So effective taste masking of the bitter drugs must be done so that the taste of the drug is not felt in the oral cavity.

2. Mouth feel:

FDT should disintegrate into larger particles in the oral cavity. The particles generated after disintegration of the FDTs should be as small as possible. FDTs should leave minimal or no residue in mouth after oral administration. More over addition of flavor's and cooling agents like menthol improve the mouth feel.

3. Cost:

The technology used for FDTs should be acceptable in terms of cost of the final product method like Zydis and Orasolv that require special technologies and specific packaging increase the cost to a remarkable extent.

4. Avoid increase in tablet size.
5. Minimum and no residue in mouth.
6. Good package design and protect from moisture.
7. Sensitivity to environmental condition.
8. Compatible with taste masking Technology [16,17].

Limitations to FDT

- Drugs with relatively large doses are difficult to formulate into FDTs.
- Patients who concurrently take anti-cholinergic medications may not be the best candidates for FDTs.
- Tablet usually have insufficient mechanical strength. Hence, it requires careful packaging and handling.
- Tablets may leave unpleasant taste and/or grittiness in mouth if not formulated properly.
- They are more susceptible to degradation by humidity and temperature [18].

Counseling points to patients include

- Patients may mistake FDT for effervescent tablets, pharmacist need to be clearly told about the different between them. The Cima technologies Orasolv and Durasolv use slight Effervescense, patients may experience a pleasant tingling effect on tongue.
- FDT need to be handled carefully because some of FDT developed may not have sufficient mechanical strength.
- Patients with dryness of mouth or with siogrens syndrome or who taking Anti-cholinergic drugs may not be

suitable population for administrating FDT. Although no water is needed to allow the drug to disperse quickly and efficiently but most technologies of FDT utilizes the body own salivation but decrease volume of saliva may slow down dissolution/ disintegration/ bioavailability of the product.

- Although chewable tablets have been in the market for long time, patients need to be counseled properly the difference between chewable and FDT. FDT can be used easily in children who have lost their primary teeth but donot have full use of their permanent teeth and also for geriatric patients who have lost their teeth permanently.
- With the pharmacist counseling, intervention and assistance all of these patients who taking FDT could be more properly treated with greater convenience [19].

Technologies used for manufacturing fast disintegrating tablets

Various technologies used in the manufacture of FDT include:

Freeze drying / lyophhilization:-It is one of the first generation techniques for preparing FDT, in which sublimation of water takes place from the product after freezing. Lyophilisation is a pharmaceutical technology which allows drying of heat sensitive drugs and biologicals at low temperature under conditions that allow removal of water by sublimation.

Freeze drying process normally consists of three steps:

- Material is frozen to bring it below the eutectic point.
- Primary drying to reduce the moisture around 4% w/w of dry product.
- Secondary drying to reduce the bound moisture up to required final volume.

Due to lyophilisation, bulking agent and sometimes drug acquire glossy amorphous structure and thus dissolution is enhanced. The tablets prepared by freeze drying or lyophilisation are very porous in nature and disintegrate or dissolve rapidly when come in contact with saliva [20-22].

Molding:-Tablets produced by molding are solid dispersion. Moldedtablets disintegrate more rapidly and offer improved taste because the dispersion matrix is generally made from water soluble sugars. There are two types of molding process:

1. Solvent method: solvent method involves moistening the powder blend with a hydroalcoholic solvent followed by compression at low pressure in molded plates to form a wetted mass. Air drying is done to remove the solvent. Such tablets are less compact than compressed tablets and possess a powder structure that hastens dissolution.
2. Heat method: in the heat molding process a suspension is prepared that contains a drug, agar and sugar (mannitol or lactose). This suspension is poured in the blister packaging wells, and then agar is solidified at the room temperature to form a jelly and dried at 30°C under vacuum. The main concern about these molded tablets is their mechanical strength, which can be achieved by using binding agents [23].

Spray drying:-Spray drying is a process, fine powders can be produced. Spray – dryers are invariably used in the pharmaceutical industry to produce highly porous powders. Allen et al. have used spray drying for the production of FDT's. The formulations contained hydrolysed and non-hydrolysed gelatin as a supporting agent for the matrix, mannitol as a bulking agent and sodium starch glycolate or croscarmellose as a disintegrant. By adding an acid (eg: citric acid) or an alkali (eg: sodium bicarbonate) disintegration and dissolution were further enhanced. Tablets manufactured by this method show disintegration time < 20 sec in an aqueous medium [22].

Sublimation:-This process involves addition of some inert volatile substances like urea, urethane, camphor etc to other excipients and the compression of blend into tablet. Removal of volatile material by sublimation creates pores in the tablet structure, due to which tablet dissolves when comes in contact with saliva. Additionally several solvent like cyclohexane, benzene etc can also be used as pore forming agents. Fast dissolving tablets with highly porous structure and good mechanical strength have been developed by this method [10, 24].

Mass extrusion:- 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 and cutting into even segments up to heated blade to form tablets [25].

Direct compression method:-Direct compression represents the simplest and most effective tablet manufacturing technique. FDT can be prepared by using this technique because of the availability of improved excipients especially superdisintegrants and sugar based excipients.

(a) Superdisintegrants: In many orally disintegrating tablet technologies based on direct compression, the addition of superdisintegrants principally affects the rate of disintegration
and hence the dissolution. Tablet disintegration time can be optimized by concentrating the disintegrants. Below critical concentration tablet disintegration time is inversely proportional to disintegrants concentration. Above the critical concentration level, however, disintegration time remains approximately constant or even increases.

Microcrystalline cellulose, cross linked carboxymethyl cellulose sodium, cross linked polyvinyl pyrrolidone and partially substituted hydroxypropyl cellulose, though water insoluble, absorbs water and swells due to capillary action and are considered as effective disintegrants in the preparation of fast dissolving tablets.

Fast disintegration of tablets can also be achieved by incorporating effervescent disintegrating agents, which generates carbondioxide. This phenomenon also resulted in partial taste masking of unacceptable taste of the drug. The major drawback of effervescent excipients is their hygroscopicity. Hence their manufacture requires control of humidity conditions and protecton of the final product. This is reflected by the overall cost of the product [26].

(b) Sugar based excipients:-This is another approach to manufacture FDT by direct compression. The use of sugar based excipients especially bulking agents like dextrose, fructose, isomalt, lactilol, maltilol, sorbitol, starch hydrolysate, polydextrose and xylitol which display high aqueous solubility and sweetness and hence impart taste masking property and a pleasing mouth feel [25,27,28].

Cotton candy process:-This process is so named as it utilizes a unique spinning mechanism to produce floss like crystalline structure, which mimic cotton candy. Cotton candy process involves formation of matrix of polysaccharides or saccharides by simultaneous action of flash melting and spinning. The matrix formed is partially recrystallized to have improved flow properties and compressibility. This candy floss matrix is then milled and blended with active ingredients and excipients and subsequently compressed to FDT. This process canaccomadate high doses of drug and offers improved mechanical strength. However high process temperature limits the use of this process [29].

Nanonization:-A recently developed nanomelt technology involves reduction in the particle size of drug to nano size by wet milling technique. Surface adsorption of the nano crystals of the drug is done on selected stabilizers for stabilizing them against agglomeration, which are then incorporated in to the FDT's. this technique is mainly advantageous for poor water soluble drugs and also for wide range of doses (up to 200mg of drug per unit) [24].

Important Patented Technologies for Fast Dissolving Tablets

Zydis technology:-Zydis technology is the first mouth dissolving dosage form in the market. It is a unique freeze dried tablet in which the active drug is incorporated in a water soluble matrix, which is then transformed in to blister pockets and freeze dried to remove water by sublimation. When zydis units are put into the mouth, the freeze dried structure disintegrates instantaneously and does not require water to aid swallowing. The zydis matrix is composed of many material designed to achieve a number of objectives. Polymers such as gelatin, dextran or alginates 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 p^H adjusting agents may be used. Preservatives may also be added to prevent microbial growth. Zydis products are packed in blister packs to protect the formulation from environmental moisture [29,30].

Orasolv technology:-CIMA labs have developed orasolv technology. In thid system active medicament is taste masked. It also contains effervescent disintegrating agent. The evolution of carbon dioxide from the tablet produces fizzing sensation, which is a positive organoleptic property. Concentration of effervescent mixture usually employed is 20 – 25% of tablet weight. Tablets are made by direct compression technique at low compression force in order to minimize oral dissolution time. Conventional blenders and tablet machine is used to produce the tablets. The tablets produced are soft and friable [31].

Durasolv technology:-This technology is patented by CIMA labs. The tablets produced by this technology utilize the conventional tableting equipment. Tablets in this are formulated by using drug, nondirect compression fillers and lubricants. Nondirect compressible fillers are dextrose, mannitol, sorbitol, lactose and sucrose, which have advantage of quick dissolution and avoid gritty texture, which is generally present in direct compressible sugars. The tablets obtained are strong and can be packed in conventional packing into bottles and blisters [32].

Wow tab technology:-Wow tab technology is patented by yamanouchi pharmaceutical company wow means "Without water". In this process, combination of low mouldabilitysaccharrides and high mouldability saccharides is used to obtain a rapidly melting strong tablet. The active ingredient is mixed with a low mouldability saccharide and granulated with a high mouldability saccharide and compressed into tablet [33].

Flash tab technology:-Prographarm labs have a patent over this technology. In this technology, microgranules of the taste masked active drug are used. These may be prepared by using conventional techniques like coacervation, microencapsulation and extrusion – spheronisation. All these processes utilize conventional tableting technology. These taste masked micro crystals of active drug, disintegrating agent, a swelling agent and other excipients like soluble diluents etc are compressed to form a multiparticulate tablet that disintegrates rapidly [34].

Nano crystal technology:-This is patented by Elan, king of Prussia. Nanocrystal technology includes lyphilization of colloidal dispersions of drug substance and water soluble ingreidents filled into blister pockets. This method avoids manufacturing process such as granulation, blending and

tableting, which is more advantageous for highly potent and hazardous drugs. As manufacturing losses are negligible, this process is useful for small quantities of drug [35].

Ceform technology:-In ceform technology microspheres containing ceform active drug 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 ceform machine throws the dry drug blend at high speed through small, heated openings. The carefully controlled temperature of the resultant microbrust of heat liquefies the drug blend to form a sphere without adversely affecting drug stability. The microspheres are then blended and/ or compressed into the pre-selected oral delivery dosage format. The ability to simultaneously process both drug and excipients generates a unique microenvironment in which materials can be incorporated into the microspheres that can alter the characteristics of the drug substance, such as enhancing solubility and stability. The microspheres can be incorporated into a wide range of fast dissolving tablets such as flash dose, EZ chew, spoon dose as well as conventional tablets.

Pharmaburst technology:-SPI pharma, New Castle, patents this technology. It utilizes the coprocessed excipients to develop FDT's which dissolves within 30 – 40s. This technology involves dry blending of drug, flavour and lubricant followed by compression into tablets. Tablets obtained have sufficient strength so they can be packed in blister packs and bottles.

Frosta technology:-This technology is patented by Akina. It utilizes the concept of formulating plastic granules and compressing 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 usually mixing the porous plastic material with water penetration enhancer and followed by granulating with binder. The tablets obtained have excellent hardness and rapid disintegration time ranging from 15 to 30s depending on size of tablet [36].

Lyoc technology:-Lyoc technology is pantented by Pharmalyoc. Oil in water emulsion is prepared and placed directly into blister cavities followed by freeze drying. Non – homogeneity 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 [37].

Evaluation parameters for FDTs

General Appearance:

The general appearance of a tablet, its visual identity and overall elegance is essential for consumer acceptance. It indicates tablet size, shape, colour, presence or absence of an odor, surface texture, physical flaws, consistency and legibility of any identification markings.

Size and shape:

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

Uniformity of weight:

I.P procedure for uniformity of weight was followed, twenty tablets were taken and their weight was determined individually and collectively on a digital weighing balance. The average weight of one tablet was determined from the collective weight. The weight variation test would be a satisfactory method of determined the drug content uniformity.

Average weight of tablets in mg	Maximum percentage difference allowed
130 or less	±10
130-324	±7.5
More than 324	±5

Friability

To achieve percentage friability within limits for an FDT is a challenge for a formulator since all methods of manufacturing of FDT are responsible for increasing the percentage friability values. Thus, it is necessary that this parameter should be evaluated and the results are with in bound limits (0.1%-0.9%). It is measured of mechanical strength of tablets. Roche friabilitor was used to determine the friability by following procedure. A preweighed tablet was placed in the friabilitor. Friabilitor consists of a plastic chamber that revolves 25 rpm, dropping these tablets at a distance of 6 inches with each revolution. The tablets were rotated in friabilitor for atleast 4 minutes. At the end of the test tablets were dusted and reweighed, the loss in the weight of the tablet is the measure of friability and is expressed in percentage as:

Percentage friability = (loss in weight/ initial weight) ×100

Tablet 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 of the tablet of each formulation was determined using Monsanto hardness tester or Pfizer hardness tester [38].

Wetting time and water absorption ratio:

Wetting time of dosage form is related with the contact angel. Wetting time of the FDT is another important parameter, which needs to be assessed to give an insight

into the disintegration properties of the tablet. Lower wetting time implies a quicker disintegration of the tablet. The wetting time of the tablets can be measured using the simple procedure. Five circular tissue paper of 10 cm diameter are placed in a petridish. Ten millimeters of water soluble dye solution is added to petridish. A tablet is carefully placed on the surface of the tissue paper. The time required for water to reach upper surface of the tablet is noted as the wetting time.

For measuring water absorption ratio the weight of the tablet before keeping in the petridish is noted (w_b). The wetted tablet from the petridish is taken and reweighed (w_a). The water absorption ratio, R can be determined according to the following equation.

$R = 100 (w_a-w_b)/w_b$

Moisture uptake studies:

Moisture uptake studies for FDT should be conducted to assess the stability of the formulation. Ten tablets from each formulation were kept in a dessicator over calcium chloride at 37ºc for 24 hours. The tablets were then reweighed and exposed to 75% relative humidity, at room temperature for 2 weeks. Required humidity was achieved by keeping saturated sodium chloride solution at the bottom of the dessicator for 3 days. One tablet as control (without super disintegrants) was kept to assess the moisture uptake due to other excipients. Tablets were weighed and percentage increase in weight was recorded.

In-vivo Disintegration test:

The test was carried out on 6 tablets using the apparatus specified in I.P 1996 distilled water at 37ºc±2ºc was used as a disintegration media and the time in seconds is taken for complete disintegration of the tablet with no particulate matter remaining in the apparatus was measured in seconds.

In-vitro dispersion time:

Invitro dispersion time was measured by dropping a tablet in a beaker containing 50 ml of sorenson's buffer PH 6.8. Three tablets from each formulation was randomly selected and invitro dispersion time was performed.

Dissolution test:

The development of dissolution method for FDT is comparable to approach taken for conventional tablets and is practically identical when FDT does not utilize taste masking. Commonly the drugs may have dissolution conditions as in USP monograph. Other media such as 0.1NHcl, P^H 4.5 and P^H 6.8 buffers should be used for evaluation of FDT. Experience has indicated that USP 2 paddle apparatus is most suitable and common choice for dissolution test of FDT tablets, where a paddle speed of 50 rpm is commonly used. The USP 1 (basket) apparatus may have certain applications for FDT but used less frequently due to specific physical properties of tablets. Specifically tablet fragments or disintegration tablet masses may become trapped on the inside top of the basket at the spindle where little or no effective stirring occurs, yielding irreproducible results in dissolution profile.

Stability testing of drug:

The FDT are packed in suitable packaging and stored under the following conditions for a period as prescribed by ICH guidelines for accelerated studies;

- 40ºc±1ºc
- 50ºc±1ºc
- 37ºc±1ºc
- RH 75%±5%

The tablets were withdrawn after a period of 15 days and analysed for Physical characterization (Visual defects, Hardness, Friability, Disintegration, Dissolution) and drug content uniformity. The data obtained is fitted into first order equation to determine the kinetics of degredation. Accelerated stability data are plotting according to Arrhenius equation to determine the shelf life at 25ºc.

Future prospects:

For protein and peptide based therapeutics, they have limited bioavailability manufactured by conventional dosage forms. By using FDT, their bioavailability can be increased. FDT not only increases the bioavailability of drugs but also suitable for the drugs that have high molecular weight proteins and peptides [40].

Table 1.Superdisintegrants used in FDTs

Superdisintegrant	Nature	Properties	Mechanism	Trade names
Crosspovidone	Cross linked homopolymer of N-vinyl-2-pyrrolidone	Particle size 100 µm, Insoluble in water, gives smoother mouthfeel	Both swelling and wicking	Kollidon, polyplasdone
Cross carmellose sodium	Cross linked form of sodium cmc	Particle size 200 mesh, insoluble in water	swelling	AC-DI-SOL,NYMEE 25X, NYMCEL
Sodium starch glycolate	Cross linked low substituted carboxy methyl ether of polyglycopyranose	Particle size 140 mesh, insoluble in organic solvents, disperses in cold water and settles	Water uptake followed by rapid and enourmous swelling	Explotab Primogel

		in the form of a highly saturated layer		
Acrylic acid derivatives	Poly (acrylic acid) super porous hydrogel	Particle size 106 µm	Wicking action	
Effervescent mixture	Citric acid, tartaric acid, Sodium bicarbonate	Crystalline nature	Effervescence	
Sodium alginate	Sodium salt of alginic acid	Slowly soluble in water, hygroscopic in nature	Swelling	
NS-300	Carboxy methyl cellulose	Particle size 106 µm	Wicking type	
ECG-505	Calcium salt of CMC	Particle size 106 µm	Swelling type	
L-HPC	Low hydroxyl propyl cellulose	Particle size 106 µm	Both swelling and wicking	
Aliginic acid NF	Cross linked alginic acid		Wicking action	satialgine
Soy polysaccarides	Natural disintegrant			EMCOSOY
Calcium silicate			Wicking action	
Ion exchange resin	Resins			Amberlite

Table 2. Drugs Explored For Fast Dissolving Tablets

CATEGORY	DRUG
NSAIDS	Ketoprofen, Piroxicam, Paracetomol, Rofecoxib, Nimesulide, Ibuprofen, Tepoxaline
Antiulcer	Famotidine, Lansoprazole
Anti-depressants	Mitraxepine, Fluoxetine
Anti-parkinsonian agents	Bromocriptinemesylate, Lysuride maleate
Anti-migrane	Sumatriptan, Rizatriptan, zolmitriptan
Anti-histaminic	Loratadine, Diphenhydramine,Buclizine
Hypnotics and sedatives	Zolpidem, Clonazepam
Anti-psychotics	Olanzepine, Risperidone, Pirenzepine
Anti-bacterial agents	Albendazole, Bephenium, Hydroxynaphthoate, Pyrantel, Embonate, Thiabendazole
Anti-arrhythmic agents	Amiodarone, Disopyramide, FlecainideAcetate, Quinidine
Anti-Epeleptics	Beclamide, Carbamazepine, Clonazepam, Ethotoin, Methoin, Methsuximide, Phensuximide, Primidone, Sulthiame, Valproic acid
Anti-Hypertensive agents	Amlodipine, Carvedilol, Benidipine, Darodipine , Prazosin, Terazosin
Antineoplastic agent & Immunosuppressants	Aminoglutethimide, Amsacrine, Azathiopnne, Busulphan, Mitozantrone, Procarbazine, Tamoxifen citrate, Testolactone
Anti-fungal agents	Amphotericin, Butoconazole Nitrate, Econazole
Cardiac Inotropic agents	Amrinone, Digitoxin, Digoxin, Enoximone, Lanatoside C, Medigoxin
Diuretics	Acetazolamide, Triamterene, Amiloride
Anti-gout agents	Allopurinol, Probenecid, Sulphinpyrazone
Anti-muscuranic agents	Atropine, Benzhexol
Nitrates and other anti-anginal agents	Amyl Nitrate, GlycerylTrinitrate, IsosorbideDinitrate, IsosorbideMononitrate,PentaerythritolTetranitrate
Anti-malarials	Amodiaquine, Chloroquine, Chlorproguanil
Anti-coagulants	Dicoumarol, Dipyridamole, Coumalone
Miscellaneous	Propyphenazone, Spiranolactone, Phloroglucinol, Sildenafil

Table 3. Marketed FDT's

Brand name	Active ingridient	Manufacturer
Zooming ZMT and Rpimelt	Zolmitriptan	Astra Zeneca
Alavert	Loratadine	Wyeth consumer Healthcare
Cibalginadue FAST	Ibuprofen	Novartis consumer Healthcare
Hyoscyamine sulfate ODT	Hyoscyamine sulfate	ETHEX corporate
Nurofen Flash Tab	Ibuprofen	Boots Healthcare
Kemstro	Baclofen	Schwarz pharma
Fluoxetine ODT	Fluoxetine	Bioavail
Benadryl Fastmelt	Diphenhydramine	Pfizer
Zolpidem ODT	Zolpidemtartarate	Bioavail
Nasea ODT	Ramosetoron	Yarmanouchi
Ralivia Flash Dose	Tramadol Hcl	Bioavail
Gaster D.	Famotidine	Yarmanouchi
Excedrin Quick Tabs	Acetaminophen	Bristol-myerssquibb
Claritin Red Tab	Loratadine	Sching corporation
Remeron Sol Tab	Mirtazepine	Organon Inc.
Feldene melt	Piroxicam	Pfizer
Maxalt-MDT	Rizatriptan benzoate	Merck
PropulsidQuicksolv	Cisapride monohydrate	Janssen
Pepcid ODT	Famotidine	Merck
Imodium Instant melts	LoperamideHcl	Janssen
Zyprexa	Olanzepine	Eli Lilly
Childrens Dimetapp ND	Loratadine	Wyeth consumer Healthcare
Zofran ODT	Ondansetron	Glaxo smith kline
Klonodin wafers	Clonaxepam	Roche
Risperidal M-Tab	Risperidone	Janssen
Zelapar	Selegiline	Elan American corporation
Zubrin (pet drug)	Tepoxaline	Schering corporation
Aricept ODT	DonepzilHcl	Eisai and Pfizer
Fazal co	Clonzapine	Alamo pharmaceuticals
Permax	Pergolide	Amarin corporation
Febrectol	Paracetamol	Prographarma
Domray MD	Domperidone	Ray Remedies
Mosid MT	Mosapride	Torrent
Nisure-MD	Nimesulide	Suzenpharma
Nimez MD	Nimesulide	Zotapharma
Valus	Valdecoxib	Glenmark
Zyrofmeltab	Rofecoxib	Zyduscadila
Torrox MT	Rofecoxib	Torrent
Romilast	Montelukast	Ranbaxy
OlanexInstab	Olanzepine	Ranbaxy
Zotacet MD	Cetirizine Hcl	Zotapharma
Benadryl Fast melt	Diphenhydramine and Pseudoephedrine	Lambert

CONCLUSION

Orally disintegrating tablets are easy to manufacture, provides accurate dose, improved patient compliances, better safety and efficacy. Compared to conventional dosage forms, FDT are easy to carry like conventional dosage forms and like liquid dosage forms no need to swallow. It provides easy administration of drugs to geriatric, pediatric and ill patients. Bitter drugs can also be administer in the form of FDT since many taste masking technologies are available. So drugs which are bitter can also be given in the form of FDT. Large number of drugs belonging to different categories can be easily formulated into FDT. Not only single drug, but also combination of drugs can also be formulated. Now- a-days, there is a continuous development of new pharmaceutical excipients, one can expect the novel technologies for FDT, in the near future.

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