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“Review on Fast Dissolving Tablets”

Soumya Singh*, Manish Jaimini.

*Author for correspondence

Soumya Singh

Department of Pharmaceutics,

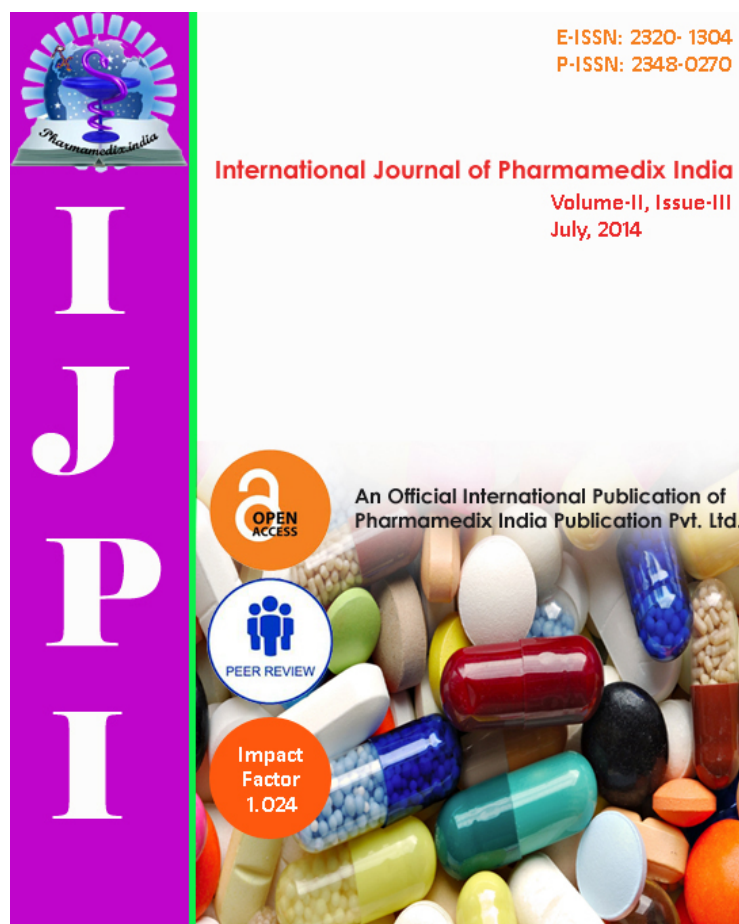
Jaipur College of Pharmacy,

ISI-15, RIICO Institutional Area,

Sitapura, Tonk Road, Jaipur.

(Rajasthan)-302022.

Email ID: soumyaa.singh@gmail.com



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Abstract:

Fast dissolving drug delivery system (FDDS) is now gaining the popularity in pharmaceutical companies as they are the novel drug delivery technique in order to provide the patient with medicines without obstacles in swallowing. It is a very well known fact that a drug can be administered through many different routes so as to produce a systemic pharmacological effect. The route of administration is considered as the path by which a drug is taken into the body for the treatment of various diseases and disorders. The main route of administering a drug is the oral route which is the oldest and most commonly used because of its ease of administration, self-medication and avoidance of pain as compared to parental route. Oral drug delivery remains the preferred route of drug delivery. Despite of the tremendous advancement in oral route some of the people find difficulty in swallowing tablet and other oral dosage form, so in order to troubleshoot all these problems associated with oral route, fast dissolving drug delivery systems (FDDS) were first came into existence in 1970. Oral fast-dissolving tablets, are an examples of a few existing technologies which having the potential to accommodate various physicochemical, pharmacokinetic and pharmacodynamic characteristics of drugs. Since emergence it captures the major portion of tablets and capsules from the market, thus it satisfies the role over Conventional Dosage forms.

Keyword: Fast Dissolving Tablets, Patented Technologies, Super Disintegrates, Methodology.

Introduction

In the recent decades, a variety of pharmaceutical research had been conducted for developing new dosage forms basically considered for quality of life. Most of these efforts had been focused on the ease of medication. Among all the various dosage forms developed to increase the ease of

administration. The Fast Dissolving tablets (FDTs) are also known as Orodispersible tablets, Orally Disintegrating tablets, Mouth Dissolving tablets, Porous tablets, Fast Disintegrating tablets, Quick Disintegrating tablets, Rapid Dissolving tablets, Quick Melt tablets and Rapid Melt tablets. It is the most widely preferable commercial products for

oral cavity in which an attractive site for the administration of drugs takes place because of ease of the administration. Various dosage forms such as Tablets, Capsules, and Liquid preparations are administered orally. In the last decade, Rapid Disintegrating tablet (RDT) technologies that made the tablet disintegrate in the mouth cavity without chewing and through additional water intake had drawn a great deal of attention on RDTs. The RDT are also widely known as fast melting, fast dispersing, rapid dissolving, rapid melt, and quick disintegrating tablets.

The US Food and Drug Administration Center for Drug Evaluation and Research(CDER) defined in the 'Orange Book' as an ODT, "the solid dosage form contains medicinal substances, which disintegrates quickly normally within a few seconds, when it placed upon the tongue". The benefits of these dosage forms were highlighted by the adoption of the term, "Orodispersible Tablet", by the European Pharmacopoeia by which it completely described about a tablet that can be placed in the oral cavity where it dispersed fully by rapid rate before the process of swallowing.(Dutta, 2011)

All RDTs are approved by the Food and Drug Administration(FDA) and classified as orally disintegrating tablets. The European Pharmacopoeia recently adopted the term orodispersible tablet for the tablet that dispersed or disintegrated within 15 seconds

to 3 minutes in the mouth before swallowing it. Thus the tablet disintegrated into smaller granules or melts in the mouth from a hard solid matter to a gel like structure and it allow easy swallowing by patients. Basically the disintegration time for the good RDTs varies from several seconds to about a minute. These tablets provide benefits particularly for pediatric and geriatric populations who have problem in swallowing conventional tablets and capsules. On further addition, pediatric patients may suffer from ingestion problems as these results in the underdeveloped muscular and nervous control. Moreover, the patient traveling with little or no access to water and limit utility of orally administered conventional tablets or capsules. RDT results in the quick dissolution and rapid absorption by which it shows rapid onset of action. Then the drug candidates undergo pre-gastric absorption when formulated as RDTs and may show increased oral bioavailability. It mainly provide good stability, accurate dosing, easy manufacturing.(Velmurugan & Sundar, 2010)

From the past one decade, there had been an increased demand for more patient friendly and compliant dosage forms. As a result, the demand for the developing new technologies has been enhancing annually. Since the development cost of the new drug molecules are very high and efforts are now being made by pharmaceutical companies for

focusing on the development of new drug dosage forms for existing drugs with improved safety and efficacy together with the reduced dosing frequency, and this will lead to the production of more cost-effective dosage forms.(Dutta, 2011)

For the most effective therapeutic agents used to produce systemic effects by the oral route and it still represents the preferred way of administration and also owing to its several advantages and high patient compliance compared to many other routes of administration.

At present tablets and hard gelatin capsules constitute a major portion of drug delivery systems that are currently available in the market. However, many of the patient groups such as the elderly, children, and the patient who are mentally retarded, uncooperative, nauseated, or on reduced liquid intake or diets having difficulties in swallowing these dosage forms and also those who are travelling or have little access to water are similarly affected by this.(Sharma, 2008)

To full fill all these medical needs pharmaceutical technologists have developed a novel oral dosage form called as Orally Disintegrating Tablets (ODTs) which has disintegrated rapidly in saliva, usually in a matter of seconds, without the need to intake of water. The drug dissolution and absorption as well as onset of clinical effects and drug bioavailability may be significantly

greater than those which are observed from conventional dosage forms.

Although the chewable tablets have been on the market for some time that they are not the same as the new ODTs. Patients for whom chewing is difficult or painful could use these new tablets easily for the treatment. ODTs can be used easily in the children who have lost their primary teeth but do not have complete use of their permanent teeth.(Reddy et al., 2002)

Recent market researches indicate that the more than half of the patient population preferred ODTs to other dosage forms and the most consumers would ask their doctors for ODTs (70%) and the purchase data of ODTs are also more than sufficient(70%) or preference of ODTs to regular tablets or liquids are also more (>80%).(Sastry, 2000)

ODT products have been developed for the numerous indications ranging from migraines(for which rapid onset of action is important) to the mental illness (for which patient compliance is important for treating basically chronic indications such as depression and schizophrenia). (Shukla et al., 2009)

Despite of so much of the advancements in various delivery system that developed for administration of various drugs through the different routes such as oral, parental, transdermal and nasal etc. and the oral route is considered as the most preferred route of

administration that includes painless, ease of administration, patient friendly and so on. Several new technologies had been developed for the oral delivery that is being available to address to improve the patient compliance. Fast dissolving drug delivery system (FDDS) is gaining the popularity in pharmaceutical companies as they are the new drug delivery technique in order to provide the patient with medicines without obstacles in swallowing. FDDS include tablets and films that are designed in such a way that they disintegrated and then swallowed without the need of water as compared to other conventional dosage forms. Films are the small polymeric strips which are placed on the mucosal surface and then rapidly dissolve within a fraction of seconds in order to release the active ingredients without the consumption of water.(Badgujar&Mundada, 2011)

AN IDEAL FDT SHOULD HAVE

- No Requirement of water for oral administration, yet dissolve / disperse/ disintegrate in mouth in the matter of seconds.
- Having a pleasing mouth feel.
- Have an acceptable taste masking property.
- Harder and less friable by nature.
- Leave minimal or no residue in the mouth after administration.
- Exhibit low sensitivity to the environmental conditions (temperature and humidity).
- Allow the manufacturing of tablet using conventional processing and packaging equipments.(Bradoo, 2001)

ADVANTAGES

- Ease of administration to the patients who could not swallow such as the elderly, strokes victims and bedridden patients. Patients who should not swallow such as renal failure patients and also who refuse to swallow, such as pediatrics, geriatric and psychiatric patients.
- Patient's compliance for the disabled bedridden patients and for travelling and busy people, who do not have the ready access to water.
- Good mouth feel property of Mouth Dissolving Drug Delivery System (MDDDS) helps to change the basic view of medication as "bitter pill" and particularly for pediatric patients due to improve taste of bitter drugs.
- Convenience of the administration and accurate dosing as compared to the liquid Formulations.
- Benefits of liquid medication in the form of solid preparation.
- More rapid drug absorption through the pre-gastric area i.e. mouth, pharynx and

esophagus which may produces rapid onset of Action.

- Pre-gastric absorption could result in the improved bioavailability, reduced dose and improved clinical performance by reducing the side effects.
- New business opportunities like product differentiation, line extension and life-cycle management, exclusivity of product promotion and patent life extension. (Bhaskaran&Narmada, 2002)

PROBLEMS DURING DEVELOPMENT OF ODT

- Quick disintegration of tablets.
- Avoid increase in the tablet size.
- Had sufficient mechanical strength.
- No residue in the mouth.
- Protection from the moisture.
- Good packaging design.
- Compatible with taste masking technologies.
- Not affected by all the drug properties
- No drug excipient interaction.(Patidar et al., 2011)

REQUIREMENT TO DEVELOP ODTs

The need for non-invasive delivery systems prevails due to patient's poor acceptance, incompliance with existing drug delivery regimens, limited market size for drug companies and high cost of drugs in disease management.(Kumari et al., 2010)

Orally disintegrating dosage forms are exceptionally suitable for patients, who find

solid dosage form inconvenient to swallow with a glass of water.(Mahaveer, 2010)These patients are the following:

- Pediatric and geriatric patients having difficulty in swallowing or chewing solid dosage forms
- Patients who are reluctant to take solid preparations due to fear of choking
- Patient with allergies who requires a more convenient dosage form than antihistamine syrup
- A middle-aged woman subjected to radiation therapy for breast cancer may be too nauseous to swallow her dose.
- A schizophrenic patient who may try to hide a conventional tablet under his or her tongue so as to avoid their daily dose of an atypical antipsychotic
- A patient suffering from motion sickness during the journey may have little or no access to water.(Chandan, 2010)

The major aim of these formulations is increased bioavailability and faster onset of action. In some cases; where drug dissolves rapidly, its dispersion in saliva (in oral cavity) causes pregastric absorption from some formulations in buccal, pharyngeal and gastric regions. A pregastric absorption avoids first pass metabolism and it is advantageous to drugs that undergo first pass hepatic metabolism. Correspondingly,

safety profiles may be improved for drugs which produce substantial toxic metabolites by first-pass hepatic metabolism and gastric metabolism.¹³

Emerging new drug delivery technologies and utilizing them in new product development nevertheless of its size; is crucial for pharmaceutical industries to survive. It is common for pharmaceutical manufacturers to develop a given drug entity in a new and improved dosage form as a drug nears the end of its patent life. A new dosage form allows a manufacturer to enlarge market exclusivity. It allows unique product differentiation and extends patent protection, hence forth offering its patient population a more convenient dosage form. For instance Eisai Inc. launched Aricept ODT, a line extension of donepezil for Alzheimer's disease, in Japan in 2004 and in the U.S. in 2005 in response to a generic challenge filed in the U.S. by Ranbaxy. Merck's Japanese subsidiary launched Lipola M (simvastatin ODT), a line extension of its block-buster, Zocor, a cholesterol-lowering drug, in response to seventeen generic registrations of simvastatin applied for in Japan in 2004.(Kumar et al., 2011)

The development of a fast-dissolving tablet also provides an opportunity for a line extension in the marketplace; a wide range of drugs (e.g., neuroleptics, cardiovascular drugs, analgesics, antihistamines, and drugs

for erectile dysfunction) can be considered candidates for this dosage form. Pharmaceutical marketing is another reason for the increase in available fast dissolving/disintegrating products.(Prajapati&Ratnakar, 2009) As a drug entity nears the end of its patent life, it is common for pharmaceutical manufacturers to develop a given drug entity in a new and improved dosage form. A new dosage form allows a manufacturer to extend market exclusivity, while offering its patient population a more convenient dosage form or dosing regimen. In this regard, fast dissolving/ disintegrating tablet formulations are similar to many sustained release formulations that are now commonly available. An extension of market exclusivity, which can be provided by a fast-dissolving/disintegrating dosage form, leads to increased revenue, while also targeting underserved and undertreated patient populations. Although the cost to manufacture these specialized dosage forms exceeds that of traditional tablets, this additional cost is not being passed on to the consumer.(Arunachalam, 2010)

DIFFERENT METHODOLOGY USED FOR FAST DISSOLVING FORMULATIONS

a) Lyophilization or Freeze-drying- Formation of porous product in freeze-drying process is exploited in formulating MDTs. Lyophilization is a process, which includes the removal of solvent from a frozen suspension or solution

of drug with structure-forming additives. Freeze-drying of drug along with additives imparts glossy amorphous structure resulting in highly porous and lightweight product. The resulting tablet has Rapid disintegration and dissolution when placed on the tongue and the freeze-dried unit dissolves instantly to release the drug. However, the MDTs formed by lyophilization have low mechanical strength, poor stability at higher temperature, and humidity.(Hirani et al., 2009)

b) Molding- In this method, molded tablets are prepared by using water-soluble ingredients so that the tablets dissolve completely and rapidly. The powder blend is moistened with a hydro alcoholic solvent and is molded into tablets under pressure lower than that used in conventional tablet compression. The solvent is then removed by air-drying. Molded tablets are very less compact than compressed tablets. These possess porous structure that increase dissolution.(Shaikh et al., 2010)

c) Cotton candy process- This process is so named as it utilizes a unique spinning mechanism to produce floss-like crystalline structure, which mimics 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 re-crystallized 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 MDTs.(Arya et al., 2010)

d) Spray drying- This technology produces highly porous and fine powders as the processing solvent is evaporated during the process. In this method to prepare MDTs hydrolyzed and non hydrolyzed gelatin were used as supporting matrix, mannitol as bulking agent and sodium starch glycolate or cross carmellose sodium as super disintegrant. Disintegration and dissolution were further increased by adding acidic substances like citric acid or alkali substance like sodium bicarbonate. This formulation technique gives porous powder and disintegration time <20 sec.(Siddiqui et al., 2011)

e) Mass extrusion-This technology involves softening the active blend using the solvent mixture of water-soluble polyethylene glycol and methanol and subsequent 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.(Purvani&Wadhavani, 2000)

f) Melt granulation- In this process, MDTs can be prepared by incorporating a hydrophilic waxy binder (super polystate) PEG-6-stearate. Super polystate is a waxy material with an m. pt. of 33-37°C and a hydrophilic- lipophilic balance of 9. It not only

acts as a binder and increases the physical resistance of tablets, but also helps in the disintegration of tablets as it melts in the mouth and solubilizes rapidly leaving no residue. Super polystate was incorporated in the formulation of MDTs by melt granulation method where granules are formed by the molten form of this material.(Purvani et al., 2000)

g) Phase transition process- Kunoet. al., investigated processes for the disintegration of MDTs by phase transition of sugar alcohols using erythritol (m. pt. 122°C), xylitol (m. pt. 93-95°C), trehalose (97°C), and mannitol (166°C). Tablets were produced by compressing a powder containing two sugar alcohols with high and low melting points and subsequent heating at a temperature between their melting points. Before heating process, the tablets do not have sufficient hardness because of low compatibility. The tablet hardness was increased after heating process, due to the increase of inter particle bonds or the bonding surface area in tablets induced by phase transition of lower melting point sugar alcohol.(Chien, 1992)

h) Sublimation- The presence of a highly porous structure in the tablet matrix is the key factor for rapid disintegration of MDTs. Even though the conventional tablets contain highly water-soluble ingredients, they often fail to disintegrate rapidly because of low porosity. To improve the porosity, volatile

substances such as camphor can be used in tableting process, which sublimated from the formed tablet. Developed MDTs utilizing camphor, a subliming material that is removed from compressed tablets prepared using a mixture of mannitol and camphor. Camphor was sublimated in vacuum at 80°C for 30 min after preparation of tablets.(Vandana et al., 2005)

i) Direct compression method- This technique is easy way to formulate MDTs since limited number of processing steps, low manufacturing cost and also accommodate high dose the final weight of tablet can easily exceed that of other production method. The disintegration and dissolution of directly compressed tablets depends on single or combined effect of disintegrant, water soluble excipients and effervescing agents. Disintegrant efficacy is strongly affected by tablet size and hardness. Disintegration properties can be optimized by medium or low tablet size, low hardness and low physical resistance .It is essential to choose a suitable and an optimum concentration of disintegrant to ensure fast disintegration and high dissolution rates.The addition of water soluble excipients or effervescent agent can further increase dissolution or disintegration properties. Super disintegrants provide fast disintegration due to combine effect of swelling and water absorption. As an effect of swelling of super disintegrant the wetted

surface of the carrier increase, which promotes wettability and dispersibility of the system and thereby increase the disintegration and dissolution. The optimum concentration of superdisintegrant can be selected according to critical concentration of disintegrant. Below this concentration the tablet disintegration time is inversely proportional to the concentration of superdisintegrant, whereas if concentration of superdisintegrants incorporated in tablet is above the critical concentration, the disintegration time remains approximately constant or even increases. Direct compression represents the simplest and most cost effective tablet manufacturing technique. This technique can now be applied to preparation of ODT because of the availability of improved excipients especially superdisintegrants and sugar based excipients:

1. Sugar Based Excipients- This is another approach to manufacture ODT by direct compression. The use of sugar based excipients especially bulking agents like dextrose, fructose, isomalt, lactitol, maltitol, maltose, mannitol, sorbitol, starch hydrolysate, polydextrose and xylitol, which display high aqueous solubility and sweetness, and hence impart taste masking property and a pleasing mouth feel.

Mizumoto et al have classified sugar-based excipients into two types on the basis of molding and dissolution rate. The mechanical strength of molded tablets is a matter of great concern. Binding agents, which increase the mechanical strength of the tablets, need to be incorporated. Taste masking is an added problem to this technology. The taste masked drug particles were prepared by spray congealing a molten mixture of hydrogenated cottonseed oil, sodium carbonate, lecithin, polyethylene glycol and an active ingredient into a lactose based tablet triturate form. Compared to the lyophilization technique, tablets produced by the molding technique are easier to scale up for industrial manufacture. (Patel & Patel, 2006)

2. 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. The presence of other formulation ingredients such as water-soluble excipients and effervescent agents further hastens the process of disintegration. For the success of fast dissolving tablet, the tablet having quick dissolving property which is achieved by using the superdisintegrant. (Purvani et al., 2000) (Table 1)

Table 1: Superdisintegrants employed in Formulations

S N	Super disintegrants	Nature	Mechanism of Action	Brand Names
1.	Crosscarmellose	Modified cellulose or Cross linked Cellulose	Wicking due to fibrous structure swelling with minimal gelling	Ac-Di-Sol Nymce 25 X Nymcel
2.	Crosspovidone	Cross linked PVP	Water wicking, swelling and possibly some deformation recovery	Kollidon Polypylasdone
3.	Aliginic acid NF	Cross linked Aliginic acid	Wicking action	Satialgine
4.	Sodium starch glycolate	Modified starch	Rapid and extensive swelling with minimal showing gelling	Explotab Primogel
5.	Sodium Alginate	Sodium salt of Aliginic acid	Swelling	-
6.	Soy Polysaccharides	Natural disintegrant	-	EMCOSoy
7.	Calcium silicate	-	Wicking Action	-
8.	Ion exchange resin	Resins	-	Amberlite (IPR 88)

j) Three-dimensional Printing (3DP) -Three-dimensional printing (3DP) is a rapid prototyping (RP) technology. Prototyping involves constructing specific layers that uses powder processing and liquid binding materials. A novel fast dissolving drug delivery device (DDD) with loose powders in it was fabricated using the three dimensional printing (3DP) process. Based on computer-aided design models, the DDD containing the drug acetaminophen were prepared automatically by 3DP system. It was found that rapidly disintegrating oral tablets with proper hardness can be prepared using TAG. The rapid disintegration of the TAG tablets seemed due to the rapid water penetration into the tablet resulting from the large pore size and large overall pore volume.(Amin, 2006)

k) 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 nano crystals 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 poor 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 exception durability and wide range of doses (up to 200 mg of drug per unit).(Amin, 2006)

IMPORTANT PATENTED TECHNOLOGIES FOR FAST DISSOLVING TABLETS

- **Zydis Technology-** Zydis formulation is a unique freeze dried tablet in which drug is physically entrapped or dissolved within the matrix of fast dissolving carrier material. When zydis units are put into the mouth, the freeze-dried structure disintegrates instantaneously and does not require water to aids wallowing. The zydis matrix is composed of many material designed to achieve a number of objectives. To impart strength and resilience during handling, polymers such as gelatin, dextran or alginates are incorporated. These form a glossy amorphous structure, which imparts strength.(Bhowmik et al., 2009)To obtain crystallinity, elegance and hardness, saccharides such as mannitol or sorbitol are incorporated. Water is used in the manufacturing process to ensure production of porous units to achieve rapid disintegration while various gums are used to prevent sedimentation of dispersed drug particles in the manufacturing process. Collapse protect ants such as glycine prevent the shrinkage of zydis units during freeze-drying process or long-term storage. Zydis products are packed in blister packs to

protect the formulation from moisture in the environment.(Wilson et al., 1987)

- **Durasolv Technology-** Durasolv is the patented technology of CIMA labs. The tablets made by this technology consist of drug, filler and a lubricant. Tablets are prepared by using conventional tableting equipment and have good rigidity. These can be packaged into conventional packaging system like blisters. Durasolv is an appropriate technology for product requiring low amounts of active ingredients.(Bhowmik et al., 2009)

- **Orasolv Technology-** CIMA labs have developed Orasolv Technology. In this system active medicament is taste masked. It also contains effervescent disintegrating agent. 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.(Wilson et al., 1987)

- **Flash Dose Technology-** Flash dose technology has been patented by fuisz. Nurofenmeltlet, a new form of ibuprofen as melt in mouth tablets prepared using flash dose technology is the first commercial product launched by biovail corporation. Flash dose tablets consist of self-binding shear form matrix termed as “floss”. Shear

form matrices are prepared by flash heat processing. (Bhowmik et al., 2009)

- **Wow tab Technology-** Wow tab technology is patented by Yamanouchi Pharmaceutical Co. WOW means “Without Water”. In this process, combination of low mouldability saccharides and high mould ability saccharides is used to obtain a rapidly melting strong tablet. The active ingredient is mixed with a low mouldability saccharide (eg. lactose, glucose, and mannitol) and granulated with a high mouldability saccharide (eg. Maltose, oligosaccharides) and compressed into tablets.(Wilson et al., 1987)

- **Flash tab Technology-** Prographarm laboratories have patented the Flash tab technology. Tablet prepared by this system consists of an active ingredient in the form of micro crystals. Drug micro granules may be prepared by using the conventional techniques like coacervation, micro encapsulation and extrusion spheronisation. All the processing utilized conventional tableting technology. (Agrawal, 2011)

FDTRELEASE MECHANISM OF SUPERDISINTEGRANTS

There are four major mechanisms for tablets disintegration as follows:

- **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. (Seager, 1998)

- **Porosity and capillary action (Wicking)-**

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 /excipient 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 net work around the drug particles. (Seager, 1998)

- **Due to disintegrating particle/particle**

repulsive forces-Another mechanism of disintegration attempts to explain the swelling of tablet made with 'nonswellable' disintegrants. Guyot-Hermann has proposed a particle repulsion theory based on the observation that nonswelling 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. (Seager, 1998)

- **Due to deformation**-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. (Seager, 1998)

CONCLUSION

Now days there are wide range of products available commercially in market, which are produced by the same technologies as employed in the manufacturing of fast dissolving tablets. Still there is broad area for research on this technology. (Virely et al., 1990) Some of the major 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 creates problem of enhanced disintegration time. The two points to be considered in case of FDTs are shortening the disintegration time and at the same time keeping other parameters in mind like friability, taste and mouth feel and tablet strength within the accepted range. These

problems may be solved by using taste masking and super-disintegrating agents without significant increasing the weight and volume of final dosage forms. There is also a scope to develop better packaging system to formulate FDTs more stable during handling.(Lachmann et al., 1998)

REFERENCES

- Agrawal, V.A., (2011). Fast Disintegrating tablet as a New Drug Delivery system: A Review. *Pharmacophore*, 2(1), 1-8.
- Amin, A.F., (2006). Emerging trends in the development of orally disintegrating tablet technology. *IJPRS*, 21-29.
- Arunachalam, A., (2010). Fast Dissolving Drug Delivery System: A Review. *Journal of Global Trends in Pharmaceutical Sciences*, 1(1), 92-110.
- Arya, A., Chandra, A., Sharma, V.,(2010). Fast dissolving oral films: An innovative drug delivery system and dosage form. *International Journal of Chem Tech Research*, 2(1), 576-583.
- Badgujar, B.P., and Mundada, A.S.,(2011). The technologies used for developing orally disintegrating tablets: a review. *Acta Pharmaceutica*, 61(2), 117-139.
- Bhaskaran, S., Narmada, G.V.,(2002). Rapid dissolving tablet a novel dosage form. *Indian Pharmacist*, 1, 9–12.
- Bhowmik, D., Chiranjib, B., Pankaj, K., (2009). Fast Dissolving Tablet: An Overview. *Journal of Chemical and Pharmaceutical Research*, 1(1), 163-177.
- Bradoo, R.,(2001). Fast Dissolving Drug Delivery Systems. *JAMA India*, 4(10), 27-31.
- Chandan, S., et al. (2010). Orally disintegrating tablets: A Review. *International Journal of Pharmacy and Life Sciences*, 1(5), 250-256.
- Chien, Y.W.,(1992) *Novel drug delivery systems*. (2nd ed.). New York: Marcel Dekker Inc. 50, 139.
- Dutta, S., et al. (2011). Formulation of fast disintegrating tablets. *International Journal of Drug Formulation & Research*, 2(1), 45-51.
- Hirani, J.J., Rathod, D.A., Vadalía, K.R.,(2009). Orally Disintegrating Tablets: A Review. *Tropical Journal of Pharmaceutical Research*, 8(2), 161-172.
- Kumar, V.D., Sharma, I., Sharma, V.,(2011). A comprehensive review on fast dissolving tablet Technology. *Journal of Applied Pharmaceutical Science*, 1(5), 50-58.
- Kumari, S., et al.(2010). Fast dissolving Drug delivery system: Review Article. *Journal of Pharmacy Research*, 3(6), 1444-1449.
- Lachmann, L., Liebermann, H.A., Kiang, J.L.,(1998) *The theory and practice of Industrial Pharmacy*. (3rd ed.). Bombay: Varghese Publishing House. 430-440.
- Mahaveer, P.K., (2010). Orally disintegrating tablets: A future prospectus. *Int J Pharm Sci Bio*, 71-79.

- Patel, M.M., and Patel, D.M., (2006). Fast dissolving drug delivery system: A Review. *Indian Journal of Pharmaceutical sciences*, 222-226.
- Patidar, A., et al. (2011). A review on: Recent Advancement in the development of rapid disintegrating tablet. *International journal of Life Science & Pharma Research*, 1(1), 7-16.
- Prajapati, B.G., Ratnakar, N., (2009). A Review on Recent patentson Fast Dissolving Drug Delivery System. *Int. J. Pharm Tech Res*, 1(3), 790-798.
- Purvani, A., Wadhavani, A., (2000). Indion414 as novel superdisintegrants. *Indian journal of pharmaceutical sciences*, 61(1), 117-119.
- Reddy, L.H., Ghosh, B., and Rajneesh, (2002). Fastdissolving drug delivery systems: a reviewof the literature. *Indian Journal of Pharmaceutical Science*, 64(4), 331-336.
- Sastry, S.V., Nyshdham, J.R., Fix, J.A., (2000). Recenttechnological advances in oral drugdelivery: A review. *Pharmaceutical Science and Technology Today*, 3, 138-45.
- Seager, H., (1998). Drug delivery products and fast dissolving dosage forms. *J. Pharm. Pharmacology*, 50, 375-382.
- Shaikh, S., Khirsagar, R.V., Quazi, A., (2010). Fast Disintegrating Tablets: An Overview of Formulation and Technology. *International Journal of Pharmacy and Pharmaceutical Science*, 2(3), 1-20.
- Sharma, S., (2008). New generation of tablet: Fast dissolving tablet. *Pharmainfo.net*, 6(1), 111-119.
- Shukla, D.S., Chakraborty, S., and Mishra, B., (2009). Mouth dissolving tablets I: an overview of formulation technology. *Scientia Pharmaceutica*, 76, 309-326.
- Siddiqui, M.D.N., Garg, G., Sharma, P.K., (2011). A Short Reviewon "A Novel Approach in Oral Fast Dissolving Drug Delivery System and Their Patents. *Advances in Biological Research*, 5(6), 291-303.
- Vandana, B., Patravale, and Namita, B., Prabhu, (2005). *Indian Journal of Pharmaceutical Sciences*, 233-235.
- Velmurugan, S., and Sundar, V., (2010). Oral Disintegrating Tablets: An Overview. *International Journal of Chemical and Pharmaceutical Sciences*, 1(2), 1-12.
- Virely, P., Yarwood, R., Zydis, (1990). A novel-Fast dissolving dosage form. *Manuf. Chem.*, 61, 36-37.
- Wilson, C.G., Washington, N., Peach, J., (1987). The behavior of a fast dissolving dosage form (Expidet) followed by gscintigraphy. *Int J Pharm*, 40, 119-123.