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Mouth Dissolving Tablets – An Innovative Technology: A Review

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ABSTRACT

A recent advance in Novel Drug Delivery System (NDDS) aims to enhance safety and efficacy of drug molecule by formulating a convenient dosage form for administration and to achieve better patient compliance. Mouth dissolving tablets or fast dissolving tablets have received ever-increasing demand during the last decade, and the field have been rapidly growing in the pharmaceutical industry and gaining popularity due to ease of administration and better patient compliance to all age groups. MDDDS have the unique property of dissolving and/or rapidly disintegrating and releasing the drug as soon as they come in contact with saliva, thus obviating the requirement of water during administration. This review focusses on various formulations and also technologies developed to achieve fast dissolution/dispersion of tablets in the oral cavity. The target population for these new fast dissolving/ disintegrating dosage forms have generally been pediatric, geriatric, and bedridden or developmentally disabled patients. Patients with persistent nausea, who are in traveling, or who have little or no access to water are also good candidates for MDDTs.

Keywords: Fast dissolving, orodispersible, taste masking, superdisintegrants, rapidly disintegrating.

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INTRODUCTION

Oral administration is the most popular route due to ease of ingestion, pain avoidance, versality (to accommodate various types of drug candidates), and, most importantly, patient compliance. Also, solid oral delivery systems do not require sterile conditions and are, therefore, less expensive to manufacture[1, 2]. Traditional tablets and capsules are inconvenient and unfeasible for some geriatric patients because of changes in various physiological and neurological conditions linked with ageing including difficulty in swallowing, hand tremors, weakening in their eyesight, hearing, memory, risk of choking other than change in taste and smell. Solid dosage forms pose difficulty for swallowing in among all groups such as children, mentally retarded uncooperative, nauseated, or on reduced liquid intake diets. Geriatric & paediatric patients & travelling patients, who may not have ready access to water are most in need of easy swallowing dosage forms [3,4,5]. About 35% of the general population in addition to 30-40% of elderly institutionalized patients and 18-22% of all persons in long term care facilities suffer form dysphagia, i.e. difficulty in swallowing[6]. Since from past decade, there has been an increased demand for more patient-friendly and compliant dosage forms. As a result, the demand for developing new technologies has been increasing day by day[7].

Recently, mouth dissolving tablets are emerging trend in novel drug delivery system & have received ever increasing demand during the last few decades. These mouth dissolving tablets are also called as orosdispersible, orally disintegrating, rapidly disintegrating systems, fast melt, quick dissolve and fast disintegrating tablets. United State Food and Drug Administaration(FDA) define orally disintegrating tablets as " A solid dosage form which contain a medicinal substance or active ingredient which disintegrates rapidly within a matter of seconds when placed upon a tongue[8]. Thus, these MD tablets rapidly disintegrate and dissolves in the mouth as soon as they come in contact with saliva without the need of water or chewing. The faster the drug into solution form, quicker the absorption and onset of clinical effects. Some drugs are absorbed from the mouth, pharynx and esophagus as the saliva passes down into the stomach. In such cases, bioavailability of drug is significantly greater than those observed from conventional tablet dosage form[9,10,11].

An Ideal Properties Of Mouth Dissolving Tablets[12]

- Require no water for oral administration, yet dissolve / disperse/ disintegrate in mouth in a matter of seconds.
- Have a pleasing mouth feel.

- Have an acceptable taste masking property.
- Leave minimal or no residue in mouth after administration
- Exhibit low sensitivity to environmental conditions (temperature and humidity).
- Allow the manufacture of tablet using conventional processing and packaging equipments.
- Is cost effective
- has sufficient strength to withstand the rigors of the manufacturing process and post-manufacturing handling

Salient features of fast dissolving drug delivery system[13]

- Ease of administration to patients who refuse to swallow a tablet, such as paediatric, geriatric, psychiatric patients.
- Convenience of administration and accurate dosing as compared to liquids.
- No need of water to swallow the dosage from, which is highly convenient feature for patients who are traveling and do not have immediate access to water.
- Good mouth feel property of MDDS helps to change the basic view of medication as "bitter pill", particularly for paediatric patients.
- Rapid dissolution of drug and absorption which may produce rapid onset of action.
- Some drugs are absorbed from the mouth, pharynx and oesophagus as the saliva passes down into the stomach, in such cases bioavailability of drugs is increased.
- Ability to provide advantages of liquid medication in the form of solid preparation.
- Pregastric absorption can result in improved bioavailability and as a result of reduced dosage, improved clinical performance through a reduction of unwanted effects.
- New business opportunity like product differentiation, product promotion, patent extension and life cycle management

The need for development of MDTs[14,15,16]

The need for non-invasive delivery systems persists due to patients' poor acceptance of, and compliance with, existing delivery regimes, limited market size for drug companies and drug uses, coupled with high cost of disease management.

Patient factors

Orally disintegrating dosage forms are particularly suitable for patients, who for one reason or the other, find it inconvenient to swallow traditional tablets and capsules with 8 ml of water. These include the following:

- Pediatric and geriatric patients who have difficulty in swallowing or chewing solid dosage forms
- Patients who are unwilling to take solid preparation due to fear of choking
- Very elderly patients who may not be able to swallow a daily dose of antidepressant.
- An eight-year old with allergies who desires a more convenient dosage form than antihistamine syrup
- A middle-aged woman undergoing radiation therapy for breast cancer may be too nauseous to swallow her H2-blocker
- A schizophrenic patient in an institutional setting who may try to hide a conventional tablet under his or her tongue to avoid their daily dose of an atypical antipsychotic
- A patient with persistent nausea, who may be in travelling, or has little or no access to water.

Effectiveness factor

Increased bioavailability and faster onset of action are major advantages of these formulations. Dispersion in saliva in oral cavity causes pregastric absorption from some formulations in those cases where drug dissolves quickly. Buccal, pharyngeal and gastric regions are all areas of absorption for many drugs[17]**.** Any pregastric absorption avoids first pass metabolism and can be a great advantage in drugs that undergo a great deal of hepatic metabolism. Furthermore, safety profiles may be improved for drugs that produce significant amounts of toxic metabolites mediated by first-pass liver metabolism and gastric metabolism, and for drugs that have a substantial fraction of absorption in the oral cavity and pregastric segments of GIT[18].

FORMULATION ASPECTS IN DEVELOPING MDTS[19,20,]

Taste and mouth feel

MDTs should have good taste and mouth feel property feeling of grittiness. A pleasant taste inside the mouth becomes critical for patient acceptance. Taste of nauseous or bitter taste drugs can be masked by using of flavours and sweeteners, complexation with ion- exchange resin and microencapsulation of drug with suitable polymer

Mechanical strength of tablets

MDTs should have appropriate mechanical strength to withstand the handling and transportation.

Drug Properties

For the ideal FDT technology, the drug properties should not significantly affect the tablet property. Many drug properties could potentially affect the performance of FDTs. For example,

the solubility, crystal morphology, particle size, hygroscopicity, compressibility, and bulk density of a drug can significantly affect the final tablets characteristics, such as tablet strength and disintegration. The FDT technology should be versatile enough to accommodate unique properties of each drug.

Drug dissolution in saliva

The drug should get solubilised in saliva so that, it can cross the mucosal lining and finally reaches to the systemic circulation

Swallow ability

MDTs should have good swallow ability as it is for those patients who have swallowing problem.

Bioavailability

Those drugs which have low bioavailability are used to formulate MDTs because of bypass of first metabolism and avoiding degradation of drug by gastric juice and enzymes present in gastro-intestinal (GI) tract.

Stability

Another factor of consideration is stability of drug in the formulation with the excipient used and process opted for formulation.

Mechanism action of Superdisintegrants[21,22,23]

There are six major mechanisms for tablet disintegration as follows

Swelling

Although not all effective disintegrants swell in contact with water, swelling is believed to be a mechanism in which certain disintegrating agents (such as starch) impart the disintegrating effect. By swelling, the adhesiveness of other ingredients in a tablet is overcome by causing the tablet to fall apart.

Porosity and Capillary Action (Wicking)

Effective disintegrants that do not swell are believed to impart their disintegrating action through porosity and capillary action. Tablet porosity provides pathways for the penetration of fluid into tablets. The disintegrant particles (with low cohesiveness & compressibility) themselves act to enhance porosity and provide these pathways into the tablet. Liquid is drawn up or “wicked” into these pathways through capillary action and rupture the interparticulate bonds causing the tablet to break apart.

Deformation

In this theory, the disintegrated particles get deformed during compression and the deformed

particles return to their pre-compression shape upon wetting, thereby this increase in size of the deformed particles causing the tablet to break apart. This phenomenon applies to disintegrants such as crospovidone and starch.

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. It is believed that no single mechanism is responsible for the action of most disintegrants. But rather, it is more likely the result of inter-relationships between these major mechanisms.

Heat of wetting:

When disintegrants with exothermic properties get wetted, localized stress is created due to capillary air expansion, which aids in disintegration of tablet. Thus, this explanation is limited to only few disintegrants not for all.

By enzymatic reaction:

Enzymes also play a role as disintegrants. These enzymes present in the body, dearth the binding action of binder and helps in disintegration. Due to swelling, pressure is exerted in the outer direction that causes the tablet to burst or accelerated absorption of water leads to disintegration. Examples as amylase, protease, cellulase and invertase.

VARIOUS TECHNIQUES USED IN THE PREPARATION OF MDTs:

1. Sublimation
2. Freeze drying technique
3. Molding technique
4. Spray drying technique
5. Direct compression
6. Mass extrusion
7. Phase transition process
8. Melt granulation technique

Freeze drying technique[24,25]:

Freeze-drying (lyophilization) is a process in which water is sublimated from the product after freezing. The main advantage being that pharmaceutical substances can be processed at non-elevated temperatures, thereby eliminating adverse thermal effects, and stored in a dry state with

relatively few shelf-life stability problems. Freeze-dried forms offer more-rapid dissolution times than other available solid products. The lyophilization process imparts a glassy amorphous structure to the bulking agents and, sometimes, to the drug, thereby enhancing the dissolution characteristics of the formulation.

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

Example for freeze drying is the zydis formulations, consist of a drug physically trapped in a water-soluble matrix, which is freeze-dried to produce a product that dissolves rapidly when placed in the mouth. The matrix consists of a water-soluble mixture of saccharide and polymer, formulated to provide rapid dispersion properties and to allow sufficient physical strength to withstand handling during use. Because of zydis's weak physical strength, the unit is contained in a peelable blister pack, which allows removal of the product without damaging it.

Sublimation:

In this method a subliming (volatile) material is removed by sublimation from compressed tablets and high porosity is achieved due to the formation of many pores where subliming material (particles) previously existed in the compressed tablets. The sublimable materials include camphor, urea, ammonium bicarbonate, ammonium carbonate, menthol, hexa methylene tetramine and thymol. These compressed tablets which have high porosity (approximately 30%) rapidly dissolved within 15 seconds in saliva[26].

Gohel M[27]*et al* prepared mouth dissolving tablets of nimesulide using vacuum drying technique and found that it would be an effective alternative approach compared to the use of more expensive adjuvants in the formulation of these dosage forms.

Lo[28] disclosed an efficient method for preparing high strength, highly porous fast dissolving delivery by using menthol. In this method, menthol, menthol soluble polymer and an active ingredient are mixed at a temperature, ensures that the menthol is substantially molten. The formulation is disposed in a mold and solidified, and the menthol is sublimed from the solidified molded formulation. Thus, the solidification occurs at a temperature sufficient to provide a substantially amorphous menthol structure.

Moulding[29]

Moulded tablets are designed to facilitate the absorption of active ingredients through mucosal

linings of mouth. This is achieved by complete and rapid dissolution of the tablet using water soluble ingredients. Moulded tablets disintegrate more rapidly and offer improved taste because of the dispersion matrix which is generally prepared from water soluble sugars. Powdered blend (containing drug and excipients like binding agents - sucrose, acacia, PVP etc.) is pushed through a very fine screen (to ensure rapid dissolution) and then moistened with a hydroalcoholic solvent and moulded into tablets under pressure lower than employed for conventional compressed tablets. The solvent is later removed by air drying. A porous structure that enhances dissolution prepared by using water soluble ingredients meant to be absorbed through mucosal lining of mouth, thus increasing bioavailability and decreasing first pass metabolism of certain drugs[30].

Effervescent method[31]:

Orodispersible tablets are also prepared by effervescent method by mixing sodium bicarbonate and tartaric acid of concentration 12% (w/w) along with super disintegrants like pregelatinized starch, sodium starch glycolate, crospovidone, and croscarmellose. First, sodium bicarbonate and tartaric acid were preheated at a temperature of 80°c to remove absorbed/residual moisture and thoroughly mixed in the motor. Finally, the blends are compressed in the punch.

Melt granulation Technique:

Melt granulation is a process in which pharmaceutical powders are efficiently agglomerated by the use of binder which can be a molten liquid, a solid or a solid that melts during the process. For accomplishing this process, high shear mixers are utilized, where the product temperature is raised above the melting point of binder by a heating jacket or by the heat of friction generated by impeller blades. Perissutti *et al* [32,33]prepared carbamazepine fast-release tablets by melt granulation technique using polyethylene glycol 4000 as a melting binder and lactose monohydrate as hydrophilic filler.

Abdelbary et al[34]. described a new approach of preparing MDTs with sufficient mechanical strength, involving the use of hydrophilic waxy binder by melt granulation or wet granulation. Waxy binder include superpolystate PEG-6-stearate having a melting point of 33-37°C and HLB value of 9, which helps in disintegration and also increases the physical strength of tablets.

Spray Drying technique:

Highly porous, fine powders are obtained by this method. Allen and Wagh[35,36] utilized this process for preparing ODT. The ODT formulations consisted of hydrolyzed/ unhydrolyzed gelatin as supporting agent for matrix, mannitol as bulking agent, and sodium starch glycolate or croscarmellose sodium as disintegrating agent. Disintegration and dissolution were further

improved by adding effervescent components, i.e. Citric acid (an acid) and sodium bicarbonate (an alkali). To maintain the net charges of the polypeptide components, an acidifying or alkalinizing agent was included. The mixtures of the above components were spray dried to obtain porous granules. By incorporating a volatilizing agent (ethanol) more pores and channels were created. A bulking agent was added to increase the dissolution rate of the matrix. A thin coating of polymeric material could be applied externally to aid intact during handling. Active ingredients can be microencapsulated or nanoencapsulated to further achieve taste masking. The ODT made from this method disintegrated in <20 s.

Mass extrusion[37]:

This technology involves softening of 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. The dried cylinder can also be used to coat granules of bitter tasting drugs and thereby masking their bitter taste.

Phase Transition Technique[38,39]

In this process tablets were prepared by compressing a mixture of high melting point sugar alcohol and low melting point sugar alcohol and subsequent heating at a temperature between their melting points. FDT were produced by compressing powder containing erythritol (melting point: 122 °C) and xylitol (melting point: 93 95 °C), and then heating at about 93 °C for 15 min. After heating, the median pore size of the tablets was increased and tablet hardness was also increased. Kuno et al investigated the disintegration of ODT by phase transition of sugar alcohols using xylitol(m.p.93-95°C), trehalose(97°C), erythritol(122°C) and mannitol (166°C)

Direct compression:

It is the most popular and easiest way to manufacture tablets by using conventional equipments, commonly available excipients and a limited number of processing steps. This technique can now be applied to fast dissolving tablets because of the availability of improved tablet excipients, especially tablet disintegrants and sugar based excipients. Addition of disintegrants in fast dissolving tablets, leads to quick disintegration of tablets and hence improves dissolution. The introduction of superdisintegrants and a better understanding of their properties have increased the popularity of this technology. Microcrystalline cellulose, cross linked carboxymethyl cellulose sodium, cross linked polyvinyl pyrrolidone and partially substituted hydroxypropyl cellulose are best examples for superdisintegrants.

Another approach to fast dissolving tablets by direct compression is the use of sugar based excipients (e.g., dextrose, fructose, isomalt, maltitol, maltose, mannitol, sorbitol, polydextrose and xylitol), which display high aqueous solubility and sweetness, and hence, impart taste masking and a pleasing mouthfeel.

Cousin et al[40], used carboxymethyl cellulose as disintegrating agent and swelling agent consisting of modified starch/ microcrystalline cellulose to manufacture orally disintegrating tablets. Bi[41] *et al*. and Watanbe *et al*. used microcrystalline cellulose (MCC) and low substituted hydroxypropyl cellulose (HPC) to manufacture rapidly disintegrating tablets. The ratios of MCC to HPC varied from 8:2 to 9:1.

PATENTED TECHNOLOGIES

OraSolv® and DuraSolv® Technology[42,43,44]

OraSolv® technology has developed by CIMA labs. OraSolv® technology produces tablets by low compression pressure, utilizes effervescence material. This technology utilizes conventional manufacturing equipment. The effervescence material causes the dosage form to quickly disintegrate following contact with water or saliva. The widely used effervescence disintegration pair includes an acid source and carbonate source. The acid source include malic acid, tartaric acid, fumaric acid, adipic acid, citric acid and carbonate source include sodium bicarbonate, potassium bicarbonate, magnesium bicarbonate. The carbon dioxide evolved from the reaction (occurred between acid and carbonate) may provide some fizzing sensation, which is a positive organoleptic sensation. However, current technology uses this concept in a modified fashion to prepare fast disintegrating dosage forms.

PakSolv ®, a proprietary packaging system consisting of specialized tablet transfer, packaging equipment and unique packaging materials and designs, developed by CIMA labs to pack soft, friable tablets, to protect it from attrition and breakage during transportation. PakSolv ®also offers light, moisture and child resistance. Pak Solv® is a “dome shaped” blister package that prevents the vertical movement of the tablets within the depressions.

To provide stronger tablets for packaging in blisters or bottles or pouches, another technology developed by Ciba called as DuraSolv technology. This technology formulation consists of a drug & fillers (nondirect compression). Fillers include dextrose, Mannitol, sorbitol, lactose and sucrose, have advantage of quick dissolution and avoid some of the gritty texture usually present in direct compressible versions of the sugar. Good rigidity and also friability can be maintained[45].

WOWTAB® Technology [46,47]

The WOW in wowtab signifies the tablet is to be given "with out water". WOWTAB® technology was patented by Yamanouchi Pharmaceutical Co. This employs a combination of low- and high-moldability saccharides to produce fast-dissolving tablets using conventional granulation and tabletting techniques. According to the patent, saccharides were divided into two groups: those with high moldability and those with low moldability. The typical low-moldability saccharides include lactose, mannitol, glucose, sucrose and xylitol. The typical high- moldability saccharides are maltose, maltitol, sorbitol and oligosaccharides.

Low moldability saccharides produce tablets with hardness between 0 and 2 kg, High-moldability saccharides produce tablets with hardness above 2 kg, when 150 mg of such a saccharide is compressed under pressure of 10–50 kg/cm using a die 8 mm in diameter.

In the patent, it is clearly mentioned that, high strength and fast disintegration properties cannot be obtained by using only single saccharide. For this reason, a saccharide having low moldability was granulated with a saccharide having high moldability as a binder. The low moldability saccharides were used as the main component. Tablets made by compression of these granules were further treated under moisture condition. The tablets show an adequate hardness and fast disintegration and dissolution when put in the mouth.

Flashtab® Technology[48] **:**

Ethypharm France patented this technology. Granular excipients were used to produce the tablets by compression method. Granulation of excipients is done by Dry or wet granulation method. Two types of excipients are used. Disintegrating agents such as carboxymethylcellulose or reticulated polyvinylpyrrolidone and swelling agents as carboxymethylcellulose, modified starch, microcrystalline cellulose, and directly compressible sugars. The produced tablets are found to have satisfactory physical resistance and disintegrate in the mouth within 1 minute.

Flashtab technology involves the use of coated multiparticles of active ingredients for effective taste-masking. Other coating techniques designed for protecting drugs can also be used for taste-masking purposes. For example, acid-labile drugs are enteric coated for protection of the drugs in the stomach.

AdvaTab™ technology[49,50]**:**

Kyowa Hakko Kogyo patented the AdvaTab™ technology, which (Eurand) produces FDT tablets based on a proprietary tablet composition. Traditional tablets are produced using an internal lubrication system, which disperses lubricant on the inside and the surface of the tablets. This method can decrease tablet mechanical strength. This technology uses less hydrophobic

lubricant and can be 30–40% stronger than conventional tablets. As a result, the tablets are hard and durable yet do not impede liquid entry upon contact with saliva. AdvaTab™ can handle high drug loading and coated drug particles. This technology gives good packaging system.

Flash Dose Technology[51]:

This technology is patented by Biovail. This dosage form was developed by Fuisz technologies and is based on the preparation of a sugar based matrix known as floss, which is made from a combination of excipients either alone or in combination with drugs. In the preparation of ODTs, the two flashdose platforms are used i.e. shear form and ceform. The prepared tablets readily dissolves without water after being placed in the mouth and release their drug contents.

Dispersible Tablet Technology:

Lek patented this technology for dispersible tablets of dihydroergotoxine[52] and cimetidine[53]. This tablet showed less than 1 minute to disintegrate when contact with water. Essential excipient in the cimetidine formulation was a disintegrating agent, which provides rapid swelling and/or good wetting capability to the tablets and thereby a quick disintegration. Disintegrating agents include cross-linked sodium carboxymethyl cellulose, starch or modified starches, microcrystalline cellulose, alginic acid. Addition of two or more disintegrating agents produced better disintegration.

Zydis technology[54.55]

This is one new and first marketed technology of mouth dissolving tablets. The tablet of this technology is produced by lyophilizing or freeze drying the drug in a matrix usually consisting of gelatin. Thus the tablet dissolves in the mouth within seconds after placement on the tongue. The tablet of the Zydis is light in weight, transparent and also fragile. The tablet is packed in a special blister packing. Patients should be advised not to push the tablets through the foil film, but instead peel the film back to release the tablet. Thus, this product dissolve on the tongue in 2 to 3 seconds and also self preserving as final water content is too low. As this product showing fastest dispersion and maximum dissolution which results in increased bioavailability and also there will be pregastric absorption from this zydis tablet. The major disadvantages of lyophillization technique are that it is expensive and time consuming; fragility makes conventional packaging unsuitable for these products and poor stability under stressed conditions.

ORAQUICK[56]

ORAQUICK is patented by KV Pharmaceuticals. The OraQuick fast-dissolving/disintegrating tablet formulation utilizes a patented taste masking microsphere technology, known as MicroMask, has superior mouthfeel over taste masking alternatives. Low heat of production in

this process makes it appropriate for heat sensitive drugs. KV Pharmaceutical also claims that the matrix that surrounds and protects the drug powder in microencapsulated particles is more pliable, meaning tablets can be compressed to achieve significant mechanical strength without disrupting taste-masking. OraQuick claims quick dissolution in a matter of seconds, with good taste-masking.

Frosta Technology[57]

This technology was developed and patented by Akina. In this technology, the highly plastic granules were used to produce strong tablets with high porosity. The highly plastic granules comprises three components; a porous and plastic material, a water penetration enhancer and a binder. The method involves in preparing the tablets, mixing porous, plastic material with a water penetration enhancer at certain ratios. In this process, the porous and plastic particles are separated by water-penetration-enhancing particles, which prevent formation of a viscous layer on the tablet surface. Although the porous and plastic materials can make close contacts to increase the chance of bonding by compression, formation of really strong bonding among granules at low pressures requires a suitable binder. The binder here can also secure the porous material and water penetration enhancer during granulation. The produced FDTs showed excellent hardness and disintegration time less than 30 seconds.

Pharmaburst technology™ [58]

Pharmaburst technology™ was developed by SPI Pharma. This technology uses Co-processed excipients to prepare FDT that, depending on the type of active ingredient and loading up to 700 mg, dissolves within 30–40 seconds. The method involves a dry blend of a drug, flavor and lubricant that are compressed into tablets on a standard tablet press under normal temperature and humidity conditions. The prepared tablets can be packaged in blister packs or bottle.

NanoCrystal™ Technology[58]

This technology developed by Elan, King of Prussia. Nanocrystal ODT technology provides for pharmacokinetic benefits of orally administered nanoparticles (<2 μm) in the form of rapidly disintegrating tablet matrix.to facilitate the preparation of small-scale clinical supplies. NanoCrystal™ colloidal dispersions of drug substance are combined with water-soluble ingredients, filled into blisters, and lyophilized. This approach is especially attractive when working with highly potent or hazardous materials. The final tablet is durable enough for conventional blister or bottle packaging and accepts as much as 200 mg of drug per unit.

TASTE MASKING:

Taste masking is an essential requirement for MD tablets. Nearly 10,000 taste buds are present

on the tongue, roof of the mouth, cheeks and throat. Each taste bud has 60-100 receptors cells. These receptors cells interact with molecules dissolved in saliva and produce positive or negative sensation. Many drugs are bitter, unpalatable and unattractive in their natural state. If the drug has bitter taste, taste masking is critically important in the formulation for maximal patient acceptability. Different approaches have been achieved by sweet masking substances, adding diluents, flavours or encapsulation.

WOWTAB used the smoothmelt action of sugar and sugar like excipients. The zydis dosage forms also use the sweetners and flavours to mask an unpleasant taste. In NuLev DuraSolv[59] technology, the bitter taste of hyosyamine sulfate was masked by adding sweeteners and flavours. Flosses and small spheres of saccharides containing unpleasant drugs were mixed with sweeteners and flavours to provide taste[60].

The bitter taste of Linezolid was masked by combination of microencapsulation by coacervation and subsequent functional membrane coating on the microcapsules with Eudragit L30 D[61]. The mass extrusion method was used to prepare the Fast disintegrating tablets of taste masked granules of pirenzepine HCl or oxybutynin HCl by coating the drugs with aminoacrylate (Eudragit E 100) [62]. Ozer and Hincal reported a simple Coacervation method using gelatin and anhydrous sodium sulphate as coacervating agent for taste masking of beclamide[63].

Microparticles of drug coated with a mixture of hydrogenated oil and surfactants in fluidized air bed using side spray method and heat treating the coated particles at a temperature above the melting point of the surfactant, resulted in taste masking and enhanced dissolution of indeloxazine hydrochloride. A polymer carrier system developed was used to reduce the bitter taste of macrolides e.g. erythromycin and clarithromycin by complexation to carbopol[64].

In MicroMask by KV Pharmaceutical, the taste masking system was prepared by casting or spin congealing melt dispersions or solutions of a drug in a molten blend of materials[65]. Flash tab technology involves the use of coated multiparticles of active ingredients for effective taste masking[40]. Cima's taste masking technology also uses coating of the active ingredient with a material that delays the dissolution in the mouth of drugs with objectionable taste[66].

CONCLUSION:

The popularity of FDTs has increased tremendously over the last decade. These forms had well satisfactorily solved the major encountering problems of non-compliance for paediatrics and geriatrics during the administration. More than 50 drugs have been formulated as FDTs and also marketed using various methods. The key factor to FDT formulations is fast disintegration,

dissolution or melting in the mouth and this can be achieved by producing porous structure or adding superdisintegrants or effervescent excipients. The FDTs show better patient compliance, provides rapid onset of action, and increase bioavailability. Considering all these good factors, one can apply for patent for newer discovery of methods for preparation of FDTs. These tablets also help in extending the patent life of the drug. By doing this, mouth dissolving tablets become more popular and gain maximum market share with well acceptance by all age group peoples.

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