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Comprehensive Review of Oro Dispersible Tablets and Co Processed Super disintegrants

Voleti Vijaya Kumar, Nandhini. M, Sreelekhaa.T, Praveen. A, E. Saravana Kumar, M. Srinath, Vishwa. S, P. Shanmugapandiyan

School of Pharmacy, Sathyabama Institute of Science and Technology (Deemed to be University), Chennai-600119, Tamil Nadu, India

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Abstract

Due to their ease of administration, self-administration, and improved patient compliance, solid dosage forms are most popular. The most normally utilized strong dose structures are tablets and capsules, which is challenging for pediatric and geriatric patients. Considering these prerequisites endeavors have been made to foster rapid dissolving Tablets. The solid dosage form of a medicine that dissolves in a matter of seconds when swallowed is known as orodispersible tablet. The utilization of Superdisintegrants improves the crumbling season of the tablet. Fast Dissolving Tablets are generally liked because of their convenience, higher bioavailability, quick disintegration and breaking down of the medication. The various technologies utilized in the formulation of Orodispersible tablets (ODT) and their evaluation are the primary focus of this review.

∗Corresponding Author
Name: Voleti Vijaya Kumar
Phone: +91 9885583630
Email: vijayakumar.pharmacy@sathyabama.ac.in

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INTRODUCTION

Conventional tablets bring about high frequency of rebelliousness and ineffectual treatment regarding gulping uniquely on account of pediatric, geriatric, or any intellectually impeded people. This prompted the improvement of tablets that break down quickly in the oral pit which are named as oral crumbling tablets Orodispersible, Speedy deteriorating, Mouth dissolving, Quick crumbling, Permeable tablets, and Rapimelts.

As of late, European Pharmacopeia has utilized the term orodispersible tablets. This might be characterized as uncoated tablets planned to be set in the mouth where they scatter promptly inside 3 min prior to gulping. US Pharmacopeia has additionally endorsed these dose structures as orodispersible tablets. According to the US Pharmacopeia (USP) crumbling method or oral surgery, the FDA specifically recommends that ODTs be regarded as strong oral arrangements that deteriorate quickly in the oral cavity, with an in vitro breaking down season of around 30 sec or less [1].

Hence, orodispersible tablets have powerful unit dosage constructions just like regular tablets, but they are also constructed of super disintegrants, which let the tablets dissolve in the mouth in the

blink of an eye almost without requiring gulping. These tablets can be distinguished from buccal, capsule, and conventional sublingual tablets because the former take longer to dissolve in the mouth [2].

Advantages of Orally Disintegrating Drugs [3][4]

a. Pharmacological

Expanded drug assimilation

Quick beginning of activity

Limited first-pass impact

Further developed bioavailability

b. Patient compliance

No need to chew or swallow tablets or capsules

No requirement of water

Taste masking

Enhanced efficacy and safety

Better safety is achieved since there is no chance of choking or suffocating with oral delivery of standard formulations because there is no physical barrier.

c. Technical

More precise dosage compared to liquid goods.

Can make use of sugars and other excipients that are generally thought to be safe.

Unit-dose packaging contributes to increased stability. Producing goods using standard procedures and tools.

d. Marketing advantage

Extensive patent protection

Value-added product line extension

Life cycle management

Limitations of Oro Dispersible Tablets

ODTs may not be the best option for patients using anticholinergic drugs concurrently, and these tablet formulations may not be appropriate for those with Sjogren's syndrome or dry mouth from reduced salivary flow.

Formulating drugs with comparatively higher dosages into ODTs is a challenge.

ODT requires unique bundling for appropriate adjustment and security of stable item [5].

Significance of Orally Disintegrating Tablets [6]

Simple administration for young patients, elderly patients, those with mental illnesses, people with disabilities, and patients who refuse to cooperate Administration ease for patients (older and/or pediatric, mentally ill, crippled, and uncooperative) who refuse to take a pill.

Patients who are traveling and do not have rapid access to water will find the dose form highly handy as it does not require water to be consumed.

Rapid drug absorption and dissolution, which may result in a rapid onset of action.

Some medications are absorbed from the mouth, throat, and oesophagus as saliva moves down into the stomach; in these cases, the medication's bioavailability is increased.

Challenges in Formulating ODT's [7][8]

a. **Palatability:** Formulation scientists face a formidable obstacle when trying to cover up the bitter taste of oral disintegrating tablets. Since most medications are not appetizing, oral disintegrating drug delivery systems usually contain the medication in a taste-masked form. As a result, drug taste masking becomes essential for patient compliance.

b. **Mechanical strength:** ODTs are stuffed into tablets with very low-tension power, which makes the tablets friable or delicate and hard to deal with, or they are built of staggeringly penetrable and gently shaped networks, permitting them to separate in the oral opening. Not many advances can make tablets that are adequately tough and hard, dissimilar to Wowtab® by Yamanouchi and Durasolv® by CIMA research centers, which can be stuffed in multidose bottles.

c. **Hygroscopicity:** Because they are hygroscopic, various dosage forms for oral dissolution are unable to maintain their physical integrity at room temperature and relative humidity. Accordingly, they require security against tenacity, which requires exceptional bundling of the items.

d. **Dose /Amount of drug:** The utilization of advancements used for ODTs is confined by

how much drug that can be coordinated into each unit segment. There are three main obstacles to the development of quick break down measurement structures caused by particles that require large amounts: a) taste veiling of the powerful fixing, b) mouth feel or soil and c) tablet size. The degree of bitterness of the drug in relation to its dose determines the amount of taste masking materials used in various dosage forms. This will also influence the final tablet size, so these challenges are related

e. **Aqueous solubility**: Water-dissolvable meds structure eutectic mixes, which achieve edge of freezing over distress and the improvement of a sparkling solid that could fall subsequent to drying because of loss of supporting plan during the sublimation connection. Such breakdown every so often can be thwarted by using different cross section outlining excipients, for instance, mannitol than can provoke crystallinity and subsequently, award rigid nature to the vague composite.

f. **Size of tablet**: The size of a tablet decides that it is so natural to take. It has been accounted that tablets bigger than 8 mm are the simplest to deal with while tablets less than 7-8 mm are the most straightforward to swallow. Likewise, the tablet size that is both easy to take and easy to manage is trying to achieve.

g. **The Drug Property**: Numerous drug properties could really impact the presentation of Fast disintegrating tablets. For example, the dissolvability, pearl morphology, particle size and mass thickness of a medicine can impact the last tablet characteristics, similar to tablet strength and weakening.

h. **The sensation in the mouth:** The ODT shouldn't separate into greater particles in the oral opening. The particles made after disintegration of the ODT should be essentially pretty much as little as could be anticipated. After oral organization, ODT ought to leave little to no buildup in the mouth. In addition to the expansion of flavors, cooling agents like menthol further enhance the mouthfeel.

i. **Aversion to ecological circumstances**: Since the majority of the materials used in ODTs are intended to disintegrate with the least amount of water, they should generally exhibit low aversion to climate conditions like humidity and temperature.

Criteria for Drug Selection [9]

The best characteristics for an oral dispersible tablet medicine are,

The medication should be stable in both water and saliva.

ODT should not use drugs that require frequent dosage and have a short half-life**.**

Minimal subatomic weight direction.

Ideal dosage for sedative effects is less than 50 mg.

Able to diffuse and parcel into the upper gastrointestinal tract epithelium.

Formulation Aspects of Oro Dispersible Tablets

Excipients used in the manufacturing of orodispersible tablets [10][11]

Diluents:

Fillers that are used to create the necessary bulk of a tablet. Disintegrants that are used in tablets that can be dispersed or taken orally serve a secondary purpose of improving the properties of a tablet, such as improving cohesion, flow, compactibility, and stability.

Eg: Lactose, Shower dried lactose, Mannitol, Sorbitol

Binders:

Binders are used to give powdered materials a cohesive quality. They can be added dry or wet to make granules.

Eg: Gelatin, glucose, Lactose, starch, Polyvinylpyrrolidone (Povidone) etc.

Super disintegrants:

Work with the breaking of the tablet when it comes into contact with water in the oral depression or GIT.

Eg: Crospovidone (Polyplasdone), Sodium starch glycollate, Starch, and Croscarmellose sodium (Ac-di-sol).

Lubricants:

Reduce inter-particulate friction, stop tablet material from adhering to die and punch surfaces, and make it easier to eject tablets from die cavities.

Example: Insoluble- Stearic acid, Magnesium stearate, Calcium stearate, Talc, Paraffin Soluble-Sodium lauryl sulphate, Sodium benzoate, PEG 400, 600,etc.

Glidants:

Improve the powder mixture's flow characteristics.

Reduce friction between particles in the following ways:

Colloidal Silicon dioxide (Aerosil), Cornstarch, PowderExample s: Colloidal Silicon dioxide (Aerosil), Cornstarch, Talc etc.

Anti Adherents:

They were included to stop tablet material from sticking to dies and punches.

Example: Talc

Sweeteners:

These are added to further develop taste of dose structure

Example: Sucrose, Sucralose, Saccharin, Aspartame, acesulfame potassium etc.

Flavors:

These are added for better appearance of dose structure

Example: Peppermint, Vanilla, Orange, Banana, Cinnamon, Mango etc.

Colors:

These are used to improve the dosage form's appearance.

Example: Sunset yellow (Supra), amaranth.

Role of Superdisintegrants in ODT

The oral disintegrating tablet is primarily composed of superdisintegrant. These are included to improve the dosage forms. The disintegration efficiency is based on the force-equivalent idea, which is the combined measurement of swelling force generation and water absorption. Superdisintegrants are often used in strong dosage structures at low levels, typically 1–10% by weight in relation to the measuring unit's total weight.

Classification of Super Disintegrants

Superdisintegrant property is seen both in natural and synthetic sources which can be listed as follows [12][13]:

a) Natural superdisintgerants

b) Synthetic superdisintgerants

c) Co-processed superdisintgerants

Co-processed Super Disntegrants

Superdisintegrants continue to be developed at an ever-increasing rate to solve the challenges associated with advanced tablet fabrication. It necessitates the development of various additional helpful excipients, which are applied to details with desired outcomes. Previously, the only excipients available to construct dosage forms were superdisintegrants; however, a range of excipient mixes are now available that can impart disintegration qualities. The purpose of some co-handled excipient blends is to satisfy the demand for several excipients.

Need For Developing Co-processed Excipients

Co-processed of excipients with moderate supporting information prompts

Regulation of solubility, Penetrability and strength of drug

The development of excipients with proven unsurpassed properties and real combinations of parts or individual parts, particularly suitable for direct printing.

Provide an ideal film filler that can replace at least two excipients.

Great compressibility and reduced weight diversity even with short dwell times and high compression rates.

To overcome the shortcomings of existing excipients, for example, loss of densification of microcrystalline cellulose during wet granulation, high reactivity to moisture and unfortunate powder filling due to agglomeration.

Address the needs of patients with diabetes and hypertension explicitly and ensure knowledge of lactose and sorbitol.

Table 1 Natural Super Disintegrants

Natural polymer	Drug	Results
Locust bean gum	Nimesulide	Disintegration time with 10% was found to be 13 sec.
Mangifera indica gum	Metformin HCl	Better drug release when used in low concentration
Hibiscus rosa sinensis	Famotidine	Rapid wetting time and 90% of drug release in 10 min.
Dehydrated banana powder	Ondansetron, propranolol	Immediate release dosage form
Plantago ovate	Granisetron	Better drug release
Cucurbita maxima pulp powder	Diclofenac	Good release rate
Fenugreek seed mucilage	Metformin	Disintegration in 15 sec. and 100% release in 18 min.

Table 2 Synthetic Super Disintegrants Classification

Method	Super Disintegrant	Drugs employed
Direct compression	Cross povidone and croscarmellose sodium	Glipizide, metaclopramide, terbutaline
	Sodium starch glycollate, crospovidone and cros carmellose sodium	Carvedilol, valsartan, Gliclazide
Wet granulation	Kollidion, Explotab	Ibuprofen
	Ac-di-sol, Sodium starch glycollate	Aceclofenac
Sublimation	Croscarmellose sodium, sodium starch glycollate	Metoprolol succinate

Solve problems such as decomposition, decay and bioavailability.

The awareness of strong measuring forms, a reduced range of new auxiliary materials and a growing inclination towards direct printing processes create a decisive freedom to improve the high usefulness of auxiliary materials [14].

Advantages of Co-Processed Excipients [15][16]

1. Lack of chemical change

Numerous in-depth analyses of the characteristics of excipient substances during co-handling have shown that these excipients exhibit no synthetic alteration. No chemical entity with a covalent link is formed when the separate components are mixed to make the co-processed excipients. To demonstrate that individual components do not create covalent bonds, analytical data supporting the suggested shelf life or retest period of the co-processed excipient must be shown.

2. Physico-mechanical properties

a. Increased flow property

Co-processed excipients have superior flow properties without the need for glidants thanks to controlled optimal particle size and distribution. SMCC's volumetric flow characteristics were compared to those of MCC. The molecule size scope of SMCC was viewed as like that of the parent excipients, However, because of its round form and level surfaces, the co-handled excipient's advancement was better than that of the simple real blends.16 Although calcium phosphate is normally not suitable for use in direct pressure operations, when granulated with larger levels of unsaturated fats, it demonstrated excellent compressibility and stream characteristics as compared to single excipients.

b. Improved compressibility

Direct compression tableting results in a net improvement in flow characteristics and compressibility profiles and produces a filler-binder excipient, co-processed excipients have

mostly been utilized in this procedure. Excipients with higher compressibility performance than simple physical mixes of their component excipients include Cellactose 18, SMCC, and Ludipress. When water is added to excipients like MCC, their compressibility decreases—a process known as quasihornification. Yet, when it is co-processed into SMCCt, this feature is enhanced.

c. Improved potential for diluting

Since most active medicinal compounds are poorly compressible, excipients need to have greater compressibility qualities in order to retain adequate compaction even when diluted with a poorly compressible material. It has been shown that the dilution potential of cellulose is greater than that of a physical combination of its constituent excipients.

d. Variation in fill weight

Co-processed excipients have been shown to have less fill-weight variation problems than parent materials or simple mixes. The main reason of this phenomenon is the impregnation of one particle into the matrix of another, which leads to a near-optimal size distribution, better flow characteristics 21, and decreased roughness of the particle surfaces. When compared to solo excipients, the co-handled calcium phosphate excipient exhibits a consistent molecular size dispersion, resulting in less particle separation and a smaller weight variety.

e. Decreased lubricant sensitivity

The majority of co-processed products have a relatively large amount of delicate material, like lactose monohydrate, and a relatively small amount of plastic material, like cellulose, which is adhered to or fixed between the weak material's particles. Since plastic creates a sturdy structure with a large holding area, it has excellent gripping characteristics. Due to the large amount of fragile material, which separates the oil organization and prevents the formation of a clear oil network by framing newly exposed areas under pressure, the oil network responds poorly to oil.

3. Non Physico-Mechanical Advantages

Utilizing a single excipient with multiple functional properties allows pharmaceutical manufacturers to reduce their inventory of excipients. Customized planner excipients can be fostered by co-handled excipients, since they can provide utilitarian advantages while explicitly reducing barriers. This may help to reduce the amount of time needed to cultivate details. Improved organoleptic properties, such as those found in Avicel CE-15, a co-handled excipient of MCC and guar gum, were shown to have noticeable advantages in pleasant tablets in terms of less dirt, less tooth pressing, slight whiteness, improved mouth feel, and improved overall taste. Despite the fact that co-handling adds some expense, the general item cost diminishes on account of further developed usefulness and less test prerequisites contrasted and individual excipients. Drug companies can employ coprocessed excipients as proprietary blends and maintain internal models, which might support the development of a strategy that is difficult to replicate and provides advantages in terms of licensed invention privileges.

Limitations of Co-Processed Excipients

1. Constant ratio

One significant disadvantage of the co-processed excipient combination is that the excipients' ratio to one another is set. A fixed ratio of the excipients may not be the ideal choice for the API and the dose that is presently being developed for each tablet in the process of generating a new formulation**.**

2. High price

Specialized goods manufactured by patented techniques such as roller drying, fluid bed drying, and spray drying are known as directly compressible excipients. These goods are therefore more costly than the raw resources used to make them.

3. Potential dilution of up to 40%

The majority of easily compressible co-handled excipients can bind up to 40% of the dynamic elements that are ineffectively compressible, such as acetaminophen. This means that the final tablet containing 500 mg of medication would be heavier than 1.3 grams, making it large and potentially difficult to swallow.

4. Reworkability of the splash-dried coprocessed excipient

If the excipient particles are redesigned, they will lose their original round shape, which will result in the loss of their distinctive quality and an increase in the deterioration and disintegration profiles.

5. Lack of approval by pharmacopoeia

The pharmacopoeia has not formally approved co-processed adjuvant. Therefore, until a mix filler folio shows significant advantages in tablet compaction over genuine excipient combinations, the pharmaceutical industry will not accept it.

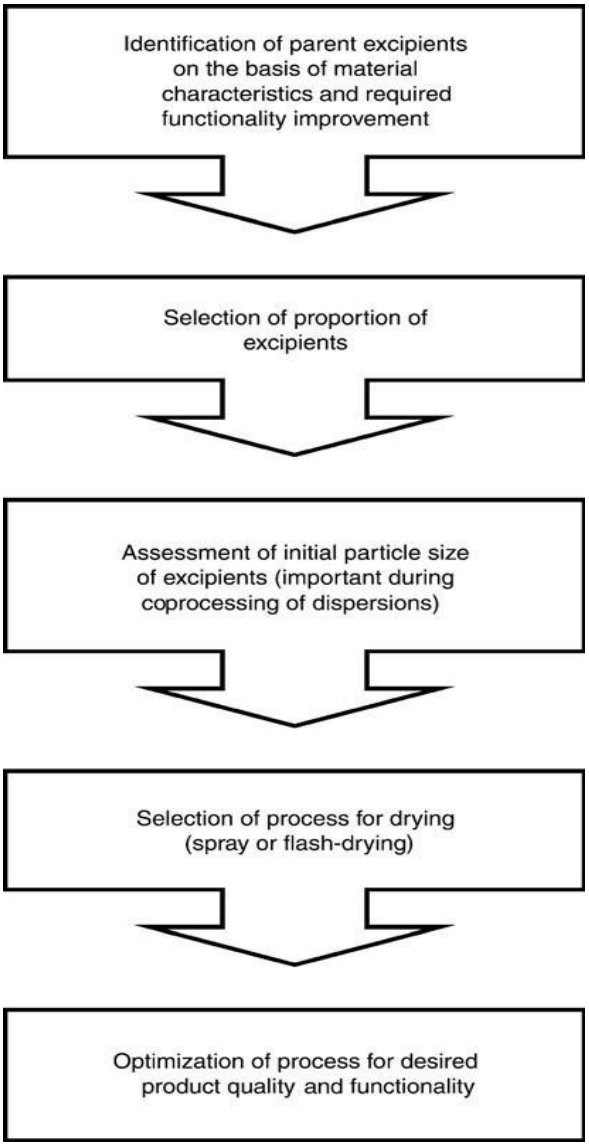

Figure 1 Outline of Co-Processing Technique

Role of Material Characteristics in Co-processing

An Input Material science has a major role in altering the excipients' physico-mechanical properties, especially in relation to pressure and stream characteristics. Three categories of strong materials may be made based on how they respond to applied mechanical power.

Table 3 Classification of materials based on how they react to mechanical force

Classification of material	Description
Flexibility	Any adjustment of shape is totally reversible, and the material re-visitations of its unique endless supply of applied pressure.
Plastic	A material's shape changes forever when stress is applied, like MCC, corn starch, and sodium chloride.
Fragile	Fast engendering of a break all through the material on use of pressure, e.g., sucrose, mannitol, sodium citrate, lactose, and di-calcium phosphate.

The lattice structure of a material controls its propensity to deform, i.e., whether or not its lattice planes are intrinsically weakly linked. Suffice it to say, most of the items are too diverse to be clearly classified into one or more categories. Drugs exhibit all three qualities, with the overpowering reaction being one of them, therefore it is difficult to distinguish the feature good for compressibility clearly. "A decrease in the mass volume of materials because of relocation of the vaporous stage" is what pressure refers to [17].

Stages Encountered During Compression [18]

a. Initial particle repacking.

b. Elastic deformation of the particles up to the yield point, or elastic limit, after which plastic deformation and/or brittle fracture take over and almost completely remove the voids, leading to the compression of the solid crystal lattice.

c. The properties of the individual particles influence the packing characteristics of a bulk of dry powder. When a powder mass is subjected to external mechanical forces, closer packing usually results in a volume decrease.

Table 4 Description and Applications of Co-processed Excipients

Grade	Description	Applications
Ludiflash	Have a cooling effect in the mouth and a mild sweet taste. have a low hygroscopicity and superior flowability. does not completely dissolve in organic solvents or water.	Excellent excipient for rapid release via direct compression of solid oral medication forms that dissolve quickly.
F-melt	Exceptionally flowable with roundly thick particles, deterioration time in no less than 30 seconds, efficient and practical, less staying or covering.	Suitable for the direct compression assembly of oral tablets that dissolve quickly and contain greases and APIs..
Pharmaburst	It is an easy-to-use, quick-to-dissolve delivery stage that is rich, smooth, and extremely feasible.	allows for the flexibility to provide effective "Fast Break down" information internally at a reasonable cost.
Modified chitosan with silicon dioxide	enhanced compaction, flow, and swelling qualities combined with water-wicking capabilities.	Serves as superdisintegrant and filler.
Pearlitol SD	Granulated mannitol spheronized, Pearlitol® 100SD, mean diameter 180 μm, mean width Pearlitol® 200SD, 100 m approximately 40% more powerful than sucrose.	Excellent excipient for direct compression, especially in chewable, effervescent tablet form.
Mannogem EZ	Its outstanding compressibility can be attributed to its open crystal-line structure. Approximately half the power of sucrose is improved.	a great carrier for active moieties that are susceptible to hydrolysis and for applications that dissolve quickly.
Polacrilin Potassium	No protuberance formed following the disintegration. excellent compatibility with excipients and popular treatment agents.	used as a pill disintegration agent and flavor masking ingredient for a variety of medications.
Glucidex IT	less tiny particles, rapid dispersion, and rapid disintegration result in free-flowing.	Utilized as a diluent for spray-dried tablets, capsules, and maltodextrin that is directly compressed and employed in the immediately compressible formulation of vitamin and supplement tablets.

Techniques for Super Disintegrant Addition [19][20]:

In essence, disintegrants are added to tablet granulation to cause the compacted tablet to crumble or break in a fluid environment. Three approaches are available for adding dissolving agents to the tablet:

I. Intragranular Internal Addition

II. Extragranular External Addition

III. Internal and External Elements in Part

The disintegrant is added to the sized granulation with mixing before compression in the external addition technique. Before soaking the powder mixes in the granulating solution, the disintegrant is combined with other powders in the internal addition process. The disintegrant is thereby integrated into the granules. A portion of the disintegrant can be added externally and internally when these techniques are applied.

Mechanism of Action of Super Disintegrants

After the tablets are broken up into tiny fragments, a homogenous suspension is created using the following mechanisms:

Capillary action/ Water wicking: The first phase is almost always a collapse by thin activity. The tablet absorbs the medium, which replaces the air adsorbed on the particles, when it is submerged in the suitable aqueous medium. As a result, the tablet disintegrates into tiny particles and the intermolecular link is weakened. Tablet water uptake is dependent on tableting conditions and the hydrophilicity of the drug or excipient. A disintegrant's ability to introduce water into a tablet's porous structure is essential to its effective breakdown. In actuality, wicking is not joined by a volume increase.

Swelling: It seems that the most prevalent overall mode of action for pill disintegration is swelling. It is important to remember that if the pressing portion is very high, liquid cannot enter the pill and the rate of deterioration decreases [21].

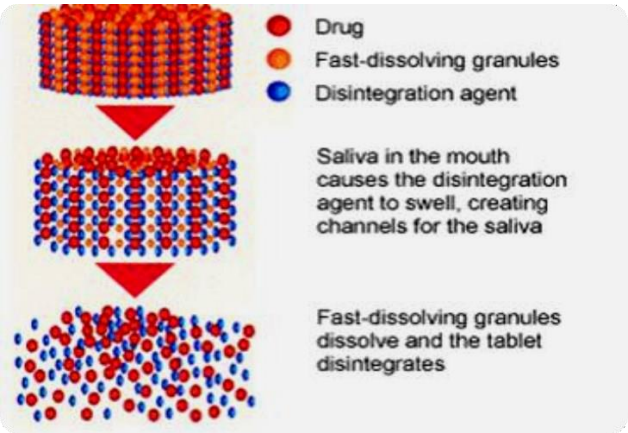

Figure 2 Swelling behavior of superdisintegrants

Air expansion /Heat of wetting: When exothermic disintegrants are wetted, capillary air expansion produces localized stress that promotes tablet disintegration

Due to disintegrating particle/particle repulsive forces: An additional instrument of deterioration attempts to explain the enlargement of tablets composed of "non-swellable" disintegrants. Water is anticipated for the component of breaking down that is caused by the horrifying electric forces between particles. The investigators conclude that wicking is more significant than repelling.

Due to deformation: When degraded particles come into contact with fluid medium or water, they become twisted and take on their normal shape. This phenomenon occurs during tablet pressure. The distorted particles get bigger until the tablet crumbles. It is possible that this is a starch mechanism, but research on it is quite new.

Owing to gas release: When tablets are wet, bicarbonate and carbonate react with citrus extract or tartaric corrosive to produce carbon dioxide. The tablet fractures as a result of internal pressure building up. The bubbly mixture can be introduced to two different parts of the plan or added right before pressure.

By Enzymatic reaction: The body's enzymes function as disintegrants in this scenario. These enzymes break down the binder's capacity to bind, which speeds up its dissolution.

TECHNIQUES FOR PREPARATION OF ODT'S [22][23]

The use of direct compression in the production of ODTs

One popular method for ensuring these measurement structures are ready is direct compression. Simple implementation, the use of conventional equipment in conjunction with frequently available excipients, a preset number of handling steps, and cost viability are some advantages of this approach. Directly compressed tablets dissolve and break down with the help of effervescent agents, disintegrants, and water-soluble excipients, either separately or in combination. The basic idea behind the creation of these dosage forms using this technique is the addition of superdisintegrants in the right amounts to promote quick disintegration and a pleasing mouthfeel.

The prepared tablets are thought to be the ideal approach for creating oral disintegrating dosage forms because they don't contain a binder and have a low moisture content. This method is also regarded as innovative disintegrant growth.

Wet granulation technique

Wet granulation is the most widely used granulation process in the pharmaceutical sector.

Rather than compaction, it combines powders with an adhesive to produce granules, or it adds a liquid solution to powders to make a wet mass (with or without a binder). After drying, the wet mass is measured to obtain granules. Using a mix of capillary and viscous forces, the additional liquid binds the moist powder particles together in the wet state. On the other hand, there are several drawbacks to ODTs, such as high moisture content, which can be reduced by adding a dry folio like PVP, and high crumbling time. Additionally, the cost of creation is high because more resources are needed for assembly.

Alternative methods used in the production of ODTs

When creating dosage forms that dissolve in the mouth, several methods are frequently used. These methods, which are explained below, each have benefits and drawbacks of their own

Freeze Drying

Also known as lyophilization, this process involves extracting a dissolvable substance from a frozen pharmaceutical solution or suspension that contains excipients that frame the structure of the medication. Tablets designed using this method are often incredibly light and porous, allowing for a rapid breakdown. The drug material and the excipients made from freeze-drying, which have a glassy, amorphous, porous structure, improve solubility.

Three phases are typically involved in the freeze-drying process:

The material is brought beneath the eutectic point by freezing it.

Essential drying reduces the moisture content by approximately 4% weight/weight of the dried object.

Optional drying reduces the bound moisture content to the necessary final volume.

The entire freeze-drying procedure is carried out at room temperature, negating any potential negative thermal effects on medication security.

Sublimation

It is because of their low porosity, compressed tablets with highly water-soluble excipients as matrix material usually do not dissolve in water quickly.

Along with other tablet excipients, urea, urethane, ammonium carbonate, naphthalene, camphor, and other inert, volatile compounds are added and the mixture is compressed into a tablet. Sublimation removes volatile molecules and creates a porous structure. Additionally, certain solvents like as benzene, cyclohexane, and so on can also be used as specialists in pore framing [24].

Moulding

The goal of tablets that have been molded is to facilitate the active components' absorption by the oral mucosa. This is made possible by the water-soluble components in the tablet dissolving completely and quickly. Shaped tablets have a superior flavor and break down faster because of the scattering grid, which is mostly made of sugars with a water solvent. The powdered mixture (which contains the medication and excipients such as binding agents such as sucrose, acacia, PVP, and so on) is passed through a very fine screen to ensure quick disintegration. It is then moistened with a hydroalcoholic dissolvable and formed into tablets using less pressure than is used for regular packed tablets. After that, the dissolveable is removed by air drying.

Spray Drying

This process creates a very fine and porous powder by shower-drying a wet item with a support lattice and other components. This creates a particulate help grid. In these formulations, mannitol functioned as a bulking ingredient, sodium starch glycolate or croscarmellose sodium as a disintegrating agent and hydrolyzed or unhydrolyzed gelatin as a matrix support. The dissolution and breaking down processes were further enhanced by the inclusion of bubbly ingredients such sodium bicarbonate and citrus essence. Finally, the definition was spray dried to produce a porous powder.

Mass Extrusion

This innovation comprises of mellowing the dynamic mix utilizing a dissolvable combination of water solvent polyethylene glycol with methanol and ejection of relaxed mass through the extruder or needle to get chamber of the item into even

Table 5 Patented technologies in ODT's [25]

Technology	Process Involved	Patent Owner	Drugs Used (Brand Name)	Drug Release
Zydis	Freeze drying	R.P. Scherer Inc.	Loratidine (Claritin Reditab & Dimetapp quick dissolve)	Dissolves in 2-10 sec.
Quicksolv	Freeze drying	Jansen Pharmaceuticals	Cisapride monohydrate (Propulsid Quicksolv)	------
Flashtab	Freeze drying	Ethypharm	Ibuprofen (Nurofen Flashtab)	Dissolves within 1 min.
Lyoc	Multiparticulate Compressed tablets	Farmlyoc	Phloroglucinol Hydrate(Spasfon Lyoc)	------
Orasolv	Compressed tablets	Cima Labs Inc.	Paracetamol (Tempra Quicklets), Zolmitriptan (Zolmig Rapimelt)	Disintegrates in 5-45 sec.
Durasolv	Molding	Cima Labs Inc.	Hyoscyamine Sulphate (NuLev),	Disintegrates in 5-45 sec.

fragments utilizing warmed edge to frame tablet. The dried chamber can likewise be used for covering the granules of unpleasant medications and consequently veiling their taste.

Cotton candy process

The cotton candy technique gets its name from the unique turning tool that is used to provide a structure that resembles glass and resembles floss, just like cotton candy. This approach involves arranging a grid of saccharides or polysaccharides while simultaneously softening and twisting the sparkle. To improve stream characteristics and compressibility, the lattice frame is partially recrystallized. Compressed into ODTs, this matrix is combined with active and excipient components and then ground. This cycle delivers worked-on mechanical strength and can require large quantities of medication. However, the high temperature limits the use of the method.

Phase Transition

The novel method for preparing ODTs with the right amount of hardness. By compacting and then heating tablets containing two different sugar alcohols one with a high liquefying point and the other with a low one—this approach delivers ODTs. Because the particles are not compactible, the heating process strengthens the bonds that hold the particles together, making the tablets more durable than they otherwise would have been.

Melt Granulation

This is a cycle in which medication powders are effectively combined by using a fastener, which can be a powerful liquid or one that melts during the interaction. High shear blenders, in which the item temperature is elevated over the liquefying point of cover by a warming coat or by the grinding intensity generated by the impeller edges, are employed to achieve this interaction.

CONCLUSION

FDTs are imaginative portion forms designed to break down in spit without the need for water. Fast-dissolving tablets have improved biopharmaceutical properties, effectiveness, and safety when compared to conventional tablets. Additionally, they have increased patient compliance in pediatric and geriatric populations. The prominence of FDTs has soar lately. Disintegration or dissolution occurs in the buccal cavity without the use of water, so FDTs must be developed for psychotic individuals, patients who are immobile, geriatric, or pediatric patients, and FDTs must have sufficient mechanical strength and speed. The FDTs were created using cutting-edge technologies. convey more compelling portion definitions with extra advantages.

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REFERENCES

[1] Jaysukh J Hirani, Dhaval A Rathod, and Kantilal R Vadalia. Orally Disintegrating Tablets: A Review. Tropical Journal of Pharmaceutical Research, 8(2):161-172, 2009.

[2] B Shyamala, and GY Narmada. Rapid dissolving tablets: A novel dosage form. The Indian Pharmacist, 13(8):09-12, 2002.

[3] M Valleri, P Mura, F Maestrelli, M Cirri, and R Ballerini. Development and evaluation of glyburide fast dissolving tablets using solid dispersion technique. Drug Development and Industrial Pharmacy, 30(5):525-34, 2004.

[4] Priyanka Nagar, Kusum Singh, Iti Chauhan, Madhu Verma, Mohd Yasir, Azad Khan, Rajat Sharma and Nandini Gupta. Orally disintegrating tablets : formulation, preparation techniques and evaluation. Journal of Applied Pharmaceutical Science, 01(04):35-45, 2011.

[5] Rangasamy Manivannan. Oral disintegrating tablets: A future Compaction Publication. International Journal of Pharmaceutical Research and Development, 1(10):1-10, 2009.

[6] Sai Padmini Bolla, Syamala Segji, Vinod kumar Nallipogu, Voleti Vijaya Kumar, and Dr. C. Madhusudhan Chetty. Formulation and Evaluation of Orodispersible Tablets of Clonazepam using Natural Superdisintegrants. IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS), 9(4):47-52, 2014.

[7] Dali Shukla, Subhashis Chakraborty, Sanjay Singh, and Brahmeshwar Mishra. Mouth Dissolving Tablets: An Overview of Formulation Technology. Scientia Pharmaceutia, 77; 309–326, 2009.

[8] D Bonadeo, F Ciccarello, and A Pagano. Process for the preparation of a granulate suitable to the preparation of rapidly disintegratable mouth-soluble tablets and compositions obtained thereby. US Patent, 6:316-029, 1998

[9] Yourong Fu , Shicheng Yang, Seong Hoon Jeong, Susumu Kimura, and Kinam Park. Orally fast disintegrating tablets: Developments, technologies, taste-masking and clinical studies. Critical Reviews in Therapeutic Drug Carrier Systems, 21(6):433-476, 2004.

[10] Kirsten Behnke , Jesper Sogaard, Stephen Martin, Josef Bauml, Arun V Ravindran, Hans Agren, and Estelle D Vester-Blokland. Mirtazapine orally disintegrating tablet versus sertraline: A prospective onset of action study. Journal of Clinical Psychopharmacology, 23(4):358-364, 2003.

[11] Suresh Bandari, Rajendar Kumar Mittapalli, Ramesh Gannu, and Yamsani Madhusudan Rao. Orodispersible Tablets: An overview. Asian Journal of Pharmaceutics, 2(1):2-11, 2008.

[12] Dave Brown. Orally Disintegrating Tablets - Taste Over Speed. Oral delivery, 3(6):2003.

[13] K. Abdul Razak, A. Seetha Devi, A. Anka Rao, V. Vasu Naik and A. Rajesh. Orally Disintegrating Tablets: A Review. International Journal of Pharma And Chemical Research, 1(1):25-30, 2015

[14] Sandipan Kundu, and PK Sahoo. Recent trends in the development of orally disintegrating tablets. Pharmatimes, 40(4):11-15, 2008.

[15] J Pathak V. Oral disintegrating technologies: Oral disintegrating dosage forms: An overview. Drug Delivery Technology, 5(3):50-54, 2005.

[16] LH Reddy, and BR Ghosh. Fast dissolving drug delivery systems: A review of the literature. Indian Journal of Pharmaceutical Sciences, 64(4):331-336, 2002.

[17] Seager H. Drug delivery products and the zydis fast dissolving dosage form. Journal of Pharmacy and Pharmacology, 50:375-378, 1998.

[18] Michael J Tobyn, Gerard P McCarthy, John N Staniforth, and Stephen Edge. Physicochemical comparison between

microcrystalline cellulose and silicified microcrystalline cellulose. International Journal of Pharmaceutics, 169: 183-194, 1998.

[19] Y Peter. Crystal Engineering and Particle Design for the Powder Compaction Process. Pharmaceutical Technology, 18:677-721, 1992.

[20] PM Belda, and JB Mielck. The tableting behavior of cellactose compared with mixtures of celluloses with lactose. European Journal of Pharmaceutics Biopharmaceutics, 42(5):325–330, 1996.

[21] MC Gohel, and PD Jogani. A review of co-processed directly compressible excipients. International Journal of Pharmacy and Pharmaceutical Sciences, 8(1):76-93, 2005.

[22] IA Adi, and MA Moawia. Compaction Mechanism and Tablet Strength of Cellactose®. Jordan Journal of Pharmaceutical Sciences, 1(1):71-82, 2008.

[23] Y Peter. Crystal Engineering and Particle Design for the Powder Compaction Process. Pharmaceutical Technology, 18: 677-721, 1992.

[24] Rakesh Pahwa and Nisha Gupta. Superdisintegrants In The Development Of Orally Disintegrating Tablets: A Review. IJPSR, 2(11):2767-2780, 2011.

[25] K prabhu Halakatti. Formulation and evaluation of mouth disintegrating tablets of famotidine by using Hibiscus rosa sinensis mucilage and treated agar. International Journal of Research in Ayurveda and Pharmacy, 1(2):497-505, 2010.