World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(REVIEW ARTICLE)

Check for updates

Various drugs used in oral disintegration tablet formulation

Kiran Mahadeo Salunke [1,*], Sujata Umakant Veer [1], Yogesh Ankush Narute [1], Pratiksha Babusha Pawar [2] and Amol Navnath Khedkar [1]

[1] *Saikrupa Institute of Pharmacy, Ghargaon, Shrigonda, Ahmednagar, Maharashtra, India 413728.*
[2] *VVPF's, College of Pharmacy, Vilad Ghat, A.nagar, Maharashtra, India 414111.*

World Journal of Advanced Research and Reviews, 2024, 24(01), 459–476

Publication history: Received on 21 August 2024; revised on 28 September 2024; accepted on 01 October 2024

Article DOI: https://doi.org/10.30574/wjarr.2024.24.1.3031

Abstract

Oral drug administration is more widely accepted because it is used to provide between 50 and 60 percent of medications. The solid dosage forms are commonly utilized since they are simple to administer, precise in their dosage forms, beneficial for self-medication, and preventive of discomfort, and last but not least, the excellent level of patient adherence. The capsules and tablets are the most widely used solid dose form administered orally. Aside from ingesting it does not possess any noteworthy drawbacks. Water plays a crucial function in this swallowing process. Even following this, some people had difficulty swallowing. In order to prevent these issues, mouth dissolving tablets were developed. They have the benefit of not requiring water and don't require swallowing because they dissolve or disintegrate in saliva. In light of the design it began to behave in two ways: first, some tablets disintegrated quickly, taking just a few moments in saliva. Another kind of tablet is known as a "first disintegration tablet" since it contains some substances that slowed down the tablet's rate of breakdown. Review attention was drawn to the concise talk about mouth dissolving tablets and the most recent versions available.

Keywords: Mouth dissolving tablets; Solid dosage form; Disintegration rate; Fast dissolving tablets; Super disintegrants

1 Introduction

1.1 Oral disintegration tablet

Drugs should be administered orally since it is easier to swallow, prevents discomfort, is more flexible, and most importantly ensures patient compliance. Many patients have trouble swallowing tablets and capsules, which causes them to not take their medications as directed. It is believed that 50% of the population is impacted by this issue, which ultimately raises the risk of therapy noncompliance and inefficiency [(1)]. For these reasons, there has been a lot of interest in tablets that dissolve in the mouth [(2)]. Among all pharmacological formulations, solid dosage forms such as oral tablets hold the most significant position. An essential stage in creating a workable fast-dissolving/disintegrating tablet (FDDT) is taste-masking. Traditionally designed tablet formulations typically don't address taste-related problems. [(3-5)]

When it comes to medication therapy for any kind of illness, the optimal dosage schedule is one that achieves the target therapeutic drug concentration in plasma (or at the site of action) right away and keeps it there during the course of treatment. Oral drug delivery is the most common method. It is therefore regarded as the most natural, simple, safe, and cost-effective way to give medication. [(6, 7)] It also offers more design options for dose forms and is simple to produce. Due to its easy production, compact size, and ease of self-administration, the oral route of administration is thought to be the most commonly used method. The most obvious disadvantage of the widely used oral dose forms, such as tablets and capsules, is that they are difficult for patients to swallow, which can result in noncompliance, especially in the case

* Corresponding author: Kiran Mahadeo Salunke

of juvenile patients. The most popular, practical, stable, and compact packing option is oral administration. As a delivery strategy, the orally disintegrating tablet (ODT) breaks down quickly in the mouth when it comes into contact with saliva; consequently, it doesn't require extra water. It can be absorbed through the mucosa of the pregastrium. Other names for this kind of dosage form that have been documented are mouth dissolving/disintegrating tablets (MDTs), quick disintegrating tablets, fast/rapid dissolving or disintegrating tablets (FDTs), quick/rapid melt tablets, or dispersible tablets, and porous tablets.[8-9] The introduction of OTDs in the 1980s and the first studies on the formulation of OTDs are attributed to the requirement for quick disintegration, rapid beginning of action, and patient compliance, particularly for paediatric, and geriatric, psychiatric, paraplegic, and bedridden patients. [10]

1.2 Ideal Characteristic of ODT: [11]

To set themselves apart from more typical dose forms, ODTs must to have a few desirable features.

- One of these dosage forms has most desirable qualities is that it doesn't require water to be swallowed; instead, it should dissolve or disintegrate in the mouth in a matter of seconds.
- After oral delivery, ODT should leave little to no residue in the mouth that is compatible with a pleasant mouth feel.
- Work well with taste-masking techniques.
- Drugs with bitter tastes should use efficient taste masking technology.

1.3 ODTs have the following benefits:[12-17]

The tablet can be swallowed without water. Have a pleasant mouth feel and are compatible with flavour masking. Easily provided to individuals who are intellectually impaired, elderly, or paediatric. Following administration, there is no residue found in the oral cavity. It is possible to manufacture the tablets at a minimal cost by utilizing standard processing and packaging equipment. Permit heavy drug loading. Compared to liquids, an accurate dose can be administered. The medication has a quick beginning of action due to its rapid dissolution and absorption. Advantageous in terms of transportation and administration compared to liquid medication. As saliva travels down into the stomach, some medication is absorbed from the mouth, pharynx, and oesophagus, lowering first pass metabolism and providing. Easy to administer and convenient because they don't require water; Study and strong enough to resist handling during production. It has a pleasant mouth feel and is not affected by temperature or humidity. Better taste that disappears quickly after dissolution; Adaptable and compatible with current manufacturing and packaging equipment; Economical; Compatible with taste masking; Quick drug therapy intervention.

1.4 Limitations of ODT: [18-20]

The tablets frequently lack adequate mechanical strength. Thus, careful handling it required. If the pills are not made correctly, they could leave the oral cavity with a grittiness and an unpleasant flavour. Drugs with high dosages may provide challenges when formulated into oral drug delivery systems (ODTs). Individuals who use anti-cholinergic medications concurrently are not good candidates for ODTs.

- One significant drawback of ODTs is that they are not as strong mechanically as other tablets. A soft, porous matrix that has been squeezed. Low compression tablet form, resulting in a fragile and breakable tablet that is challenging to handle.
- It is difficult to manufacture bitter medications as ODTs. As a result, materials that hide flavor should be employed prior to creating this class of medications.
- Because some ODT formulations may be hygroscopic, they are unable to protect their physical soundness due to humidity. Because of this, they need particular packaging.
- Reduction of salivary flow that may happen when using medication formulations.

1.5 Mode of action

ODTs use the following methods to produce the intended quick dissolving characteristics;

- Water needs to get into the tablet matrix fast in order to create rapid pill disintegration and immediate dissolving.
- Using a suitable disintegration agent or very excipients in the tablet formulation that dissolve in water.
- There are a few processes listed below by which the tablet is divided into tiny pieces, and then eventually lead to a pharmacological suspension or solution.

The mechanisms are: - High disintegration swell ability, Chemical exchange, Capillary action

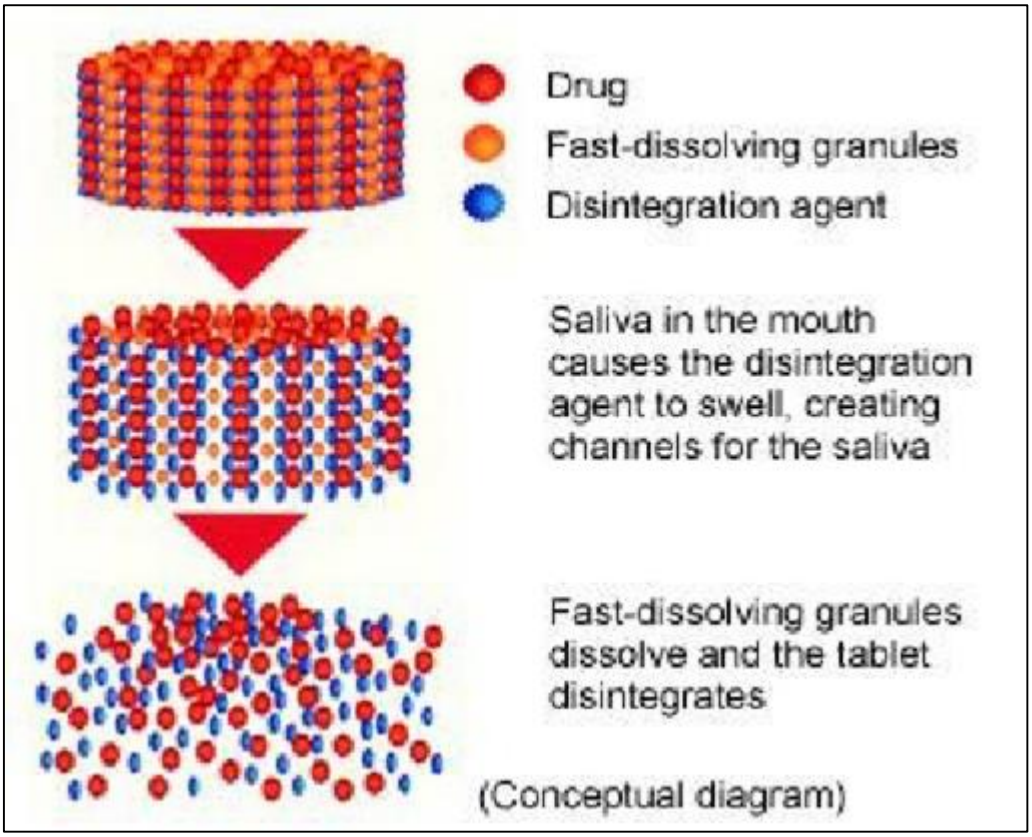


Figure 1 Conceptual diagram of FDTs

1.6 Methods for manufacturing of ODT:

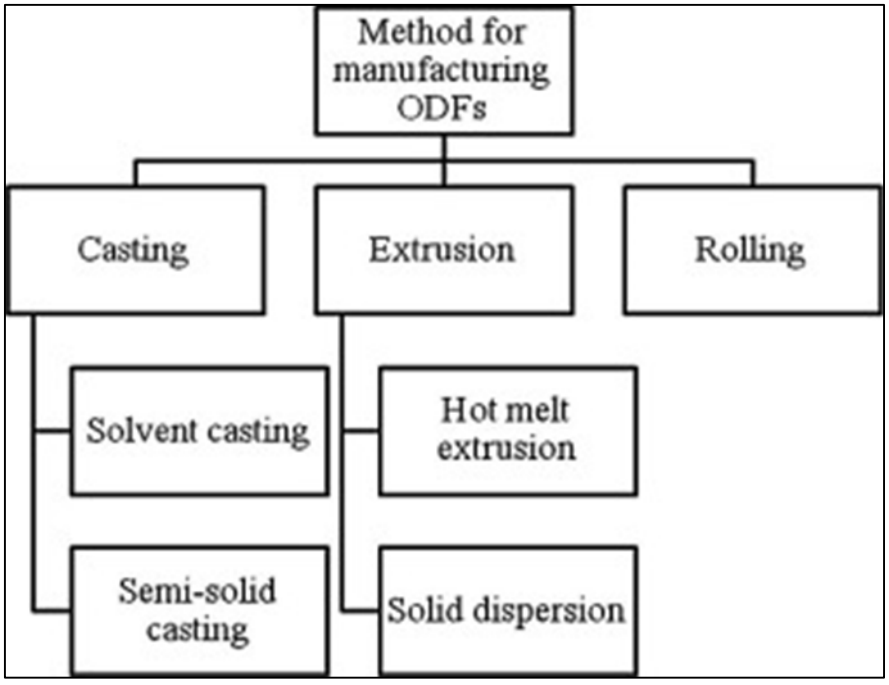


Figure 2 Manufacture of ODT

Parameters for mouth dissolving drug delivery system [21]

When designing a fast-dissolving tablet, certain fundamental parameters are taken into account. These include:-

- The tablet should have the ability to dissolve quickly and not require water during ingestion
- It should have good taste
- It shouldn't be easily broken down, in any situation
- It should feel good in the mouth
- There shouldn't be any residue left behind after oral administration
- The formulation should be resistant to changes in temperature and humidity.
- It needs to be cost-effective for both patients and manufacturers.

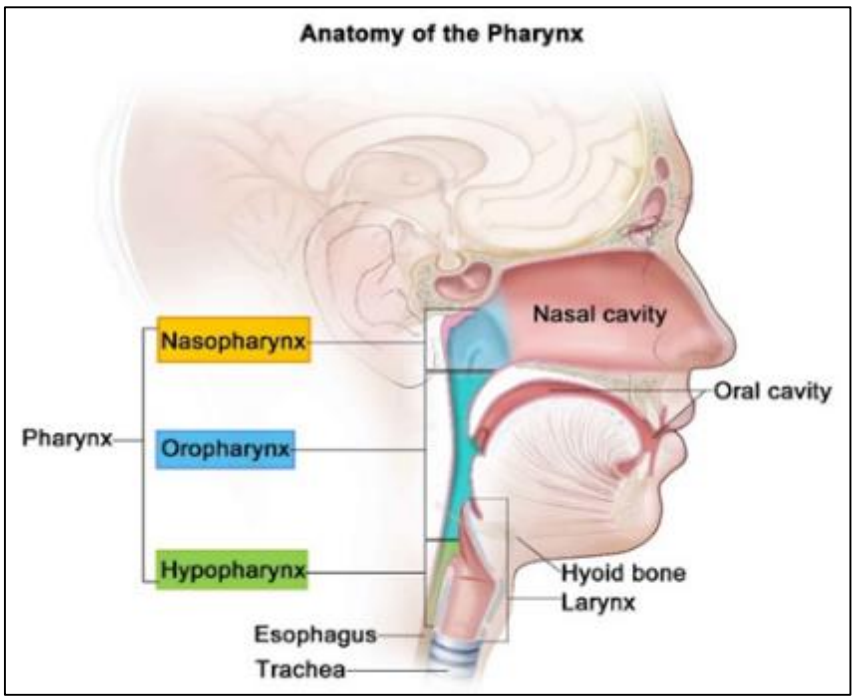


Figure 3 Anatomy of the pharynx

1.7 Properties of excipients used in the formulation of mouth dissolving tablets [22-24]

It must have a quick disintegration property. The formulation shouldn't be impacted by the excipients' inherent qualities. Interactions between pharmaceutical excipients shouldn't occur. Neither the product's efficacy nor its physical characteristics should be impacted by the excipients. The ideal melting point range for the excipients is between 30 and 35°C. Liquid, solid, or powder form binders are required in the manufacture of mouth dissolving tablets as well as polymeric blends

1.8 Characteristics of mouth dissolving tablets

- Quick disintegration: Saliva is an aqueous medium in which mouth dissolving pills should dissolve correctly; extra water is not needed. As a result, it creates in the mouth a smooth liquid suspension that patients may easily swallow.
- Sensitivity to moisture: Different excipients are used in the formulation of tablets that dissolve in the mouth. That are water-sensitive or possess a fondness for water. However, to boost the quickly vanishing attributes, it needs to have a low susceptibility to atmospheric dampness.
- Taste of active ingredients: MDTs must to be palatable or possess taste-masking qualities because they dissolves effortlessly in the saliva. It ought not to be coarse.
- Price and packaging: The variety of prices is dependent on how we formulate the mouth-dispersing pills, which varies in different ways. Certain procedures, such as Orasolv and Zydis technologies, increase prices. Because MDTs are hygroscopic, adequate packaging is required.
- Strength of the tablet: The MDTs tablets should be highly mechanically sturdy as well as extremely permeable. As a result, water absorbs quickly and disintegrates more quickly.

1.9 Ingredients for Mouth Dissolving Tablets

Mouth dissolving tablets are made using a variety of excipients, including super disintegrates, binders, fillers, sugar-based excipients, lubricants, color, surface-active agents, and others. The quick medication release and quicker

dissolving times of certain excipients are their key characteristics. The range of temperatures must be between the 30-35 °C ranges for excipients. [25]

- Super disintegrants: An essential component of mouth dissolving tablet is the super disintegrates. It facilitates the pills' rapid disintegration in the mouth, which causes them to dissolve swiftly. The disintegrates critical concentration is extremely high, and crucial to the formulation process. The disintegration time decreases below the critical concentration of disintegrates of tablets is inversely related to the concentration of super disintegrates above the essential concentration, whether the disintegration time increases or stays the same. The combination of the formulation's swelling and water absorption causes the fast breakdown. (26)
- Flavor: To improve the palatability and patient compliance of any dosage form, flavouring compounds are primarily used in its composition. Since it masks the bitterness or other unwanted tastes of the active components in pharmaceuticals, it is also referred to as a taste-masking agent. There are numerous kinds of flavourings such as anise oil, clove oil, peppermint oil, and aromatic oil, etc. (27)
- Fillers: Because they add in the calculation of the disintegration time, fillers are also crucial to the formulation of mouth dissolving tablets. Examples of fillers that are utilized include calcium carbonate, magnesium carbonate, sorbitol, and sorbitol.(28)
- Binders: The powder is made more cohesive and takes the form of granules by the addition of binder to the formulation. After compaction, such grains create a cohesive mass or compact mass of tablets. These binding agents include, for instance, polyvinyl alcohol, polyvinyl pyrrolidone, and HPMC (hydroxypropyl methylcellulose), among other things.(28)
- Sugar-based excipients: These substances are sometimes referred to as bulking or taste-masking agents. Taste is important for MDTs, hence it must be included in the formulation. However, there are several drawbacks, such as the poor compatibility and quick disintegration rate of all sugar-based excipients. Excipients based on sugar that also include bulk properties, such as fructose, sorbitol, and maltose, are extremely capable of being dissolved in water and serving as a sweetening agent to prevent the bitter taste.(29)
- Surface-active agents: These substances are crucial to the creation of MDTs. Sodium lauryl sulfate, sodium dodecyl sulfate, and polyoxymethylene sorbitan fatty acid esters are a few examples of surface-active compounds.(30)
- Lubricants: Compared to other excipients, lubricants are not as necessary. It is employed to eliminate granular characteristics and enhance the way that medications pass through the digestive system. Some examples of lubricants are calcium, magnesium, and talc.(31)
- Colors: Various color are used like yellow, pink, purplish blue, etc(32)

Table 1 Commercially available marketed mouth dissolving tablet [34]

Trade name	Active drug	Manufacturer
Zofran ODT	Ondansetron	GlaxoSmithKline
Orapred ODT	Prednisolone	Sciele Pharma
Prevacid Solution Tablet	Lansoprazole	Takeda Pharmaceuticals
Mosid MT	Mosapride citrate	Torrent Pharmaceuticals Ltd., Ahmedabad, India
Febrectol	Paracetamol	Prographarm, Chateauneuf, France

1.10 Excipients Used in Preparation of MDT

1.10.1 Superintegrants

A popular technique for making MDTs is disintegrate addition due to its price and ease of use. The core concepts consist of including the appropriate amount of super disintegrates to accomplish oral dissolving of pills and enjoyable oral sensations.

1.10.1.1 Factors to be considered for the selection of superdisintegrants:-

- As soon as the tablet comes into contact with saliva, it should dissolve in the mouth.
- It need to have the capacity to compress, resulting in less brittle tablets.
- The patient may experience a pleasant mouth feel from it. Consequently, tiny Particle sizes are employed to ensure adherence from patients.

Table 2 Excipients used in mouth dissolving tablet

Excipient used	Examples
Superdisintegrants	Crospovidone, croscarmellose, microcrystalline cellulose, sodium starch glycolate, sodium carboxyl methyl cellulose, calcium carboxyl methyl cellulose, modified corn starch
Flavours	Peppermint, cooling flavour, flavouring aromatic oil, peppermint oil, clove oil, bay oil, anise oil, eucalyptus oil, thyme oil
Sweeteners Filers	Aspartame, sugars derivatives Filers Mannitol, sorbitol, xylitol, calcium carbonate, magnesium carbonate, calcium phosphate, calcium sulfate, pre-gelatinized starch, mg trisilicate, aluminium hydroxide
Surface active agents	Sodium dodecyl sulfate, sodium lauryl sulfate, tweens, spans
Binders Lubricants	PVP, PVA, HPMC Lubricants Stearic acid, mg stearate, polyethylene glycol, liquid paraffin, colloidal silicon dioxide

PVP: Polyvinylpyrrolidone, HPMC: Hydroxypropyl methylcellulose, PVA: Polyvinyl alcohol

Table 3 Flow property based on angle of repose

Flow property	Angle of repose(degrees)
Excellent	25-30
Good	31-35
Fair-aid not needed	36-40
Passable-may hang up	41-45
Poor-must Agitate	46-55
Very poor	56-65

Table 4 Flow of property based on Hauser's ratio

Flow property	Hauser's ratio
Excellent	1.00–1.11
Good	1.12–1.18
Fair	1.19–1.25
Passable	1.26–1.34
Poor	1.35–1.45
Very poor	1.46–1.59
Very very poor	>1.60

Table 5 Weight variation of mouth dissolving tablets

Average weight of tablets	Percentage deviation
80 mg or less	±10
80 mg or 250 mg	±7.5
250 mg or more	±5

2 Manufacturing techniques of mouth dissolving tablets

There are so many methods available for the production of mouth dissolving tablets. Among the most important techniques are listed below.

2.1 Direct Compression

Direct compression technique counted as one of the simplest techniques and also cost-effective. The excipients are easily available which plays a vital role to improve the physical characteristics like improvement of flow property, compressibility as well as in disintegration. In this technique, the granules of the tablets are directly compressed and it has so many advantages. [35]

2.1.1 Advantages of Direct Compression

- It can deal with high doses, there are finite steps involved, and simple equipment is used.
- It is a convenient method, low-cost technique, excipients used are easily available in the market.
- This method has mainly three steps: milling of the excipients, then sieving in a proper no of sieve, mixing of the sieved particle of drugs, and lastly compression of tablets [36]

2.2 Lyophilisation, also known as freeze-drying

This process sublimates water out of any medication. At this price, mostly heat-sensitive medications are used. These are dried at extremely low temperatures, low enough to cause water to sublimate. For the drug particles to pass this procedure, they need to have certain qualities. Those include that the particles should dissolve quickly, have a large specific surface area, and are extremely porous. And characteristics of absorption. Initially, in 1985, scientists Jaccard and Leyder employed this method to as the water is ingested, prepare an oral dose form that dissolves quickly in the saliva. Location where water molecules are found. Using this method, an amorphous porous structure is produced to improve the property dissolution. The blister packets are filled with the medicine or excipient mixture. After that, the tray is filled with all of those blister packs. Liquid nitrogen gas is blown through a specific tunnel to freeze the medication solution within the blister packets. The freezing process is carried out continually. Following that blister Aluminium foil is used to cover the sealing machine. [37] Advantages of this method are it dissolves quickly in saliva and works well with compounds that are thermo labile. In the mouth, the medications break down in less than five seconds. Whereas disadvantages of lyophilisation are it is an expensive and time-consuming procedure there could be instability in the dosing form Because to faulty packaging. [38]

2.3 Moulding

The tablet-making process involves compressing materials and combining them with a hydro alcoholic solvent at a lower pressure. This combination is used to mold the specific tablet. Moulding tablets have certain advantages over other tablets produced by the technique of compression. The compactness of tablets that have been moulded is quite weak. Thus, it can because it is more porous, improve the absorption and dissolving or disintegration qualities. In terms of organization. Since we utilized a hydro alcoholic solvent, air drying makes it easy to evaporate. Approach. There are several moulding methods, such as:

- Heat moulding: This method involves making a suspension with agar and sugar (such as lactose or mannitol). Following that, the suspension is poured into blister packets. After that, this agar-containing mixture or suspension is left to settle at room temperature. Until a firm texture appears. It is finally dried at 30°C. Heat is the term for this entire process. Shaping. [39]
- Compression moulding: This method involves filling the tablets with a hydro alcoholic solvent mixture that contains water-soluble ingredients. Following that, it is air dried at low pressure, and the compactness of the tablets that are formed is also weak. [40]
- Vacuum evaporation without lyophilisation: Using this method, a slurry containing a combination of medications or excipients is made and then put into a mould. Following that, it is allowed to freeze for solidification while being vacuum-dried within a specific temperature range. Between the freezing point of equilibrium and the collapse temperature. Consequently, a partially A collapsed matrix appears. The vacuum drying method has benefits since the mechanical identifying the matrix improves strength. In addition, certain binding agents such as acacia, PVP and sucrose are used to increase mechanical strength. [41]

2.4 Sublimation

This method uses a variety of volatile materials, including urea, ammonium bicarbonate, camphor, naphthalene, and urethane. Tablet excipients are combined with all those ingredients. Sublimation then takes place, removing those flammable materials from the mixture. It creates a structure inside the matrix that is more permeable. Therefore, it can break down faster, like in 10 to 15 seconds. Needs to be broken down into saliva. Other solvents such as cyclohexane and benzene are used added to improve the porosity [42]

Advantages: This procedure can improve disintegration and boost the tablet's mechanical strength. The purpose of mass extrusion is primarily to conceal the bitter flavour of the tablets. To make the mix softer, some hydrophilic alcohol is added to the formulation, such as methyl alcohol and polyethylene glycol. [42]

2.5 Mass extrusion

This method is mostly used to hide the pills' unpleasant taste. To make the mix softer, some hydrophilic alcohol is added to the formulation, such as methyl alcohol and polyethylene glycol. Following that, the mixture is run through an extruder or syringe to create a cylindrical shape. Tablet computers are created by utilizing a hot blade cutter to mold the blend into cylinders. Thus, it can be applied to cover up the tablet's unpleasant flavour. [43]

2.6 Nano ionization

Using a technique called nano melt, the drug particle size is lowered to the nanometre range. One method used to reduce size is wet milling. Because the nanoparticles are so tiny, they have a propensity to group together in the mixture. Several stabilizers are used to stop agglomeration. Included in MDTs. It is mostly utilized for medications with extremely low solubility. Every tablet that are produced using this method may contain large dosages of the medication—200 mg each tablet, for example. [44]

Benefits: This procedure can lower dosages while also improving the drug's absorption. It's an inexpensive procedure, and the tablet's robustness could improve [44]

2.7 Melt granulation

This method requires no additional water or organic solvents, making it more convenient than conventional granulation methods. There is no drying process included. As such, it takes less time. This method is a variation of the dry granulation method. This procedure includes the addition of a waxy, hydrophilic binder such as superpolystate (polyethylene glycol-6-stearate). This superpolystate has a melting point range of 33–37°C and an HLB of 9. Additionally, it improves the physical resistance and tablet breakdown. The MDTs quickly dissolve in the tongue and don't There are remnants in the mouth [45]

Benefits: Because this method is dry granulation, it uses less energy. In addition to serving as a binder, the superpolystate facilitates the breakdown of less potent water-soluble medications [45].

2.8 Spray drying

Spray drying an aqueous mixture containing a support matrix and other components results in a very porous and fine powder. After that, this is combined with the active component and compacted into a tablet. The formulations included sodium starch glycolate/croscaramellose as a disintegrate, mannitol as a bulking agent, and both hydrolysed and unhydrolyzed gelatine as a supportive ingredient for the matrix. By adding an acid (like citric acid) or an alkali (like sodium bicarbonate), the process of disintegration and dissolving was further accelerated. The excipient suspension mentioned above was spray-dried to produce a porous powder that was then formed into tablets. In an aqueous media, tablets made using this process dissolved in less than 20 seconds. [46]

3 Quality Control Test of MDT

Tablets produced from all of the formulas underwent the following quality control tests:

- General appearance:- Customers' opinions regarding a tablet's overall look, visual identity, and degree of "elegance" are impacted by its size, shape, color, and flavor, surface texture, physical defects, uniformity, and readability of any distinguishing symbols.
- Size and shape: - The size and form of the tablet may be managed and tracked in terms of its dimensions [47]

- Tablet thickness: - The tablets' uniform thickness is used as a counting mechanism by some filling machinery. Just like with regular tablets, a micrometer or a Vernier caliper can be used to measure the tablet's thickness. Ten pills may be consumed, and their levels can be measured with a micrometer [48]
- Weight variation: - To look for weight variance, twenty tablets are randomly chosen from the batch and weighed individually. The weight variation standard for Indian Pharmacopoeia 5 is displayed in the (Table No. 4)
- Hardness: - The hardness of a tablet is defined as the amount of force required to shatter it across its diameter. When handled before use and during storage transition, the tablet's hardness influences how resistant it is to breaking, chipping, or abrasion. Hardness can be assessed using a Monsanto, Erweka, Pfizer, or Schleuniger hardness tester [49]
- Friability: - The Roche Friabilator can be used to evaluate friability. This gadget rotates a plastic container at a pace of 25 revolutions per minute, subjecting the tablet to the combined effects of stress and abrasion. And with each rotation, drops a tablet from a height of six inches. The A sample of pre-weighed tablets is rotated by a friabilator. One hundred times. The friability (F) is given by the following formula:

$$F=Wt.int.-Wt.\ fin$$

Where,
Wt.int. =is the tablet weight at the beginning of their friability;
Wt.fin. = Tablet final weight after friability

- Wetting time: - Wetting time and contact angle of the dose form are correlated. It must be evaluated in order to shed light on the characteristics of tablet disintegration; a shorter wetting time corresponds to a faster rate of disintegration. This is carried out by inserting a tablet into a small Petri dish that has an internal 6 ml of water, a 6.5 cm diameter, and timing how long it takes for the tablet to become completely damp(50)
- Disintegration test: - Since fast-dissolving pills must dissolve without the presence of water in order for the test to be correct, their disintegration times must be altered. For this, a 10 cm diameter Petri dish with 10 ml of water inside of it objective. Gently set the tablet in the Petri dish's center, and the length of time until it completely fractures into tiny pieces is apparent (51)
- In vitro dispersion time: - One way to determine the in vitro dispersion time is to drop a tablet into a beaker filled with 50 milliliters of liquid. Three tablets from each formulation are selected at random so that an in vitro dispersion test can be conducted. It's feasible to gauge How long it takes a medication to go away completely (52)
- In vitro dissolution test:- In vitro dissolving experiments are carried out using the USP paddle technique at 50 rpm in 900 millilitres of dissolving fluid maintained at 37±0.5 degrees Celsius might be used. A dissolving media can be chosen using a monograph. Following sample staining, Whitman filter paper is used. By carrying out a spectrophotometric examination at a certain wavelength, the sample needs to be removed at the specified times. To continue the same amount of freshly heated material at the same volume throughout the test Re-adding the medium to the dissolving media when it has warmed to 37°C every sample. Dissolution investigations are carried out with n = 6(53)

4 Various Categories of drugs administered using ODT

4.1 Anti-depressant drugs

The primary medical uses for antidepressants include the treatment of anxiety and depressive disorders. Nevertheless, enuresis, aggressiveness, eating disorders, impulse control disorders, sexual dysfunction, and certain personality disorders are also treated with this family of medications. Many types of antidepressants have been made accessible in India over time; some have endured and are still in use, while others are no longer marketed or aren't a clinician's preferred choice. Research on the efficacy of antidepressants in India has mostly followed western trends; nevertheless, not all antidepressant medications that have been sold have undergone as much evaluation as others. The majority of research conducted in the review will concentrate on studies on the usefulness, tolerability, and efficacy of antidepressants in human subjects that have been reported in PubMed-indexed journals and in the Indian Journal of Psychiatry. An antidepressant is a class of drug or treatment that is used to treat depression, anxiety, and certain other mental health issues. Antidepressants function by altering the brain's levels and activities of specific neurotransmitters, including dopamine, norepinephrine, and serotonin, which are essential for mood control. Oral disintegration tablets (ODTs) of antidepressant drugs are designed to dissolve quickly in the mouth, releasing the medication without the need for water.

4.1.1.1 Challenges and limitations

- Taste and mouth feel: Some patients may experience unpleasant taste or mouth feel due to the rapid dissolution.
- Dose limitations: ODTs often have lower dose strengths due to the rapid absorption and potential for increased side effects.
- Interpatient variability: Individual differences in oral mucosa permeability and saliva production may affect drug absorption and efficacy.
- Cost: ODTs may be more expensive than traditional formulations.

4.1.1.2 Patient considerations

- Dose titration: Gradual dose increases may be necessary due to rapid absorption.
- Taste and mouth feel: Some patients may experience unpleasant taste or mouth feel.
- Swallowing difficulties: ODTs can be beneficial for patients with swallowing disorders..

4.1.1.3 Mechanism of action

Antidepressants work by altering the levels and activity of neurotransmitters in the brain, which helps to improve mood, reduce stress, and increase feelings of well-being. The exact mechanism of action varies depending on the type of antidepressant, but most work by:

- Increasing neurotransmitter levels: Antidepressants increase the levels of neurotransmitters like serotonin, norepinephrine, and dopamine in the synaptic cleft (the gap between neurons).
- Inhibiting reuptake: Antidepressants block the reabsorption of neurotransmitters by the neuron that released them, allowing more neurotransmitters to be available for binding to receptors.
- Binding to receptors: Antidepressants bind to specific receptors on adjacent neurons, activating or blocking their activity.
- Modulating neural circuits: Antidepressants can alter the activity of neural circuits involved in mood regulation, stress response, and emotional processing.

Evaluation and formulation of antidepressants involve several steps:-

- Clinical trials: Conducted to assess efficacy, safety, and tolerability.
- Pharmacokinetic studies: Examine drug absorption, distribution, metabolism, and excretion.
- Pharmacodynamics studies: Investigate drug effects on neurotransmitters and receptors.
- Dose-response relationships: Determine optimal dosage and dosage regimens.
- Comparison to existing treatments: Assess relative efficacy and safety.

Formulation:-

- Active Pharmaceutical Ingredient (API): Selection of the antidepressant compound.
- Excipient selection: Choice of inactive ingredients to enhance stability, bioavailability, and patient acceptability.
- Dosage form design: Decisions on tablet, capsule, liquid, or other forms.
- Route of administration: Oral, intravenous, or other routes.
- Release mechanisms: Immediate, sustained, or controlled release.

Antidepressant formulation considerations:

- Solubility: Enhancing bioavailability.
- Permeability: Optimizing absorption.
- PH sensitivity: Protecting APIs from degradation.
- Moisture sensitivity: Preventing degradation or oxidation.

Example: - Fluoxetine (Prozac)

Brand Name: - Prozac

Type: - Selective Serotonin Reuptake Inhibitor (SSRI)

Used to treat

Depression, Anxiety disorders, Obsessive-compulsive disorder (OCD), Bulimia nervosa

How it works

- Fluoxetine increases the levels of serotonin in the brain.
- Serotonin is a neurotransmitter that helps regulate mood, appetite, and sleep.

How it's taken:-

- Fluoxetine is taken orally, usually once a day.
- it’s available in tablet or liquid form.

Important notes:

- Fluoxetine may take 4-6 weeks to start working.
- It's essential to continue taking the medication as directed, even if you start feeling better..

Figure 4 Fluoxetine ODT (20mg)

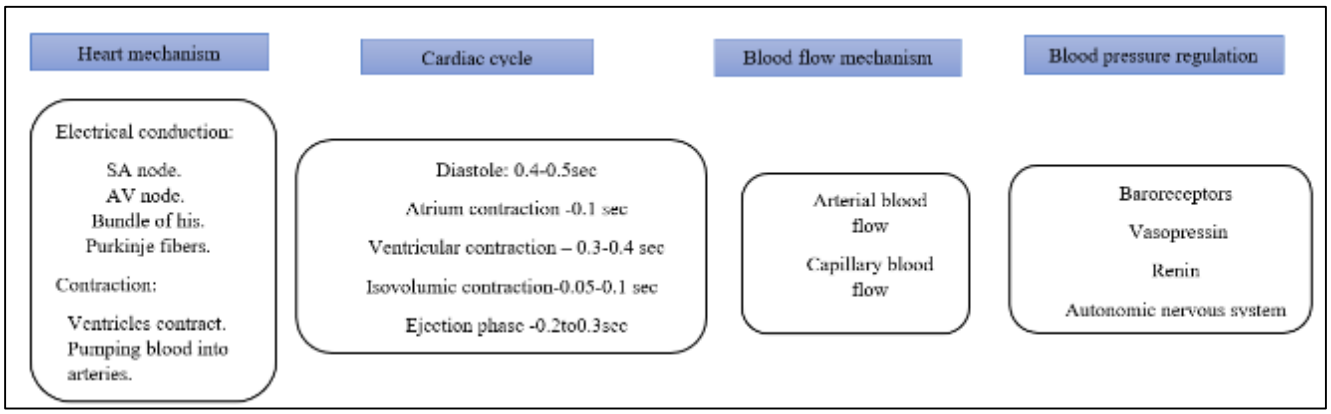
4.2 Cardiovascular

The term “cardiovascular” describes the blood arteries and heart that make up the cardiovascular system. This system bears accountability for:

- Providing nutrition and oxygen to the body’s cells and organs.
- Eliminating waste materials from organs and cells.
- Controlling one’s body temperature.
- Keeping blood pressure within normal ranges.

Figure 5 Cardiovascular Diagram

4.2.1.1 Mechanism of action



4.2.1.2 Pharmacokinetic

- Absorption: Amlodipine has an absolute bioavailability of 64% to 90%. Amlodipine's bioavailability is unaffected by food. Peak plasma concentrations can be reached in six to twelve hours. After taking amlodipine every day for 7 to 8 days, steady-state plasma levels are reached. Individuals suffering from hepatic impairment exhibit reduced amlodipine clearance. Patients with liver diseases therefore have an increase in area under the curve of roughly 40% to 60%.
- Distribution: The plasma protein binding of amlodipine is strong (93%).
- Metabolism:-Amlodipine undergoes significant liver metabolism to produce inactive metabolites. The CYP enzymes CYP3A4 and CYP3A5 are crucial for the metabolism of amlodipine.
- Excretion: Amlodipine has a biphasic plasma half-life and a 30 to 50 hour terminal elimination half-life.

4.2.1.3 High blood pressure:-

- Adults: 5 mg as starting dose and up to 10 mg per day as the maximum
- Elderly and disabled patients: Lower starting dosage to 2.5 mg; daily maximum dose to 10 mg
- Children and adolescents six years of age or older: 2.5 to 5 mg once day; up to a maximum of 5 mg daily

Figure 6 Metoprolol ODT (20mg)

4.3 Anti emetics

Antiemetic medications are those that counteract the effects of emetics. A demanding test for antiemetics is provided by cisplatin. This representative at All people find high dosages to be emetic (if anti-emetics are not provided), and patients often encounter five or more instances of vomiting.

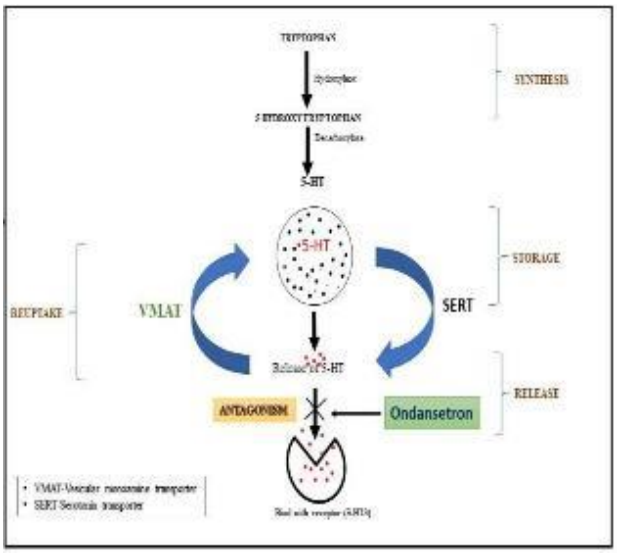
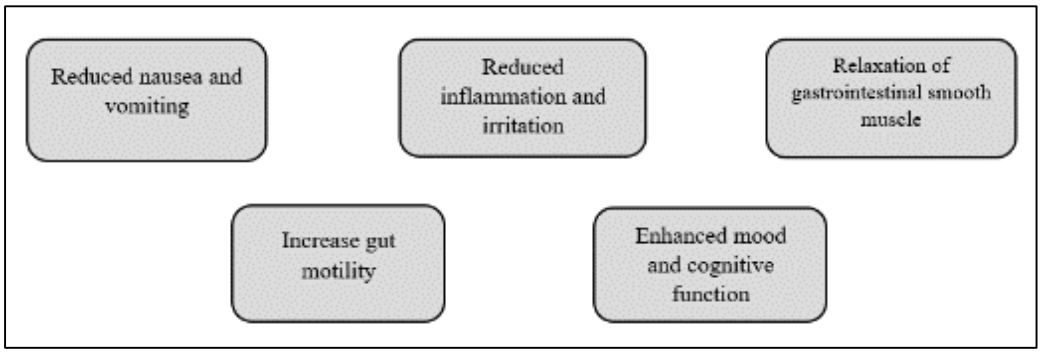


Figure 7 Mechanism of emetics

4.3.1.1 Uses of Anti Emetics



Let's take Ondansetron as an example of an anti-emetic drug:-

4.3.1.2 Indications

- Prevention and treatment of nausea and vomiting caused by chemotherapy, radiation therapy, and surgery
- Treatment of postoperative nausea and vomiting

4.3.1.3 Mechanism of Action

- Selectively blocks the action of serotonin (5-HT3) at receptor sites in the vague nerve and central nervous system
- Reduces the stimulation of the vomiting centre in the brain

4.3.1.4 Pharmacokinetics

- Oral bioavailability: 50-60%
- Peak plasma concentration: 1.5-2 hours
- Elimination half-life: 3-4 hours

4.3.1.5 Dosage and Administration

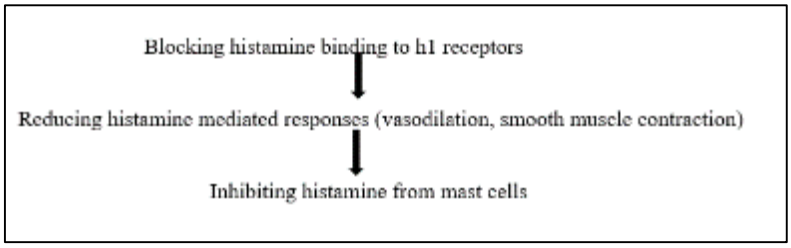
- Oral: 8 mg every 8 hours, as needed
- IV: 4-8 mg every 4 hours, as needed

Figure 8 Ondansetron ODT

4.4 Anti-histamine

A class of pharmaceuticals known as antihistamines is used to treat disorders mediated by histamines. The H-1 and H-2 classes of histamine receptors are the two primary subclasses. H-1 receptor-binding antihistamine medications are typically used to treat allergic rhinitis and allergies. Overproduction of stomach acid can result in upper gastrointestinal disorders that can be treated with medications that bind to H-2 receptors. In order to provide members of an interprofessional team overseeing the care of patients with conditions that respond to histamine receptor blockade with the essential information they need, this activity reviews the indications, contraindications, activity, adverse events, and other crucial aspects of antihistamine therapy in the clinical setting.

Mechanism of anti-histamine:



Example: Class: First-generation antihistamine

Mechanism: Blocks H1 receptors, reducing histamine's effects

Indications:

- Allergic reactions (hives, itching, swelling)
- Insomnia (sleep aid)

Effects:

- Relieves itching, redness, and swelling
- Sedates and induces sleep

Dosage: - Adults: 25-50 mg every 4-6 hours (max 300 mg/day) - Children: 12.5-25 mg every 4-6 hours (max 150 mg/day)

Figure 9 Diphenhydramine tablet 25mg

5 Conclusions

The acceptance of mouth dissolving tablets is rapidly increasing as it provides several advantages to the patients and resolve the problems of swallowing the big tablets in cases of paediatric patients as well as in geriatric patients. The formulation techniques are so much convenient as well as it requires a small amount of API to formulate it. As it disintegrates rapidly in the mouth, the absorption and bioavailability of those tablets rise rapidly. Hence it can improve the therapeutic effect in patients. MDTs can readily absorb through the buccal cavity or the mucosal membrane of the mouth. It is most suitable for children or elderly patients who have been suffering from swallowing problems. So, the future prospects of MDTs must be bright as patients demand increases.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1] Hirani J, Rathod D, Vidalia K. Orally disintegrating tablets. Tropical Journal of Pharmaceutical Research 2009; 8(2):161-172.

[2] Olmez SS, Vural I. Advantages and quality control of disintegrating tablets. FABAD Journal of Pharmaceutical Sciences 2009;34 (1):167-172.

[3] Kawano Y, Ito A, Sasatsu M, Machida Y. Preparation of orally disintegrating tablets with taste-masking function: masking effect in granules prepared with correctives using the dry granulation method and evaluation of tablets prepared using the taste-masked granules. Yakugaku Zasshi 2010;130(1):81-86.

[4] Panigrahi R, Behera SP, Panda CS. A review on fast dissolving tablets. Webmed Central Pharmaceutical Sciences 2010;1(11):1-16.

[5] Douroumis DD, Gryczke A, Schminke S. Development and evaluation of cetirizine hcl taste-masked oral disintegrating tablets. American Association of Pharmaceutical Scientists PharmSciTech 2011;12(1):141-151.

[6] Shyamala B, Narmada GY, Rapid dissolving tablets: A novel dosage form. The Indian pharmacist 2002;13(8):9-12

[7] Cantor S. L., Khan M. A., Gupta A. Development and optimization of taste-masked orally disintegrating tablets (ODTs) of clindamycin hydrochloride. Drug Development and Industrial Pharmacy . 2015;41(7):1156–1164. doi: 10.3109/03639045.2014.935392. [PubMed] [CrossRef] [Google Scholar]

[8] Gupta S., Saquib Hasnain M., Agarwal S. Formulation and evaluation of oral disintegrating tablets of itopride hydrochloride using ion exchange resins as drug carrier. Asian Journal of Pharmaceutical Sciences . 2012;7(3) [Google Scholar]

[9] Neeta, Dureja H, Bhagwan H, Dahiya S. Fast dissolving tablet: An overview. Novel Science nternational Journal of Pharmaceutical Science 2012;1(5):228-232

[10] Doenicke A., Melchart D., Bayliss E. Effective improvement of symptoms in patients with acute migraine by GR43175 administered in dispersible tablets. Cephalalgia . 1989;9:89–92. [PubMed] [Google Scholar] [Ref list]

[11] Sastry SV, Nyshdham JR, Fix JA. Recent technological advances in oral drug delivery: A review. Pharmaceutical Science and Technology Today, 2000; 3: 138-45.

[12] Brown D. Orally disintegrating tablets-taste over speed. Drug Delivery Technology 2003;3(6):58-61.

[13] Pilgaonkar P, Rustomjee M, Gandhi A, Badge PM. Orally disintegrating tablets. United States Patent. 2009.

[14] Shukla D, Chakarborty S. Mouth dissolving tablets: An overview of formulation technology. Scientia Pharmaceutica 2009;77 (2):309-326.

[15] Kumare MM, Marathe RP, Kawade RM, Ghante MH, Shendarkar GR. Design of fast dissolving tablet of atenolol using novel co-processed superdisintegrant. Asian Journal of Pharmaceutical and Clinical Research 2013;6 (3):81-85.

[16] Bradoo R. (2001). Fast dissolving drug delivery systems, JAMA, 4 (10): 27-31.

[17] Kuchekar B. S., Badhan C. and Mahajan H. S. (2003). Mouth dissolving tablets: A novel drug delivery system, Pharma Times, 35:7-9.

[18] Habib W, Khankari R, Hontz J. Fast dissolving drug delivery system. Critical Reviews in Therapeutic Drug Carrier Systems 2000; 17(1):61-72.

[19] Behnke K, Sogaard J, Martin S, Bauml J, Ravindran AV, Agren H, et al. Mirtazapine orally disintegrating tablet versus sertraline: a prospective onset of action study. Journal of Clinical Psychopharmacology 2003;23(4):358-364.

[20] Gafiţanu E, Dumistracel I, Antochi S. Formulations and bioavailability of propyphenazone in lyophilized tablets. Revista Medico-chirurgicala a Societatii De Medici Si Naturalisti Din Iasi 1991;95(1-2):127-128

[21] Parkash V, Maan S, Deepika, Yadav S, Hemlata, Jogpal V. Fast disintegrating tablets: Opportunity in drug delivery system. J Adv Pharm Technol Res.2011;2(4):223-225

[22] Arun A, Amrish C. Fast Drug Delivery Systems: A Review. Der Pharm Lett. 2010;2(2):350–61.

[23] Gupta AK, Mittal A, Jha PKK. Fast Dissolving Tablet - A Review. Pharma Innov. 2012;1(1):1–7.

[24] Pahwa R, Gupta N. Superdisintegrants in the Development of Orally Disintegrating Tablets: A Review. Int J Pharm Sci Res. 2011;2(11):2767–80

[25] Roy D, Bhowmik D, Kumar KPS. A comprehensive review on superdisintegrants used in orodispersible tablets. Indian J Res Pharm Biotechnol. 2014;5674(August):1297–303.

[26] Moreno Raja M, Lim PQ, Wong YS, Xiong GM, Zhang Y, Venkatraman S. Polymeric Nanomaterials. In: Nanocarriers for Drug Delivery. Elsevier; 2019. p. 557–653.

[27] Desai PM, Liew CV, Heng PWS. Review of Disintegrants and the Disintegration Phenomena. Vol. 105, Journal of Pharmaceutical Sciences. Elsevier B.V.; 2016. p. 2545–55.

[28] Viswanathan P, Muralidaran Y, Ragavan G. Challenges in oral drug delivery: A nano-based strategy to overcome. In: Nanostructures for Oral Medicine. Elsevier Inc.; 2017. p. 173–201.

[29] Schmidt AG, Wartewig S, Picker KM. Polyethylene oxides: Protection potential against polmorphic transitions of drugs? J Raman Spectrosc. 2004 May;35(5):360–367.

[30] Badgujar BP, Mundada AS. The technologies used for developing orally disintegrating tablets: A review. Acta Pharm. 2011;61(2):117–39.

[31] Rasetti-Escargueil C, Grangé V. Pharmacokinetic profiles of two tablet formulations of piroxicam. Int J Pharm. 2005 May 13;295(1–2):129–34.

[32] Osamura T, Takeuchi Y, Onodera R, Kitamura M, Takahashi Y, Tahara K, et al. Formulation design of granules prepared by wet granulation method using a multi-functional single-punch tablet press to avoid tableting failures. Asian J Pharm Sci. 2018;13(2):113–119.

[33] Sharma D, Singh M, Kumar D, Singh G. Novel Paradigms in Mucoadhesive Drug Delivery System. Int J Pharm Sci Res. 2012;3(08):2455–71.

[34] Siddiqui N, Garg G, Sharma PK. Fast dissolving tablets: Preparation, characterization and evaluation: An overview. Int J Pharm Sci Rev Res. 2010;4(2):87–96

[35] Advankar A, Maheshwari R, Tambe V, Todke P, Raval N, Kapoor D, et al. Specialized tablets: Ancient history to modern developments. In: Drug Delivery Systems. Elsevier; 2019. p. 615–64.

[36] De Focatiis DSA. Tooling for near net-shape compression moulding of polymer specimens. Polym Test. 2012 Jun 1;31(4):550–556

[37] Shan N, Zaworotko MJ. The role of cocrystals in pharmaceutical science. Vol. 13, Drug Discovery Today. 2008. p. 440–446.

[38] Choudhary PD, Pawar HA. Recently Investigated Natural Gums and Mucilages as Pharmaceutical Excipients: An Overview. J Pharm. 2014 Apr 7; 2014:1–9

[39] Gurav JL, Jung IK, Park HH, Kang ES, Nadargi DY. Silica aerogel: Synthesis and applications. J Nanomater. 2010; 1–11.

[40] Chawla G, Nitin J. Mouth Dissolving Tablets: An Overview. Int J Pharm Sci Res. 2012;3(09):2919–25.

[41] Mirrasekhian E, Nilsson JLA, Shionoya K, Blomgren A, Zygmunt PM, Engblom D. The Antipyretic Effect of Paracetamol Occurs Independent of Transient Receptor Potential Ankyrin 1–Mediated Hypothermia and Is Associated with Prostaglandin Inhibition in The Brain. FASEB J. 2018;32(10):5751–9.

[42] Rajasthan J, Sharma SK, Rajasthan J, Consideration B. Fast Dissolving Tablets：Method and Technology Review. Adv Res Pharm Biol. 2013;3(Iv):487–93.

[43] Datta N, Pal M, Roy U, Mitra R, Pradhan A. Orodispersible Tablets: A Systematic Review. World J Pharm Res. 2014;13(April):152–165.

[44] Yadav G, Kapoor A, Bhargava S. Fast Dissolving Tablets Recent Advantages: A Review. Int J Pharm Sci Res. 2012;3(03):728–36.

[45] Gorthi KR. Quantitative Analysis of Acetaminophen in Nuromol Tabletsby High Pressure Liquid Chromatography. Indian Journal of Research in Pharmacy and Biotechnology. 2013;1–8.

[46] Lindgren S, Janzon L. Dysphagia; Prevalence of swallowing complaints and clinical findings. Medical clinics of North America, 1993; 77: 3-5

[47] Deshpande RD, Gowda DV, Mahammed N, Maramwar DN. Bi-layer tablets-an emerging trend: A review. Int J Pharm Sci Res 2011; 2:2534.

[48] Kumar AH, Kavitha K, Kumar SA, Kumar MR, Singh SD. Novel approach of bilayer tablet technology-a review. Int J Pharm Chem Biol Sci 2013 ; 3:887-93.

[49] Gupta AK, Mittal A, Jha KK. Fast dissolving tablet-a review. J Pharm Innov 2012; 1:1-8

[50] Manivannan R. Oral disintegrating tablets: A future compaction. Drug Invent Today 2009; 1:61-5.

[51] Mangal M, Thakral S, Goswami M, Thakur N. Comparison study between various reported disintegrating methods for fast dissolving tablets. Afr J Basic Appl Sci 2012; 4:106-9.