Orodispersible Tablets: An Innovative Drug Delivery System

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Abstract- Oral medicine administration is still the most common and useful method. However, conventional pills and capsules are problematic for young, old, and dysphasic people who have difficulty ingesting solid dosage forms. Good dissolving Orodispersible tablets (ODTs) have attracted a lot of interest as a cutting-edge method of delivering drugs that quickly dissolve in the mouth without the need for water, improving patient compliance and treatment effectiveness. Wallowing solid dosage forms. Fast-dissolving Orodispersible tablets, or ODTs, have garnered a lot of attention as a novel drug delivery technique that dissolves rapidly in the mouth. The most popular form of preparation is compression. ODT is a useful medicine delivery strategy for both geriatric and pediatric patients since it tackles the problem of dysphagia ODTs ameliorate bioavailability by avoiding first- pass metabolism and furnishing a briskly onset of action.

Keywords: Orodispersible tablets, bioavailability, Mechanism of disintegration etc

I. INTRODUCTION

Oro-dispersible tablets (ODTs), which dissolve quickly, have revolutionized pharmaceutical science.[1] which provide a practical substitute for traditional solid dosage forms.[2] ODTs are particularly beneficial for individuals with dysphagia, including children, older adults, and those who are bedridden.[3]they are designed to dissolve rapidly in the mouth, eliminating the requirement for water intake.[4] oro-dispersible drug delivery systems are innovative methods of delivering medication that dissolve in the mouth without the need for water or chewing.[5] provide instant release, improve bioavailability, and improve patient complain The terms orodispersible tablets, rapid disintegrating tablets, mouth dissolving tablets, fast disintegrating tablets, rapid dissolving tablets.[6]porous tablets, and rapid melts are other names for The European Pharmacopoeia characterizes orodispersible tablets.[7] those that dissolve quickly in the mouth within three minutes before being swallowed.[8]According to the US definition, they are described as a solid dosage form that contains a medicinal substance or active ingredient, which disintegrates swiftly, typically within seconds, when placed on the tongue Food and Drug Administration defines ODT. ODT disintegration times typically vary from a few seconds to over a minute.[9]

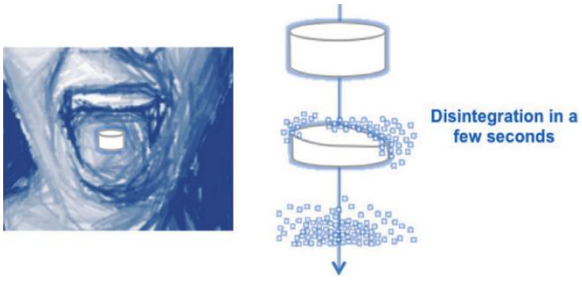

Fig.No.1 Orodispersible Tablet

Ideal properties of Oro-dispersible tablet

- It should dissolve or break down in saliva or the mouth in a matter of seconds.
- It should be able to hide flavour in a way that is acceptable.[10]
- It should leave no residue in mouth after the disintegration.
- It need to show minimal susceptibility to environmental factors, such as humidity and temperature.[11]

Selection criteria of ODTs

- should function without the need for water or any other liquid.
- It should be able to hide flavor in a way that is acceptable.[12]

- It should be insensitive to temperature and humidity, and it should dissolve completely without leaving any behind in the mouth
- Increased speed of medication absorption from the mouth, throat, and esophagus which are pre-gastric areas[13] .

Advantages of Orodispersible tablet

- Quick Disintegration and Drug Release: Conditions that need urgent relief benefit from faster dissolution since it causes a quicker beginning of action.[15]
- Better Stability Compared to Liquids: Provides a simpler substitute for syrups with extended shelf life and more precise dosing.[16]
- No Water Needed: This makes it more convenient for patients who are travelling or in places with inadequate water supplies.[17]
- By permitting partial absorption through the oral mucosa, it improves bioavailability and circumvents first-pass metabolism.[18]
- Decreased Choking Risk: Removes the risk of swallowing issues brought on by traditional solid dose forms.[19]
- No water is needed. Reduced metabolism of the first pass.
- Reduced metabolism of the first pass.[20]

Disadvantages of Orodispersible Tablet

- Limited drug weight Not suitable for drugs taking high pilules.
- Taste Masking Challenges Bitter drugs bear fresh seasoning and coating ways to enhance patient acceptability [21].
- Moisture perceptivity High vulnerability to humidity necessitates specialized packaging paraphernalia
- Mechanical Strength Issues ODTs are generally fragile and bear optimization to balance corruption and durability.[22]
- Advanced product Costs Specialized excipients and manufacturing processes increase costs compared to conventional tablets.
- Shorter Shelf Life May bear stabilizers to maintain integrity and effectiveness.[23]

Mechanism of action of Orodispersible Tablet:

- Orodispersible tablet unique shape, Orodispersible tablets dissolve quickly in the mouth without the need for water. The way they separate (disintegrate) and release the medication for absorption primarily determines The mechanism of action[24]
- The Orodispersible tablet contains both disintegrating agents and the medication's fast-dissolving granules. The oral dispersible tablets' dissolving ingredients swell and create salivary channels when oral saliva comes into contact with them.[25]

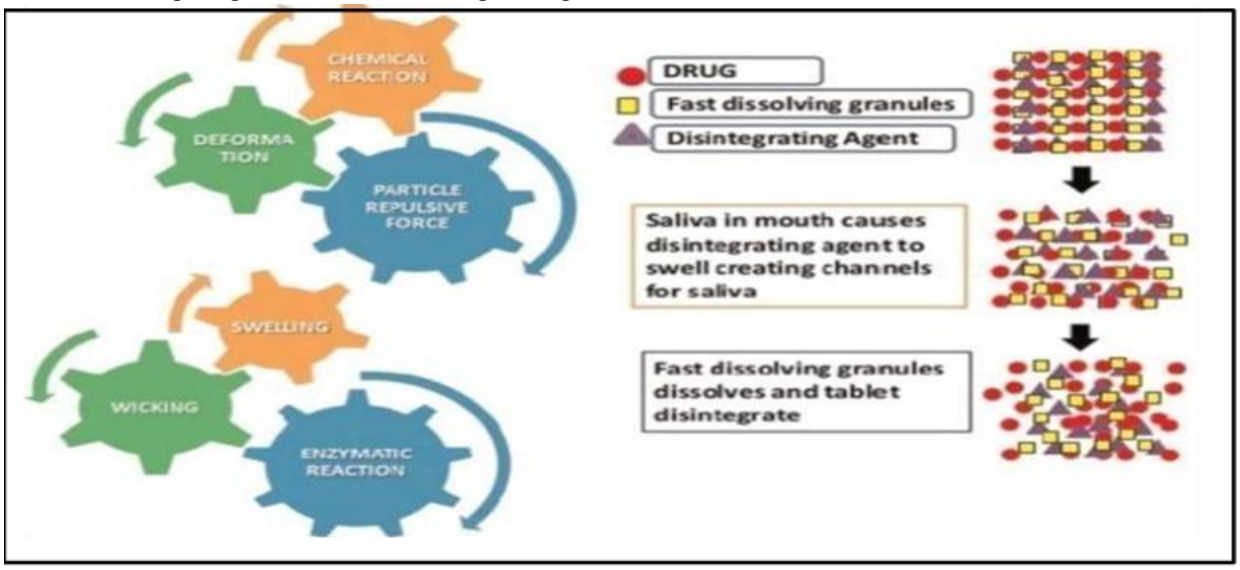

Fig. No. 2 Mechanism ODT

Preparation Methods for Fast-Dissolving Or dispersible Tablets (ODTs)

Several techniques are used for the formulation of ODTs, each designed to achieve rapid disintegration, improved mechanical strength, and enhanced bioavailability. Below are some of the widely used preparation methods.[26]

Direct Compression Method

Principle: This method eliminates the requirement for a granulation phase by blending the medicine and excipients and then compressing the mixture into a tablet.[27]

Process:

1. Mix the active pharmaceutical ingredient (API) with suitable excipients such as binders, diluents, sweeteners, and super disintegrants.
2. Ensure uniform blending to achieve homogeneity.
3. Compress the mixture into tablets using a tablet compression machine.
4. Evaluate the tablets for various parameters such as hardness, disintegration time, friability, and weight variation.[28]

Wet Granulation Method

Principle: Before compression, a binder solution is added to create granules.

Advantages: enhances mechanical strength and flow characteristics.[29]

Process:

1.Excipients and the drug are combined.
2.To create granules, a binder solution (PVP, HPMC) is applied.
3. Granules are compacted into tablets after being dried and sieved.

Limitation: requires more drying processes, which lengthens the processing time[30]

Freeze-Drying (Lyophilization) Method

Principle: The process of freeze-drying a medication suspension or solution create. [31]

Tablets are formed by snap- drying a medicine result or suspension.

Advantages Produces largely pervious tablets that dissolve snappily.

Process

1) A result or suspense of the medicine and excipients is set
2) The admixture is poured into molds and firmed
3) The firmed mass undergoes lyophilization (junking of water by sublimation).
4) The tablets are packaged incontinently to help humidity immersion.

Limitation: Precious, requires special outfit, and has poor mechanical strength.

Sublimation Method

Principle: To create a porous structure, a volatile substance (such as camphor or ammonium bicarbonate) is applied and then sublimated out.

Advantages: increases disintegration speed and porosity. [35]

Process:

1. The medication and volatile ingredients are combined to create a combination.
2.Tablets are compressed and heated under vacuum, a process known as sublimation.
3. The tablet structure has holes left by the volatile agent's evaporation.

Limitation: requires that volatile compounds be handled carefully.[36]

Spray Drying Method

Principle: To create powders, a solution comprising the medication and excipients is sprayed and quickly dried.

Advantages: relates pills that dissolve quickly and are extremely porous.[37]

Process:

1. A solvent is used to dissolve the medication, bulking agents, and disintegrates.
2. A drying chamber is sprayed with the solution.
3. After drying, the powder is gathered and formed into tablets.

Advantages:

Expensive and susceptible to heat-induced Drug breakdown.[38]

Mass Extrusion Method:

Principle:

A) solvent is used to soften the medicine and excipients before they are extruded into cylindrical shapes and then cut into tablets.

Advantages: include consistent dosing and good taste masking.[39]

Process:
1. A water-miscible solvent, such as polyethylene glycol, is combined with the medication.
2. A tiny hole is used to extrude the mixture.
3. The extradites are dried after being cut into tablets.[40]

Advantages: A complicated procedure that calls for specific tools.
Process:
1. A water-miscible solvent, such as polyethylene glycol, is combined with the medication.
2. A tiny hole is used to extrude the mixture.
3. The extradites are dried after being cut into tablets.[41]
B) Advantages:

A complicated procedure that calls for specific tools.
Cotton Candy (Floss) Method
Principals: he idea is to use flash heat processing to create a structure that dissolves quickly, resembling cotton candy.
Advantages: offers a lovely mouthfeel and quick breakdown.[42]

Process:
1) A fibrous matrix is created by processing saccharide, such as mannitol or sucrose.
2)The Fibers incorporate the medication.
3) Tablets are formed by compressing the matrix .[43]

Limitation: requires expensive manufacturing and specialized equipment.
Melt Granulation Method
Principle: forms granules without the use of solvents or water by employing low-melting binder.
Advantages: solvent-free, increases the stability of the medication.
Process:
1) The medication and excipients are combined with a low-melting binder (such as glyceryl or PEG) behenate.
2) The binder melts when the mixture is heated.
3) After cooling, the melted mixture is granulated into homogeneous particles.
4) Compression is used to make tablet

Limitation: need excipients that are sensitive to heat [44]

Table 1. Comparison of Different Methods:

Method	Porosity	Mechanical Strength	Cost	Disintegration Speed
Direct Compression	Low	High	Low	Moderate
Wet Granulation	Low	High	Medium	Moderate
Freeze-Drying	High	Low	High	Very Fast
Sublimation	High	Moderate	Medium	Fast
Spray Drying	High	Moderate	High	Very Fast
Mass Extrusion	Low	High	High	Moderate
Cotton Candy Method	High	Low	Very High	Very Fast
Melt Granulation	Moderate	High	Medium	Moderate

II. CONCLUSION

Orodispersible tablets (ODTs) have surfaced as an innovative and patient-friendly lozenge form that offers rapid decomposition in the oral depression without the need for water. This unique point makes them largely suitable for pediatric, senior, and dysphagic cases, icing better case compliance and convenience. Through colorful expression approaches similar as direct contraction, snap drying, and molding, ODTs can achieve desirable mechanical strength, fast decomposition, and bettered bioavailability. also, advances in excipient technology and taste- masking ways have further enhanced their adequacy and effectiveness.
Overall, ODTs represent a major step forward in oral medicine delivery systems. Their fast onset of action, ease of administration, and bettered remedial effectiveness make them a promising lozenge form for present and unborn medicinal operations. Continued exploration and development will really lead to indeed more effective and patient- centric phrasings

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