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Review article

A REVIEW OF DIFFERENT SOLID DISPERSION TECHNIQUE USED IN FAST DISSOLVING TABLETS.

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ABSTRACT

A never-ending challenge in the pharmaceutical industry is the low solubility of maximum drugs. Various technologies have been developed to overcome this problem, but none seem promising. Solid dispersions have attracted significant interest as an effective way to improve the dissolution rate, and hence the bioavailability, of a number of poorly water-soluble drugs. In order to improve the dissolution of poorly water-soluble drugs and thereby increase their bioavailability, the dispersion of one or more active pharmaceutical ingredients in a solid carrier is used. This process is therefore referred to as solid dispersion. One of the most challenging aspects of formulation development is the solubility behavior of a drug. Solid dispersions prepared by various methods can be used as compared to conventional formulations such as tablets or capsules, which have many advantages over the above conventional dosage form. The most common problem with the conventional dosage form is swallowing difficulties. Therefore, we are developing a new approach in a traditional dosage form, namely a fast-dissolving tablet. Fast-dissolving tablets have the advantage that they quickly dissolve in saliva without water. The faster the drug breaks down or dissolves, the faster it will be absorbed and the faster the therapeutic effect of the drug will be achieved. Advances in this area allow for the development of an economical and better way to treat disease while avoiding many of the problems associated with other delivery systems. This review highlights the manufacturing process, properties, mechanisms, and evaluation of drugs.

Key Words:-Solid dispersion, Fast dissolving tablets, Method of preparation, Carriers, Evaluation, Marketed formulation.

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INTRODUCTION

In modern drug discovery processes, a drug with low water solubility will generally exhibit dissolution rate limited absorption, and a drug with low membrane permeability will generally exhibit permeation rate limited absorption. Therefore, two areas of pharmaceutical research focused on improving the oral bioavailability of drugs include improving the solubility and dissolution rate of poorly water-soluble drugs, and improving the permeability of poorly permeable drugs. The main ways to improve resolution are to increase the available surface area. For dissolution by reducing the particle size of the solid compound and/or optimising the wetting properties of the surface of the compound, for reducing the thickness of the boundary layer, for creating good dissolution conditions and finally and mainly for improving the apparent solubility of the drug under physiologically relevant conditions[1]. The formation of solid dispersions as a viable method to improve the bioavailability of poorly water-soluble drugs has overcome the limitations of previous approaches such as salinity, co-solvent solubilization, and particle size reduction.

In solid dispersions, some of the drug immediately dissolves to saturate the fluid of the gastrointestinal tract, and excess drug precipitates as very fine colloidal particles or submicron oily globules. The solid state dispersion technique was originally

demonstrated by Sekiguchi and Obi. They proposed the faster absorption of poorly water-soluble drugs such as sulfathiazole through the formation of a eutectic mixture with a water-soluble and physiologically inert carrier such as urea[2]. The basic principle involved in improving low drug solubility with a solid dispersion involves the complete elimination of the crystal structure of the drug and its molecular dispersion in a hydrophilic polymer carrier. When the solid dispersion is exposed to an aqueous medium, the carrier dissolves and the drug is finely released as well colloidal particles. This increases the surface area, the rate of dissolution and thus the bioavailability of poorly water-soluble active ingredients. The drug in a soluble hydrophilic carrier improves the rate of dissolution by reducing particle size and increasing particle porosity. Therefore, by improving the release profile of these drugs, it is possible to increase their bioavailability and reduce side effects[1].

Oral passage of drug administration for the disease is measured as the most conventional route. The tablet is a galenic form that is widely prescribed for its accessibility in terms of self-administration, solidity and ease of development. However, geriatric, pediatric, and mentally ill patients have difficulty swallowing conventional pills, leading to poor patient compliance[3]. To overcome these problems, scientists have developed an innovative drug delivery system known as fast-dissolving tablets.

FDT technology that allows the tablets to dissolve or disintegrate in the mouth without adding extra water. The FDA defined fast dissolving tablet formulation as "solid dosage form having the medicinal substances that dissolve rapidly within seconds of time, when placed on the tongue[4]". According to the European Pharmacopoeia (EU), "Fast Dissolving Tablets should dissolve in less than three minutes [5,6]. Fast dissolving tablets are also called oral dissolving tablets, orodispersible tablets, orodispersible tablets, rapimelts, porous tablets, fast dissolving tablets, etc. They release the drug into the saliva on the tongue. Fast dissolving tablets are rapidly dissolved or disintegrated through the use of super disintegrants[7].

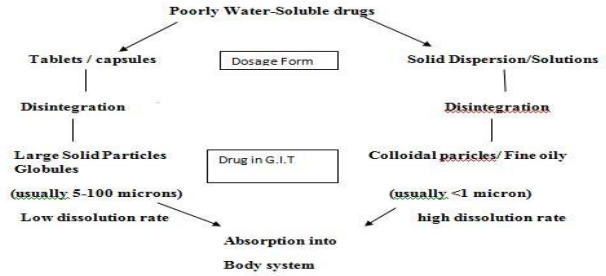

Fig 1: schematic representation of poorly water-soluble drugs

Solid dispersion

The solid dispersion method is the dispersion of one or more active ingredients that are hydrophobic in nature in an inert carrier that is hydrophilic in the solid state prepared by the solvent melting method. The product thus formed contains various components, i.e., a hydrophilic matrix and a hydrophobic drug [8].

Advantages of solid dispersion [2,6,9]

The solid dispersion method is useful to improve the solubility and bioavailability of poorly water-soluble drugs.

- ❖ It is easier to create and more usable.
- ❖ This results in an increase in the extent and rate of absorption of a drug, hence a rapid rate of dissolution.
- ❖ Conversion of the liquid form of the drug into a solid form.
- ❖ Controlling various parameters such as molecular weight, composition, particle porosity and wet ability can improve the bioavailability of poorly water-soluble drugs.
- ❖ It is easier to make fast disintegrating oral tablets by solid dispersion.
- ❖ It is used to improve the porosity of the drug.

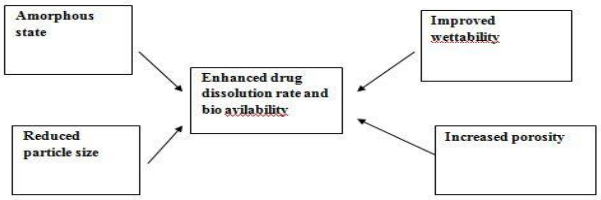

Fig 2: Advantage of Solid Dispersion

Disadvantage of solid dispersion [2,6,9]

- ❖ It results in incorrect scaling for crafting purposes.
- ❖ Polymers used in solid dispersion can absorb moisture and cause phase separation, crystal formation and convert an amorphous form to a crystalline form. Thus, this leads to a decrease in solubility and dissolution rate.
- ❖ It is a tedious preparation technique.
- ❖ It leads to the reproducibility of the physico-chemical properties.

Crystalline Particles	Amorphous Particles	Molecularity Dispersed
Type I &IV	Type II&V	Type III & VI

Fig:3 Schematic Representation of Three Modes of Incorporation of the Drug In A Solid Dispersion

Classification of solid dispersion

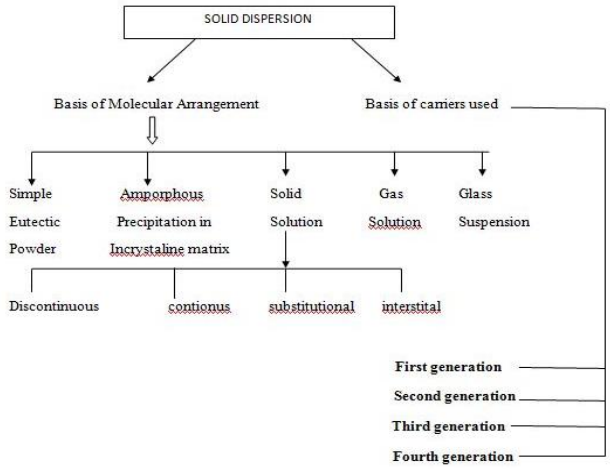

Fig 4: Classification of Solid Dispersion

Eutectic mixtures

A eutectic mixture consists of two compounds in which the two compounds are completely dissolved in the liquid state, but only to a very limited extent in the solid state. These mixtures are usually prepared by the melt technique. When this mixture is exposed to water, the miscible carrier dissolves, leaving the drug in a microcrystalline state in which it rapidly dissolves. The increase in surface area is responsible for the increase in the dissolution rate. Examples of this type of mixture include phenacetin, Phenobarbital, chloramphenicol-urea, griseofulvin-succinic acid and paracetamol-urea.

Solid solution

This type primarily involves a solid that is dissolved in a solid solvent. The size of the drug particles in a solid solution is reduced to its molecular size. Solid solutions are compared to liquid solutions in which they consist of only one phase, regardless of the number of components. They are prepared by solvent evaporation. In this, the solute and carrier are dissolved in a common solvent that is volatile, such as alcohol. A solid solution differs from a eutectic mixture in that the drug precipitates in an amorphous form in a solid dispersion, whereas in the case of a crystalline form, the eutectic. Solid solutions are generally classified by the degree of solubility between the two components or by the crystalline structure of the solution.

Glassy solution

It is a homogeneous system in which a glass or glass support solubilizes drug molecules in its matrix. The glassy or vitreous state is usually achieved by abrupt cooling of the melt. Below the glass transition temperature, it becomes transparent and brittle and can therefore be characterized. It gradually softens when heated without having a sharp melting point.

Composite or complex creation

This system is a complexation of two components in a binary system during the preparation of a solid dispersion. The rate of dissolution and gastrointestinal absorption is increased by the formation of a soluble complex with a low association constant.

Amorphous precipitate

It is believed to have a greater tendency to solidify in an amorphous form in the presence of a carrier drug that is subjected to supercooling. It is similar when compared to simple eutectic mixtures, but the only difference is that the drug precipitates in amorphous form (while in simple eutectic mixtures, the drug precipitates in a crystalline form). eg. precipitation of sulfathiazole in crystalline urea.

Supercritical fluid recrystallization

The application of supercritical fluid processes, which is a new nanoscale and solubilization technology, has increased in recent years due to particle size reduction. Supercritical fluids, such as carbonaceous liquids, whose temperature and pressure are above their critical temperature (Tc) and pressure (Tp) allow them to assume both liquid and gaseous properties.

Spray freezing into liquid

It is an atomization process in which an aqueous, organic, aqueous-organic co-solvent solution, aqueous-organic emulsion containing drugs and pharmaceutical excipients is directly injected into a compressed gas (e.g. CO2, helium, propane, ethane) or a liquid cryogenic (i.e. nitrogen, argon or hydrofluoroether).

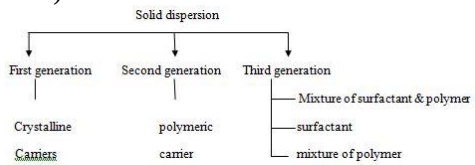

Fig 5: Classification of SD Based on Carrier

First generation solid dispersion

They are made using crystalline supports. Urea and sugar were the first crystalline carriers used in the preparation of solid dispersions. These have the disadvantage of being thermodynamically unstable and not releasing the drug faster.

Second generation solid dispersion

They are made using amorphous supports instead of crystalline supports. The drug was dispersed in the polymer carrier.

Synthetic polymers - povidone, polyethylene glycols and polymethacrylates.

Natural polymers - hydroxypropyl methyl cellulose, ethyl cellulose, starch derivatives such as cyclodextrin.

Third generation solid dispersion

These are the mixture of amorphous polymers and surfactants as carriers. These achieve the highest bioavailability for poorly soluble active ingredients.
E.g.: inulin, poloxamer 407.

Carriers used in solid dispersion

Carriers	Examples
Sugars	Dextrose, sucrose, lactose
Acids	Citric acids, succinic acids
Polymeric materials	Povidone, polyethylene glycol, methyl cellulose, hydroxyl ethyle
Surfactants	Polyoxethylene stearate, poloxamer 188, tweens, spans
Miscellaneous	Urea, urethans, hydroxyalkylxanthins

Table 1. Carriers and Examples Used In Solid Dispersion

Method of preparation

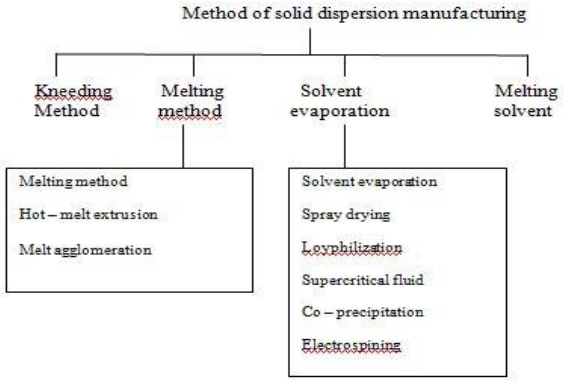

Fig 6. Method of Prepration of Solid Dispersion

Kneading technique

In this process, the drug and carrier is soaked in water and made into a paste. The drug and the carrier paste were added and kneaded for a specific time. The kneaded mixture is then dried and, if necessary, sieved. [1,10]

Melting method

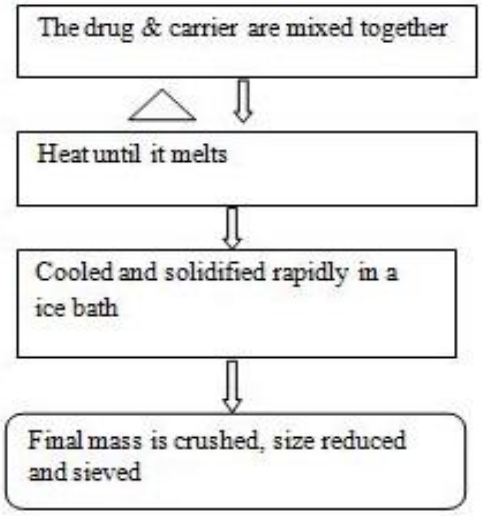

Fig 7. Schematic Representation of Melting Method

Example: - A solid dispersion of urea and albendazole was prepared by this method.

Hot stage extrusion

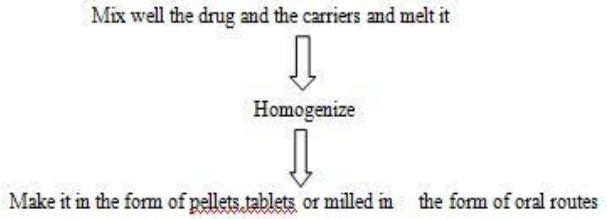

Fig 8. Schematic Representation of Hot Stage Extrusion

Solvent evaporation method

This method involves solubilizing both the drug and the carrier in a volatile solvent which is then evaporated. With this method, we can prevent the thermal decomposition of drugs and excipients because the evaporation of the organic solvent occurs at low temperatures. This involves dissolving the drug and polymer carrier in a typical solvent such as ethanol, chloroform or a combination of ethanol and dichloromethane, and the resulting films can then be milled and ground.

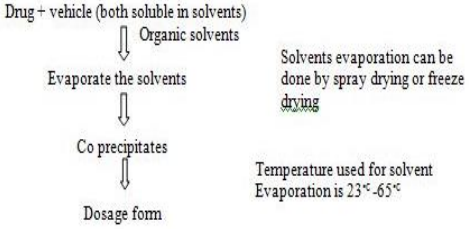

Fig 10. Schematic Representation of Solvent Evaporation Method

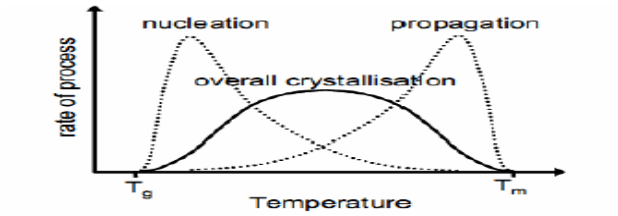

Fig 11. Overall Crystallization Rate as A Function of Temperature. Tg is the glass transition temperature and Tm is the melting temperature. Adapted from Overall crystallization rate as a function of temperature. Tg is the glass transition temperature and Tm is the melting temperature. [11]

The second challenge of the solvent method is to prevent phase separation, e.g. crystallization of drug or matrix after removal of solvent(s). High temperature drying speeds up the process and shortens the time available for phase separation. On the other hand, the molecular mobility of the active ingredient and matrix decreases at high temperatures remains high and promotes phase separation (e.g. crystallization).

Spray Freezing

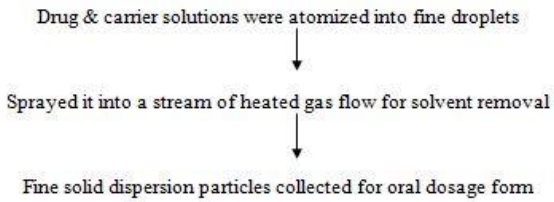

Fig12. Schematic Representation of Spray Freezing

Meltex TM

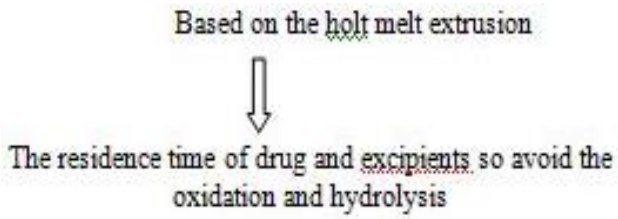

Fig 9. Schematic Representation of MELTEX TM

Melt Agglomeration Technique

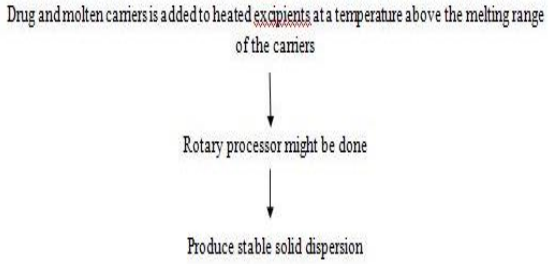

Fig 13. Schematic Representation of Melt Agglomeration Technique

Co-precipitation method

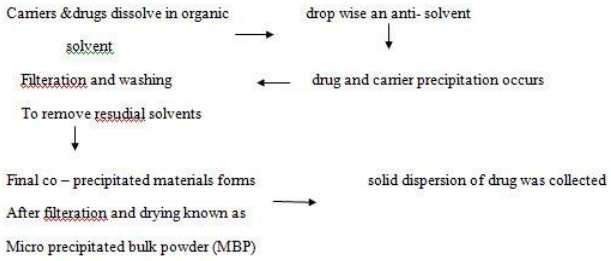

Fig 14. Schematic representation of Co-precipitation method

Supercritical fluid methods

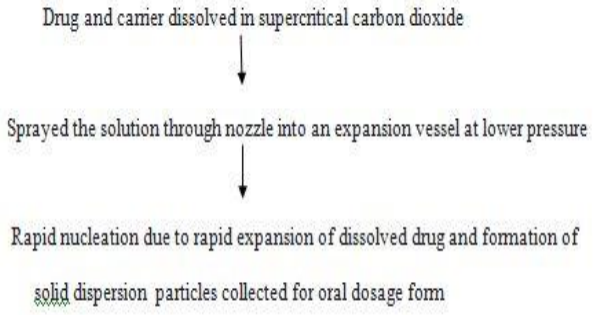

Fig 15. Schematic representation of Supercritical fluid methods

Electrostatic Spinning

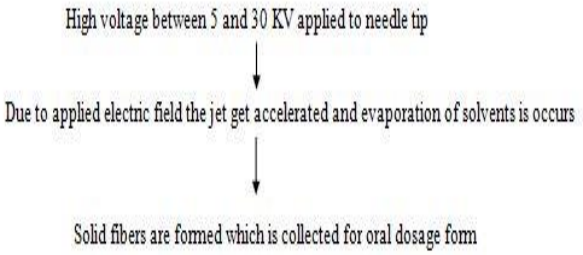

Fig 16. Schematic Representation of Electrostatic Spinning

Characterization of solid dispersion

Drug and carrier miscibility	Hot stage microscopy Differential scanning calorimetry Powder X-ray diffraction NMR 1H Spin lattice relaxation time
Interactions between drug	Raman spectroscopy Solid state NMR

and carrier	FT-IR spectroscopy
Amorphous content	Polarised light optical microscopy Hot stage microscopy Humidity stage microscopy DSC (MTDSC) ITC Powder X-ray diffraction

Table 2. List of Table Containing Characterization of Solid Dispersion

Differential Scanning Calorimetry (DSC)

DSC can be used to determine crystallinity by quantifying the temperature associated with melting (fusion) of the material. DSC is a method that is used to measure heat flow into or out of a material as a function of time or temperature.

X-ray Diffraction

The X-Ray diffraction technique is a very significant and efficient tool in studying the physical nature of solid dispersions. Freshly, it was used to study binary eutectic systems. The diffraction method is also particularly valuable in detecting compound or complex formation since its spectra or lattice parameters are markedly diverse from those of pure components. The biggest drawback of using the diffraction method to study dispersion arrangements is its frequent inability to differentiate amorphous precipitation from molecular dispersion if the lattice parameter of the solvent component is not changed.

Dissolution Studies

Dissolution study is carried out to establish the rate and extent of dissolution. The dissolution study of solid dispersion was performed on the USP- type II paddle apparatus at 37±0.20C. Drug was dispersed in medium. Sample was taken time to time, filtered and analyzed for drug contents by measuring the absorbance at suitable wavelength using UV visible Spectrophotometer.

Fourier Transform Infra-Red Spectroscopy (FT-IR)

FT-IR spectroscopy can be used to find possible interactions between the drug and the solid state carrier in the FT-IR spectrophotometer by the conventional KBr pellet method.

UV visible Spectroscopy

Here, pure drug and dispersed drug spectra are scanned. Molar extinction calculation will provide evidence of any decay.

Scanning Electron Microscopy (SEM)

SEM is useful for determining morphology, solid particle size, and sometimes drug polymorphism. The fine dispersion of drug particles in the carrier matrix can be visualized. The application of the electron microscope method, although usually partial, to high resolution chemicals.

Marketed formulation

Product Name	API	Polymer	Preparation method
Sporanox	Itraconazole	HPMC	Spray drying on sugar bead
Prograf	Tacrolimos	HPMC	Spray drying
Kaletra	Lopinavir	PVP	Melt extrusion
Intelence	Etravirine	HPMC	Spray drying
Zotress	Everolimus	HPMC	Spray drying
Novir	Ritronavir	PVP	Melt extrusion
Onmel	Itraconazole	HPMC	Melt extrusion
Zelboraf	Vermurafenib	HPMCAS	Co-precipitation
Incivek	Telaprevir	HPMCAS	Spray drying

Table 3. Table contain marketed formulation

FAST DISSOLVING TABLET

Definition

Fast dissolving tablets are solid unit dosage forms when placed in the mouth, dispersed or disintegrated in saliva without the need for water for frequent drug release for rapid onset of action [8].

Advantages [12]

Easy to use on patients unable to chew tablets such as minors and elderly, unconscious and mentally handicapped.

- If you don't need water to take the pill while traveling.
- Rapid disintegration and dissolution of the drug tablet for fast action.
- The bioavailability of drugs can be increased by preventing the passage of drugs from the pharynx and esophagus.
- It is well known by the lips and can quickly help pediatric patients take the medicine like bitter pills.
- In MDT penetration, there is no chance of choking or choking.

- It is useful in some cases, such as motion sickness, during coughing, etc.
- These PCTs are stable longer, until they are consumed [13].

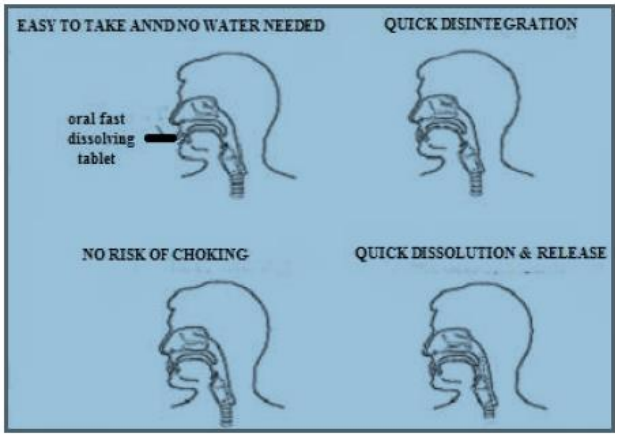

Fig 17: Advantage of Fast Dissolving Tablets

Disadvantage [12]

The main disadvantages of FDTs are related to the mechanical strength of the tablets.

- FDTs are very fragile and flexible in shape or pressed into a container with low compression, which makes the container friable and brittle and difficult to work with.
- There is nothing to invent drugs for bad tastes as extra precautions of FDT might be needed before such a drug is developed.
- Absorption rate and total bioavailability of the salivary solution.
- Medications and dose are stable.
- Some FDTs are hygroscopic and, under normal humidity conditions that require specialized packaging, cannot maintain physical integrity.
- Dry mouth due to decreased saliva development may not be a good candidate [14,15].

Ideal properties of fast dissolving tablet [12]

Properties	Yes	No
Suitable for manufacturing and packing traditional tablets	✓	
Compact	✓	
Fragility Concern		✓
Nice sensation in mouth	✓	
Humidity, temperature or any other Environmental adaptation		✓
Air enough to drink		✓
Economic	✓	
Wastage in oral cavity		✓
Patient compliance	✓	
Taste compatability	✓	

Table 4. Ideal Properties

Criteria for drug selection

- It must not be bitter.
- A dose of less than 20 mg should be delivered.
- Low molecular weight.
- Liquids and saliva would be extremely soluble.
- You will have a high metabolism in the first stage.
- Will be permeable to oral tissues.

Mechanism of superdisintergants

There are four major mechanisms for tablets disintegration as follows

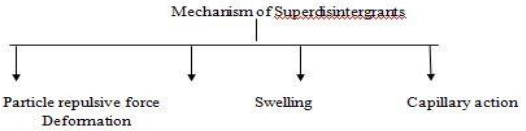

Fig18. Schematic Representation of Superdisintergants Mechanism

Swelling

The most widely used general mechanism of action for tablet disintegration is swelling. High porosity tablets exhibit poor disintegration due to lack of adequate swelling force. On the other hand, sufficient swelling force is exerted on the low porosity tablet. It should be noted that if the packing fraction is too high, the fluid cannot penetrate the tablet and the disintegration is again slower [7,16].

For example. Sodium Starch Glycolate, Plantago Ovata

Porosity and Capillary Action (Wicking)

The disintegrating action of some superdisintegrants is due to capillary action and porosity. The disintegrated particles act to increase the porosity which transmits the fluid permeation pathways in the tablets. After that, by capillary action or absorption action, the liquid is depleted, which leads to the breaking of the bonds between the particles and, ultimately, the disintegration of the tablet [7,17].

For example. Crosspovidone, Crosscarmellose

Deformation

When pressure is applied to the starch grains, they deform and when the pressure is removed, they return to their original shape. But when pills turn into pills, they constantly deform, which releases their energy upon contact with water. Occasionally, starch swelling ability was enhanced when the granules were extensively deformed during compression. This increase in size of the deformed particles produces tablet breakage. This may be a starch mechanism and has only recently begun to be studied [7,17,18].

Due to Disintegrating Particle/Particle Repulsive Forces:

This mechanism is associated with non-swelling disintegrants. For this, Guyot-Hermann gave the theory of particle repulsion. According to this disintegration, the forces of electrical repulsion between the particles are responsible for the water. No single mechanism is thought to be responsible for the action of most disintegrants. But, it is the result of the interrelations between these main mechanisms.

Superdisintergants	**Mechanism of action**	**Properties**	**Available grade**
Cross-linked alginic acid	Based on wicking movement, prompt bulge upon hydration	Loose cohesion in a wet and dry medium	Alginic acid, Satialgine
Cross-linked PVP	Act by capillary action	Spongy in nature and water in soluble	Crosspovidone, Crosspovidone M
Cross-linked starch	Less than 30 seconds swells 7-11 folds	SR in matrix and swells in 3d	Sodium starch glycolate
Cross-linked polymer	High swelling tendency of hydration either in contact with water	increases the effective surface area for absorption of active substance	Kyron T-314
Cross-linked cellulose	Swells 4to 8folds in less than 10 sec	Swelling in 2d	Ac-Di-sol, Croscarmellose

Table 5. List of Superdisintergants available commercially

Techniques used for the preparation of fast dissolving tablets:

Techniques for the preparation of fast dissolving tablets:

- Freeze-drying orLyophilization
- Moulding
- Direct Compression
- Sublimation
- Nanonization
- Spray Drying
- Mass Extrusion
- Fast dissolving film

Table6: list of Techniques for the preparation of fast dissolving tablets

Freeze-drying or lyophilisation

In Freeze-drying process that the product has frozen water. This technique produces a fast dissolving amorphous porous layer. There are references here to a standard way to develop FDT using this technique.

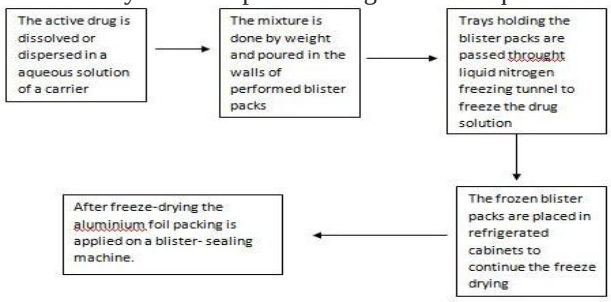

Fig 19. Procedure of Freeze-Drying or Lyophilisation

Direct Compression

Direct compression is the simplest and most economical tableting technique. In this method, tablets are prepared directly by compressing the mixture of drug and excipients without any pre-treatment. This mixture has have good flow properties. This method takes place in 3 steps, i.e.

a) Grinding of drugs and excipients
b) Mixture of drugs and excipients
c) Compression of the tablet

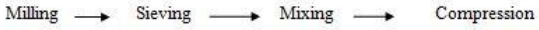

Fig 20. Procedure for direct compression

Sublimation

The porous bulk formulation, rapid disintegration and dissolution is achieved by the addition of inert solid ingredients that volatilize quickly, including urea, camphor and ammonium carbonate, ammonium bicarbonate and hexamethylenetetramine. They were packed with other ingredients. The volatile material is formed by reducing the pressure and adding a moderate temperature which makes the mass porous. The properties of the sublimation process are usually soluble solvents such as cyclohexane and benzene [12,19].

Nanonization

A newly developed Nanomelt technology involves reducing the drug particle size to nanometer size by grinding the drug using a proprietary wet milling technique. Drug nanocrystals are stabilized against agglomeration by surface adsorption on selected stabilizers, which are then incorporated into FDTs. This technique is particularly advantageous for poorly water-soluble drugs. Other advantages of this technology include rapid disintegration/dissolution of nanoparticles leading to greater absorption and therefore greater bioavailability and dose reduction, cost effective

manufacturing process, conventional packaging due to exceptional durability and a wide range of doses (up to 200 mg of drug per unit) [7,12,20].

Spray drying

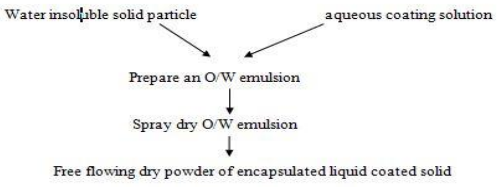

Fig 21. Procedure for spray drying

Mass-extrusion

Active mixing is facilitated by the solvent combination of water-soluble methanol and polyethylene glycol and the resulting extruder or syringe removal of the soft mass to produce a cylindrical medium and is broken into uniform segments by means of of a heated blade to shape a board. The active mix, dry cylinders, should be used to coat the bitter medicine granules and thus block the taste.

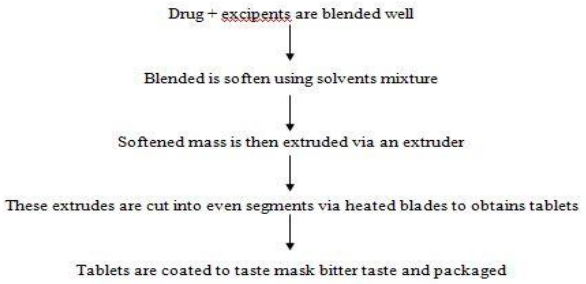

Fig 22. Procedure for mass-extrusion

EVALUATION TEST FOR FAST DISSOLVING TABLETS

***In vitro* assessment methods**

The general appearance, the external presentation of the pill, its visual character and the general "fashion" are classified as essential for consumer recognition. This includes size, shape, shading, presence or absence of fragrance, taste, surface, actual defects, and the consistency and decipherment of any recognizable tablet engraving.

I.P weight uniformity

The weight standardization procedure was followed, twenty tablets were taken and their weights determined individually and collectively on a digital scale.

Tablet hardness

Tablet hardness is the pressure exerted across the width of the tablet to break the tablet. The hardness of each pill has been checked using Monsanto hardness analyzer and many unique analyzers such as heavy duty Cobb analyzer, Pfizer analyzer. , Erweka analyzer and Schleuniger analyzer useful to decide the hardness of a single pill.

Friability (F)

Tablet hardness is the pressure exerted across the width of the tablet to break the tablet. The hardness of each pill has been checked using Monsanto hardness analyzer and many unique analyzers such as heavy duty Cobb analyzer, Pfizer analyzer. , Erweka analyzer and Schleuniger analyzer useful to decide the hardness of a single pill.

Disintegration test

The standard methodology for performing a disintegration test for fast-dissolving tablets has several limitations and does not address estimating extremely short deterioration times. The disintegration time must be adjusted because disintegration is necessary without water, so the test must mimic the deterioration of salivary substances. For this, a Petri dish 10 cm in diameter was filled with 10 ml of water. The tablet is deliberately placed in the center of the Petri mission and the perfect opportunity for the tablet to completely disintegrate into fine particles has been observed.

Wetting time

To quantify the wetting time of tablets, the strategy detailed by yunixia et al. A piece of tissue paper (12 cm x 10.75 cm) was folded twice and placed in a small Petri dish (ID = 6.5 cm) containing 6 ml of Sorenson pH 6.8 buffer. The tablet was placed on the paper and the correct possibility of complete wetting of the tablet was determined. Three preliminary values were determined for each batch and the usual standard deviation. [8]

***In vitro* dispersion time**

In vitro dispersion time was estimated by placing the tablet in a beaker containing 50 ml of Sorenson's buffer pH 6.8. Three tablets were randomly selected from each formulation and the in vitro dispersion time was performed similarly. The time necessary for the complete dispersion of the tablet was estimated.

Stability studies

It depends on the temperature. The orodispersible tablets were packaged in appropriate containers and stored under the following conditions for the time recommended by ICH regulations for expedited analysis. (i) 40 ± 1°C (ii) 50 ± 1°C (iii) 37 ± 1°C and 75% ± 5% RH. At that time, the tablets were removed after 15 days and analyzed for their actual appearance, such as visual blemishes, hardness, friability,

disintegration, dissolution, and drug content.[26] The information obtained is introduced under the conditions of the first requirement to decide the decay kinetics. Accelerated equilibrium facts were plotted using the Arrhenius equation to determine shelf life at 25°C. The in vivo disintegration test was modified to end on 6 tablets using the equipment specified in I.P. - 1996. Distilled water at 37°C ± 2°C was used as the degradation medium and the time in seconds was included for the complete disintegration of the pill.

Indian marketed fast dissolving products

Brand (Trade) Name	Active drug	Manufacturer /company
Acepod-O	Cefpodoxime	ABL Lifecare, India
Acufix DT-TAB	Cefixime	Macleods, India
Alepam	Amoxycillin trihydrate and Potassium clavulanate	Scoshia Remedy, India
Bigcef DT-TAB	Cefuroxime	Bestochem,India
Clonazepam ODT	Clonazepam	Par Pharmaceutical
Dompan	Pantoprazole and Domperidone	Medley Pharmaceuticals, India
Mosid-MT	Mosapride citrate	Torrent Pharmaceuticals, India
Minoclav DT-TAB	Amoxycillin trihydrate and Potassium clavulanate	Minova life Sciences, India
Nulev	Hyoscyamine sulphate	Schwarz Pharma, India
Nimulid MDT	Nimesulide	Panacea Biotech, New delhi, India
Numoxylin CV DT	Amoxycillin trihydrate and Potassium clavulanate	Gepach international, India
Zyrof Meltab	Rofecoxib	Zydus, Cadila, India

Table 7. List of table contains Indian marketed fast dissolving drug

CONCLUSION

The bioavailability of poorly water-soluble drugs, essentially like pills that are controlled orally, remains one of the most difficult elements for drug development. The development of solid dispersion strategies for preclinical, clinical and commercial use has been well exploited in recent years due to the availability of dynamic carrier and self-emulsifying carrier surfaces. The fast-dissolving tablets have an innovative measurement shape that overcomes the problem of swallowing and offers a rapid onset of action. The pediatric and geriatric population was decisive. Goals because both congregations thought traditional tablets were hard to swallow.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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