



Fast Dissolving Drug Delivery System: A Review

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Abstract:

Fast dissolving film on placing in mouth, saliva serves to rapidly dissolve the dosage form. Some drugs are absorbed from mouth, pharynx and esophagus as the saliva passes down in to the stomach and it may produce rapid onset of action. Fast dissolving film is most advanced solid dosage form as compared to tablet, capsule and syrup. Dosage form allow medication to bypass first pass metabolism and increasing bioavailability of drug. These formulations are suitable for cold, cough, depression etc. The present review describes detail about advancement in design and development of fast dissolving oral film.

Keywords: Fast dissolving film, solvent casting, palatability, XGel.

Introduction:

Fast dissolving drug delivery system (FDSS)

The oral route remains the perfect route for the administration of therapeutic agents because the low cost of therapy and ease of administration lead to high levels of patient complains. Oral dosage forms are more popular than other dosage forms because of following reasons.

1. Ease of administration.
2. Accurate dosage.
3. Self- medication.

4. Pain avoidance.
5. Patient compliance.

Orally administered drugs are provided to the patient in many dosage forms including solid dosage forms such as capsules, tablets and liquid dosage forms such as solution, suspension and emulsion. The most popular oral solid dosage forms are tablets and capsules. Tablets are widely accepted because of the convenience in terms of self-administration, compactness, and ease in manufacturing. Children, geriatric patients and many other persons including disabled patient often have trouble in swallowing tablet many other person including disabled patient often have trouble in swallowing tablet or capsules, furthermore, dosing is an issue, as most medications are available in doses or capsules, furthermore, dosing is an issue, as most medications are available in doses that are significantly too large for the pediatric population and cannot easily and reproducibly be divided into smaller doses (e. g.. enteric-coated tablets) .⁴

In some cases, such as motion sickness, sudden episode of allergic attack or coughing and an unavailability of water, the swallowing of tablet or capsules may become difficult. In order to assist these patients, several fast-dissolving drug delivery systems have been developed.

To overcome this problem, scientists have developed innovative drug delivery systems known as “melt in mouth” or “mouth disintegrate (MD)” tablets. Their growing importance was underlined recently when European Pharmacopoeia (European Pharmacopoeia 5.0,2005) adopted the term “Oro-dispersible tablets” as a tablet to be placed in mouth where it disappears rapidly before swallowing and which disintegrates in less than 3 minutes. A new oral fast dissolving dosage form such as the fast- dissolving film has been developed which offers the combined advantages of ease of dosing and convenience of dosing in the absence of water. ^{4,5}

“Quick dissolving oral strip is relatively a new dosage form in which thin film is prepared using hydrophilic polymers, which rapidly dissolves on tongue or buccal cavity.” Quick dissolving oral strips (QDOS) are also known as mouth dissolving films (MDF), Fast dissolving films (FDF), Oro dispersible films (ODF)^{4,5}. On placing mouth dissolving films in the mouth. Saliva serves to rapidly dissolve the dosage form. The is absorbed in the normal way. Some drugs are absorbed from the mouth, pharynx and esophagus as the saliva passes down into the stomach & it may produce rapid onset of action. In such cases bioavailability of drug is significantly greater than those observed from conventional tablets dosage form.

ADVANTAGES OF FDF

1. Availability of larger surface area that leads to rapid disintegrating and dissolution in the oral cavity.
2. Administered without water, anywhere, any time.
3. Suitability for geriatric and pediatric patients, who experience difficulties in swallowing and for the other groups that may experience problems using conventional oral dosage form. Due to being mentally ill, the

developmentally disable and the patients who are un-cooperative, or are on reduced liquid intake plans or are nauseated.

4. Advantageous in patient which is suffering from motion sickness, cold, sudden episodes of allergic attack coughing, bronchitis or asthma where an ultra-rapid onset of action is required.^{7,8}
5. The disadvantage of most FDF is that they are fragile and brittle which warrants special package for protection during storage and transportation. Since the films are flexible, they are not as fragile as most of the FDFs. Hence, there is ease of transportation and during consumer handling and storage.
6. Since the first pass effect can be avoided, there can be reduction in the dose which can lead to reduction in side effects associated with the molecule.
7. FDFs may provide drug manufacturers with significant opportunities in lifecycle management, market expansion, and product differentiation.

DISADVANTAGES OF FDF

1. Drugs which are unstable at buccal pH cannot be administered.
2. Drugs which irritate the mucosa cannot be administered by the route.
3. Drug with small dose requirement can only be administered.
4. Taste masking – Most drugs have bitter taste, and need taste masking.
5. Special packaging – must be protected from water so it needs special packaging.

Properties of Fast Dissolving Film

1. Thin elegant films.
2. Various sizes
3. Un-obstructive
4. Mucoadhesive
5. Quick dissolving
6. Fast disintegrating
7. Rapid release of drug

Criteria for Fast Dissolving Film

Fast dissolving oral film should:

1. Have a pleasant mouth feel.
2. Not require water to swallow, but it should dissolve or disintegrate in the mouth in matter of seconds.
3. Compatible with taste masking.
4. Leave minimum or no residue in the mouth after oral administration.
5. Exhibit low sensitivity to environmental conditions such as temperature and humidity.

Criteria for selection of drug candidate for FDF

1. The drug should have pleasant taste.
2. The drug should preferably have a dose up to 40 mg.
3. The drug should have small or moderate molecular weight.
4. The drug should have good stability and solubility in water and in saliva.
5. It should be partially unionized at the pH of oral cavity.
6. It should have the ability to permeate oral mucosal tissue.

Challenges for preparing FDF

- a. Palatability
- b. Mechanical strength
- c. Hygroscopicity
- d. Amount of drug
- e. Aqueous solubility
- f. Cost effectiveness.

Structure and Function of Oral Mucosa

Drug delivery via the oral mucosa is a promising route, when one wishes to achieve a rapid onset of action or improved bioavailability for drugs which have high first-pass metabolism. Thus, fast dissolving films allows the film to dissolve in mouth so drug gets directly absorb into the systemic circulation through the oral mucosa. The oral mucosa is composed of an outermost layer of stratified squamous epithelium below this lies a basement membrane, a lamina propria followed by the sub mucosa as the innermost layer.

Floor of mouth:

The floor of the mouth is covered with lining mucosa. Minor salivary glands: The basic structure of a salivary gland is that of a branching duct that has the principal secretory cells (the acinar cells) at the proximal ends of the branches and an opening into the oral cavity at the other end of a single collecting duct.

Four morphologically and functionally varying segments exist in each basic salivary gland: acinus, intercalated duct, striated duct, and excretory duct. Two types of cells exist in each segment: abluminal cells and luminal cells. The abluminal cells are myoepithelial cells in the acinus and intercalated duct and basal cells in the striated and excretory ducts. Acinar cells may be serous or mucous, depending on the chemical composition of the saliva produced by a specific gland. Parotid glands are mostly serous, submandibular glands and mixed (predominantly serous), sublingual glands are mixed (predominantly mucosa), and minor salivary glands are mixed

(predominantly mucosa), except in the palate, where the glands are mostly mucous, and in the tongue. The oral cavity is scattered with 500-1000 minor salivary glands within the mucosa and submucosa of the cheeks, lips, floor of the mouth, hard and soft palates, retromolar trigone, and tongue; the anterior hard palate and gingivae are devoid of these glands. The lobules of the minor salivary glands 1-5 mm in size and are separated from one more confluent. Most lobules have individual excretory ducts that open into the oral cavity, but they are not usually perceptible¹⁰. In the tongue, lips, and buccal mucosa, lobules of salivary gland tissue are located beneath the mucosal epithelium and within the deeper skeletal muscles. These glands are unencapsulated.¹⁰ The posterior hard palate contains pure mucous type acini without serous cells. In the tongue, Blandine and Nunn glands are located on the anterior ventral portion and are of the mucous type. The posterior dorsal and lateral portions contain serous glands called von Ebner glands. A stratified, squamous epithelium lines the oral cavity. Three different types of oral mucosa can be identified, i.e., masticatory, lining, and specialized mucosa.

The masticatory mucosa covers the gingiva and hard palate.

It comprises a keratinized epithelium strongly attached to underlying tissues by a collagenous connective tissue and as such is able to withstand the abrasion and shearing forces of the masticatory process. The lining mucosa covers all other areas except the dorsal surface of the tongue and is covered by a non-keratinized and hence more permeable epithelium. This mucosa is capable of elastic deformation and hence stretches to accommodate speech and mastication requirements.

The epithelium in humans varies in thickness according to the region, e.g., Floor of the mouth $190\mu\text{m}$, hard palate $310\mu\text{m}$, buccal $580\mu\text{m}$. A loose, elastic connective tissue attaches the lining mucosa to underlying structures.

The specialized mucosa of the dorsum of the tongue is characteristic of both the masticatory and lining mucosa in that it consists of epithelium partly keratinized and partly non-keratinized. This epithelium is bound to the muscle of the tongue, the regional differences in morphology result in different permeability characteristics that have considerable influence on the design and sitting of drug delivery systems. The differentiation process that gives rise to the regional differences occurs as the keratinocytes migrate from the buccal layers to the epithelial surface. Within the basal layer the keratinocytes are cuboidal or columnar with a surrounding plasma membrane and containing the usual intracellular organelles. A constant population of epithelial cells is maintained by the division of the basal keratinocytes at a rate equating to the desquamation of surface cells. Aging and disease can result in a loss of this balance, which can lead to a thickening (hyper-trophia) or thinning (atrophia) of the epithelium.¹¹

Tongue anatomy:

The tongue is the central part of the oral cavity. It's a muscular organ whose base is attached to the floor of the oral cavity, whilst its apex is free and mobile. The lingual mucosa is covered by stratified squamous epithelium with varying degrees of keratinization. Since the dorsal surface of the oral tongue is more at risk for desiccation and abrasions from contact with food boluses of varying temperatures and textures, it is covered by epithelium

that is keratinized. However, the ventral surface of the tongue as well as the pharyngeal part, are relatively well protected from the harsh environment.

Mechanism of oral this film:

Mechanism of absorption through oral mucosa

There are two permeation pathways for passive drug transport across the oral mucosa: paracellular (intracellular, passing around the cell) and transcellular (intracellular, passing through the cell) routes. Drugs can use these two routes simultaneously, but one route is usually preferred over the other depending on the physicochemical properties of the drugs. Since the intercellular spaces and cytoplasm are hydrophilic in character, lipophilic compounds would have low solubility in this environment.

The cell membrane, however, is rather lipophilic in nature and hydrophilic solutes will have difficulty permeating through the cell membrane due to a low partition coefficient.

Therefore, the intercellular spaces are the major barrier to permeation of lipophilic compounds and the cell membrane acts as the major transport barrier for hydrophilic compounds. Since the oral epithelium is stratified, solute permeation may involve a combination of these two routes. The route that predominates, however, is generally the one that provides the least amount of hindrance to passage.

Classification of Fast Dissolve Technology

Fast dissolving technologies can be divided in to three broad groups.

1. Lyophilized systems.
2. Compressed tablet- based systems.
3. OTF.

Lyophilized systems

This system has been by far most successful among them in terms of sales values, sales volume and number of worldwide product approvals. The technology around these systems involves taking a suspension or solution of drug with other structural excipients. The units have a very high porosity, which allows rapid water or saliva penetration and very rapid disintegration.

Compressed tablet-based systems

This system is produced using standard tablet technology by direct compression of excipients. Depending on the method of manufacturing, the tablet technology has different level of hardness and friability. The speed of disintegration of fast dissolving tablets compared with standard tablet is achieved by formulation using water

soluble excipients or super disintegrant or effervescent components, to allow rapid penetration of water in core of tablet.

OFT

Oral films also called oral wafers in the related literature, are groups of flat film which are administered into oral cavity. Dissolvable OTF have evolved over past few years, from confection and oral care markets in the form of breath strips and became a novel and widely accepted from by consumers for delivering vitamins and personnel care products. Today, OTF are proven and accepted technology for systemic delivery of APIs for over-the-counter (OTC) medications and are early-to-development stages for prescription.

Active Pharmaceutical agent

A typical composition contains 5 to 30 % w/w of the drug. Small dose molecules are the best to be incorporated in quick dissolving oral strips. Multivitamins up to 10% w/w of dry film weight was incorporated in the strips with dissolution time of less than 60 seconds, Suitable drug candidate for FDFs should possess following characteristics:

1. It should be potent.
2. It should not have bitter taste.
3. It should have good stability in water and pH of saliva.
4. It should be permeable through buccal mucosa^{19,21}

Film forming polymer

The oral strip must disintegrate in the saliva of the oral cavity. So, the final film must necessarily be water soluble, for the preparation of FDOS the various Polymers can be used in the film up to 40% w/w of the film content. The polymers which can be used are Hypromellose (HPMC), hydroxy propyl cellulose, Starch and modified starch, pullulan, pectin, gelatin, Carboxy methyl cellulose, PVP + Cross linked PVP, Alginates, Poly vinyl Alcohol, Malt dextrose, Polyox.

- Nontoxic and nonirritant
- Devoid of leachable impurities.
- Should not retard disintegration time of film.
- Tasteless.
- Should have good wetting and spread ability property.
- Should have sufficient peel, shear, and tensile strength.

- Readily available.
- Inexpensive.
- Sufficient shelf life.
- Should not aid in causing secondary infections in oral mucosa.

Plasticizer

The role of plasticizer is beneficial for preparation of FDOS. Plasticizer helps to improve the flexibility of the strip and reduces the brittleness of the strip. The plasticizer should be compatible with polymer and solvent. The plasticizer helps to improve flexibility and reduces brittleness of film. Propylene glycol (PG), polyethylene Glycol (PEG), Glycerol, Phthalate derivatives like dimethyl, diethyl and di-butyl phthalate.

Flavoring agents

Preferably up to 10% w/w flavors are added in the quick dissolving strip Formulations. The acceptance of the oral disintegrating or dissolving formulation by an individual is largely depends on the initial flavor quality which is observed in first few seconds after the product has been consumed and the after taste of the formulation which lasts for at least about 10 min. The selection of flavor is dependent on the type of drug to be taste fondness. The geriatric population like mint or orange flavors while younger generation like flavors like fruit punch, raspberry etc.

Flavoring agents can be selected from synthetic flavor like oils, oleo resins, extract derived from various parts of the plants like leaves, fruits and flowers, Peppermint oil, cinnamon oil, spearmint oil, oil of nutmeg are example of flavor oils while vanilla, cocoa, coffee, chocolate and citrus are fruity flavors. Apple, raspberry, cherry, pineapple are few examples of fruit essence types²⁶. Flavors can be used alone or in the combination.

Sweetening agents

Sweeteners are the important part of the formulations intended to be disintegrated or dissolved in the oral cavity. Generally, sweeteners are used in the concentration of 3 to 6 % w/w either alone or in combination. Both natural sweeteners as well as artificial sweeteners are used in the formulation of these quick dissolving strips. Polyhydric alcohols such as sorbitol, mannitol, and isomalt can be used in combination as they additionally provide good mouth feel and cooling sensation. However, it should be noted that the use of natural sugars in such preparations need to be restricted in people who are on diet or in the case of diabetic patients. Due to this reason, the artificial sweeteners have gained more popularity in food and pharmaceutical preparations. Saccharin, cyclamate and aspartame are the first generation of the artificial sweeteners followed by acesulfame-k, sucralose, alitame and neotame which fall under the second-generation artificial sweeteners. Acesulfame-k and sucralose have more

than 200-600-time sweetness. Neotame and alitame have more than 2000-8000 times sweetening power as compared to sucrose.

Saliva stimulating agents

The purpose of using saliva stimulating agents is to increase the rate of production of saliva that would aid in the faster disintegration of the rapid dissolving strip formulations. E.g., Citric acid, malic acid, lactic acid, ascorbic acid and tartaric acid. These agents are used alone or in combination between 2 to 6% w/w of weight of the strip.

Approaches used for the formulation of Fast Dissolving film.

Conventional approaches

The following processes can be used to manufacture the quick dissolving oral film.

1. Solvent Casting Method
2. Hot-Melt Extrusion Method
3. Semisolid Casting
4. Solid Dispersion Extrusion Method

1. Solvent Casting Method

Solvent casting method most commonly used for preparation of OFDS using water soluble excipients. Polymers and drugs which are dissolved in de-ionized water; consequently, a homogenous mixture is obtained by applying high shear forces generated by a shear processor. Then, the prepared solution is poured onto petri plate and the solvent is allowed to dry by exposing it to high temperature in order to attain good quality films. In solvent casting technique, film forming polymer is usually soaked in appropriate solvent for overnight. The type of API, which has to be incorporated in ODF, governs the selection of suitable solvent depending on critical physicochemical properties of APIs such as melting point, shear sensitivity and polymorphic form.

2. Hot-Melt Extrusion Method

Hot melt extrusion is a technique which is a mixture containing drug, polymer and excipients is extruded under high temperature to form a homogenous mass which is then casted to form smooth films. This a solvent free process; however, the processing of thermolabile substances is a major drawback of this process due to use of high temperature during extrusion.

Patented Approaches

XGel properties whilst also having the ability to incorporate active pharmaceutical ingredients. The XGel™ Film systems can be made to encapsulate any oral dosage form and can be soluble in either cold and hot water.

XGel™ film is comprised of a range of different water-soluble polymers, specifically optimized for the intended use.

Soluleaves: This technology is used to produce a range of oral delivery films that can incorporate active ingredients, colors, and flavors, Soluleaves™ films can be designed to dissolve rapidly on contact with saliva, quickly releasing the active ingredients, and flavors. This quality makes edible films an excellent delivery method for a large range of administration is especially useful for pediatric or elderly patients who may have difficulty swallowing traditional tablets or capsules. The delivery system can be used for the cough/cold, gastrointestinal, and pain therapeutic areas as well as delivering nutritional products. Soluleaves™ films can also be designed to adhere to mucous membranes and to release the active ingredient slowly over 15 min.

Wafertab: Wafertab™ is a drug delivery system that incorporates pharmaceutical actives into an ingestible filmstrip. The system provides rapid dissolution and release of actives when the strip comes into contact with saliva in the mouth. The Wafertab™ filmstrip can be flavored for additionally improved taste masking. The active ingredient is precisely dosed and integrated into the body of a premanufactured XGel™ film, thus preventing exposure to unnecessary heat and moisture and potentially enhancing product stability. The Wafertab™ system lends itself to many possibilities for innovative product design, enabling multiple films with different actives to be bonded together. Wefertab™ can be prepared in a variety of shapes and sized and is an ideal method for delivery of medicines, which require fast release or for use by patients who have difficulty in swallowing.

Evaluation/characterization Fast Dissolving Film

Fast dissolving oral film of Venlafaxine HCL were evaluated for their morphology. Weight, thickness, pH, folding endurance, drug content, disintegration time, and in vitro dissolution. All studies were carried out in triplicate and average values were reported.

Weight of film:

Fast dissolving oral film were weighed on analytical balance and average weight can be determined for each stripe. It is desirable that strips should have nearly constant weight. It is useful to ensure that a strip contains the proper amount of excipients and API.

Thickness of film:

The thickness of film was measured by micrometer screw gauge at three different points and average of three values was calculated. This is essential to ascertain uniformity in thickness of strip which is directly related to accuracy of dose in the strip.

pH Value:

The pH value was determined by dissolving one oral film in 10 ml distilled water and measuring pH of solution obtained. All determinations were performed in triplicate. It is necessary that strip should have nearly uniform pH value.

Folding Endurance:

Folding endurance of strip is essential to study elasticity of film during storage and handling. The folding endurance of film was determined by repeatedly folding one film at same place till it broke. A strip was cut evenly and repeatedly folded at the same place till it breaks. The number of times strip should be folded at the same place without breaking gave exact value of folding endurance. All determinations were performed in triplicate.

Content Uniformity:

Drug content was determined by dissolving the film by placing in 100ml volumetric flask, containing 50 ml phosphate buffer pH6.8 using magnetic stirrer the film was dissolved. An aliquot of 1ml of sample was withdrawn and diluted to 10ml phosphate buffer pH6.8. The solution was filtered through Whatman filter paper and analyzed by using UV-spectrophotometer at 225 nm against blank prepared by using dummy strip treated in same manner.

Content uniformity $Y = m \times x + c$.

Where, (x= concentration $\mu\text{g/ml}$, Y= absorbance and m= slope).

Tensile Strength:

Tensile strength is a maximum stress applied to a point at which it breaks. In this, test, the film was tied between two clamps and the one end of clamp was directly attached to pan through pulley. The stress was applied to strip by putting load in pan and finally reading of load at failure was noted. All determination was performed in triplicate with standard deviation.

$$\text{Tensile strength} = \frac{\text{Load at failure}}{\text{strip thickness} \times \text{strip width}} \times 100$$

Film moisture content:

Moisture content test was performed to ensure dryness. The prepared films were initially weighed and placed in desiccator containing calcium chloride. After 3 days the film were reweighed to obtain the percentage of moisture loss. Three films of each formula used in this test.

$$\% \text{ Moisture content} = \frac{\text{initial weight} - \text{final weight}}{\text{initial weight}} \times 100$$

Swelling Index:

Phosphate buffer pH 6.8 is used to check the swelling studies of film. Initial weighted film is placed in pre-weighed stainless steel wire mesh. This mesh is then dipped in to the phosphate buffer. Increase in weight of film is noted at constant pre-determined time intervals until no more increase in weight.

$$\frac{\text{final weight}(wt) - \text{initial weight}(w_0)}{\text{initial weight}}$$

Disintegration Time:

It was determined by using disintegration test apparatus. Two square inch film was placed in basket, raised and lowered it in such a manner that the complete up and down movement at equivalent to thirty times a minute. Time required by film, when no traces of film remain above gauze was noted. Test was performed in triplicates.

Invitro-dissolution studies:

The in vitro dissolution study was carried out in 900ml phosphate buffer pH 6.8 using USP type 2 dissolution apparatus at $37 \pm 0.5^\circ\text{C}$ and at 100 rpm. Each square cut strip sample as submerged in to dissolution media and appropriate aliquots were withdrawn at 1, 2.5, 7.5, 10, 12.5, 15 min. Time interval and replaced with same volume of dissolution media. The samples were filtered through Whatman filter paper and analyzed spectrophotometrically at 225 nm (Model UV-1700 UV-Visible spectrophotometer, Shimadzu, Japan). The dissolution test was performed in triplicate for each batch.

Stability Studies:

Stability studies on the optimized formulation of fast dissolving oral strip packed in aluminum foil were carried out to determine the effect of temperature and humidity on the stability of the drug. The strip was stored in stability chamber for 3 months. The sample were withdrawn at every 30-day time intervals and analyzed for Invitro parameters.

Dryness/track test

In all there have been eight stages identified for film drying and these set-to-touch, dust free, track-free (surface dry), dry-to touch, dry-through (dry-to-handle), dry-to-recoat, and dry print-free. Track is the tenacity with which

the strip adheres to an accessory (a piece of paper) that has been pressed into contact with strip. Instruments are also available for this study.

Storage and packaging of Oral films

Fast dissolving strips can be packed using single pouches, blister card with multiple units, multiple-unit dispenser, and continuous roll dispenser. There is certain patented peel by Amcor flexible. The rapid card is of same size as a credit card and holds three films on each side. Every dose can be taken out individually.

Transparency

To determine transparency of oral film, a simple ultraviolet (UV) spectrophotometer can be used. The film specimen is placed on the internal side of spectrometer cell.

Scanning electron Microscopy

To study the surface morphology of film between different excipients and drug scanning, electron microscopy can be used. The film sample should be placed in sample holder and at $\times 1000$ magnification, various photomicrographs can be taken using tungsten filament as an electron source.

Applications of OTF in drug delivery systems

Oral mucosal delivery via sublingual, buccal, and mucosal routes by use of oral thin film could become preferential delivery method for therapies requiring rapid drug absorption, including those used to manage pain, allergies, sleep, and central nervous system disorders.

Topical applications: The use of dissolvable films may be feasible in delivery of active agents such as analgesic or antimicrobial agents in the wound care and other applications.

Gastrointestinal delivery system: Dissolvable films are being considered in the dosage form for which water soluble and poorly soluble molecules of various molecular weight are contained in film format. Dissolution of film could be triggered by pH or enzyme secretion of gastrointestinal tract (GIT) and could potentially be used for treatment of gastrointestinal disorder.

Diagnostic devices: Dissolvable films may be loaded with sensitive reagent to allow controlled release when exposed to a biological fluid or to create isolation barriers for separating multiple reagents to enable a timed reaction within a diagnostic device.

Marketed Products Available Fast Dissolving Oral Film

Table: List of marketed products of fast dissolving oral strip

Product	API	Manufacturer	Uses
Listerine	Cool mint	Pfizer, Inc.	Mouth ulcer
Benadryl	Diphenhydramine HCL	Pfizer	Antiallergic
Suppress	Mentol	Innozen, Inc.	Cough suppressant
Klonopin Wafers	Clonazepam	Solvay Pharmaceuticals	Antianxiety
Theraflu	Dextromethorphan	Novartis	Antiallergic
Orajel	Menthol	Del	Mouth freshener
Gas-X	Simethicone	Novartis	Antiflatulating
Chloraseptic	Benzocaine	Prestige	Sore throat
Sudafed PE	Phenyl epinephrine	Wolters Kluwer Health, Inc.	Congestion
Triaminic	Diphenhydramine	Novartis	Antiallergic

Conclusion: Oral route always remain primary drug delivery due to ease of administration. Fast dissolving films are more superior to release drug, using HPMC, they have improved acceptance and patient compliance with no risk of choking and efficacy in comparison with conventional drug delivery. Fast Dissolving Films having great potential of delivering drug systemically as well as locally by avoiding first pass metabolism and improving bioavailability. Drugs like antiemetic, antidepressants, antiepileptics etc. Can be administered via this route. The swallowing difficulties can be reduced for patients like geriatric and pediatric patients.

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