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Systemic Review on Fast Dissolving Oral Films

Dr. Shashank Soni*, Saurabh Singh

Department of Pharmaceutics, Amity Institute of Pharmacy Lucknow, Amity University, Sector 125, Noida, Uttar Pradesh, India
ssoni@lko.amity.edu, Orcid Id: 0000-0002-4043-4861

ABSTRACT: -

Schizophrenia is increasing worldwide, these clinical conditions account for more than 7% of global burden of diseases, which also significantly increase the global illness burden and are linked to a high level of disability and mortality. Overuse of antipsychotics is a public health issue for which creative solutions are required. A strategy to address this public health issue is the development of novel and, if possible, natural products. Fast dissolving oral film is a recently developed system that are used in several advantages and applied in this area. This review intended to draw attention to these new dosage forms of drugs pertinent to the field of mental health prevention and therapy. This is a overview about development, evaluation of fast dissolving oral film implementation in mental disorder treatment

Keywords: Schizophrenia, antipsychotics, natural products, fast dissolving oral films

Introduction: -

Schizophrenia is a severe, incurable brain condition. If schizophrenia is not appropriately treated and managed, it can give implications. More than 23 million people worldwide suffer from psychoses like schizophrenia, which also significantly increase the global illness burden and are linked to a high level of disability and mortality [1-3]. Mental illness is a significant public health issue that have an influence on social and economic issues in addition to health [4-6]. For mental treatment, the medication must be released from the dose form right away. Recently, fast-dissolving dose forms have become more and more popular because they do not require water to administer. Oral films breakdown quickly in the mouth along with the medication, and most of the medication enters the systemic circulation by way of the buccal/oral mucosa, avoiding first-pass metabolism. The FDA has approved the thienobenzodiazepine class of medications, which for the treatment of acute manic episodes, schizophrenia, depressive episodes linked to bipolar disorder, and bipolar disorder maintenance treatment. Therefore, the aim was to create and assess fast-dissolving oral films to enhance patient compliance while improving the drugs water solubility, dissolution rate, oral bioavailability, and reduction of first-pass metabolism. Oral fast-dissolving films made with a solvent casting technique that uses HPMC as the film-forming polymer and water and 95 percent ethanol as solvents. To accomplish the goal, PEG 400 was chosen as the plasticizer, while super disintegrants like sodium starch glycolate (SSG) and croscarmellose sodium (CCS) were added both singly and in combination. The drug concentration, weight fluctuation, film thickness, disintegration time, folding durability, percentage of moisture content, and in vitro dissolution experiments were assessed for the produced films. Fast-dissolving oral thin films are defined by the Food and Drug Administration of the US (USFDA) as a flexible, thin, non-friable polymeric film strips containing one or more active medicinal components that have been dissolved or dispersed. The film strip is meant to applied to the tongue for quick in-vitro disintegration or to dissolve in saliva before swallowing to be delivered into the gastrointestinal tract [8-9]. Around sixty percent (60%) of oral solid dose formulations are available due to patient acceptability. Patients with dysphasia, low bioavailability, and a rapid onset of time led us to switch from solid dosage formulations to liquid orals and parenteral. Unfortunately, both parenteral and liquid orals have certain disadvantages. A drawback of liquid orals is, for instance, correct dosage whereas a drawback of parenteral is painful medication administration. These shortcomings cause the systems to display patient noncompliance. As a result, the development of a unique oral dosage form that addresses the issues of bioavailability, start of action, and patient compliance is necessary. Therefore, hydrophilic components and super-disintegrating agents were used in the formulation of the fast-dissolving tablets. Nevertheless, the lyophilization method for fast-dissolving tablets is costly and has challenges for handling, handling, and storage (fragility, friability). Thus, the most sophisticated kind of oral solid dose forms, called rapid dissolving oral film, is created. When a patient applies a thin film called Fast dissolving Oral Films on their tongue or oral mucosa, it can quickly dissolve or disintegrate in their saliva before they swallow. Fast dissolving oral Films is a medication that contains dispersed active ingredients. Fast dissolving has advantages over traditional solid dosage forms like tablets and capsules that are it can help patients who are bedridden, elderly or have trouble chewing or swallowing medication comply with their prescribed regimen. Fast Dissolving oral film can also prevent first pass metabolism, enable quick drug release, maintain hydration, and increase bioavailability. One of the most practical and accurate dosage forms is the fast dissolving/disintegrating formulation, which has certain restrictions but can be administered without water, particularly in the case of elderly and paediatric patients [3]. Patients find the oral route to be quite acceptable.

Advantages of oral fast dissolving films

1.**Bioavailability**: Oral fast-dissolving films provide better site-specific targeting and medication absorption, which boosts therapeutic efficacy.

2. **Passive Drug diffusion**: These films employ passive drug diffusion across the oral mucosa and route paracellular drug penetration.

3. **Patient Compliance and convenience**: OFDFs are patient-friendly since they are easy to use and non-invasive.

4**. Non- Invasiveness**: Compared to other oral dose forms, OFDFs are a recommended method since they are non-invasive.

5**. Site- Specific Drug Delivery**: The therapeutic efficacy of the medication is enhanced by OFDFs since they enable drug delivery to specific oral areas.

6. **Durable and Fragile**: OFDFs are brittle yet retain their original form as they reach stomach, in contrast to conventional tablets and capsules, which are robust.

7. **Overcoming Resistance:** Drug resistance may be overcome with the use of OFDFs, which are made to release medications toward the rear of the mouth.

8**. Overcoming Physical Barriers**: Physical barriers can be overcome with the help of OFDFs, which are designed to release medications at the rear of the mouth.

Disadvantages of oral fast dissolving films

1. **Solubility**: Approximately 80% of upcoming novel chemical entities (NCEs)encounter solubility issues, which results in the creation of OFDFs that are poorly soluble.

2. **Nanosuspension**: To improve the bioavailability of paroxetine, OFDFs loaded with nanosuspensions are challenging to create due to their instability.

3**. Nanoemulsion**: Because nano emulsions are unstable, it is difficult to make sublingual films based on them that dissolve quickly.

4. **Nano- emulsion- in -oil**: Because oil dispersions are unstable, replacing microplastics in capsule with them can be difficult.

5. **Fast- dissolving films loaded with active ingredients**: Overcoming the restrictions of oil dispersions and preserving the stability of the film active ingredients are major challenges.

6. **Fast dissolving Films loaded with Polymers**: Two major obstacles are preserving the polymer stability in the coating and getting over oil dispersions constraints

7**. Cost: -**ODFs may be more expensive to manufacture compared to traditional tablets and capsules, which may limit their availability and affordability**.**

8. Stability issues: - ODFs may have stability issues, particularly when exposed to heat, light, or other environmental factors. This may reduce their shelf life**.**

Comparison` between fast dissolving tablets and fast dissolving film

Criteria	**Fast dissolving tablets**	**Fast dissolving films**
Form	It is in tablet form	It is in film form
Thickness	The thickness is of 0.015-0.5 inches	Same as conventional tablet
Dissolution	Less dissolution due to less surface area	Greater dissolution due to larger surface area
Durability	Less durable as compared to oral films	Better durable as compared to oral disintegrating films
Patient compliance	As compared to film it is less patient compliance	It is more patient compliance
Dose size	Large dose can be incorporated	Small dose can only be incorporated
Chocking	Fear of chocking is present	No risk of chocking

Table 1: - Comparison between fast dissolving tablets and fast dissolving film

The following are some essential drug physiochemical characteristics that are crucial for creating these films : -

Solubility Enhancement: -Solubility of poorly water-soluble drugs, can be increased by adding β-cyclodextrin (β -cd), β-cyclodextrin possesses a conical structure, featuring hydrophilicity on the outer surface due to numerous hydroxyl groups, while its interior cavity exhibits hydrophobic characteristics., Enhancing the solubility of poorly water soluble. The co-amorphous dispersions at 1:2 molar ratio showed more than 600-fold increase in solubility of poorly water-soluble drugs like olanzapine.

Rapid disintegration and dissolution: -The disintegration time should be between 24 to 60 sec. The disintegration time totally depends on polymer concentration.

Taste Masking and Patient Compliance: - Taste-masking agents can be incorporated into the film formulation to enhance patient compliance, especially in paediatric or geriatric populations. MDFs provide a patient-compliant dosage form with improved solubility and rapid dissolution of olanzapine.

pKa and PH: - The pH and pka of olanzapine plays an important role in the formulation of fast dissolving oral film. Since the PH of all produced films ranges from 5.90 to 6.90, which is like salivary pH, no discomfort to the oral cavity was seen. Determining the surface PH of the films is necessary to examine potential adverse effects resulting from pH changes in vivo, as the buccal mucosa may get irritated by an acidic or alkaline pH. Thus, maintaining the surface pH as near to neutral as feasible is the goal. The pH was measured by meeting the orals film surface with the electrode. At the oral cavity's pH, it needs to be slightly unionized.

Objective: -

This paper attempts to elucidate the challenges that formulators typically have whole oral films that dissolve quickly. Furthermore, the paper provides detailed solutions to these issues, which will aid in the development of an oral film that dissolves quickly for drugs that are bitter or poorly water soluble. These treatments will improve this dosage forms output in the shortest amount of time.

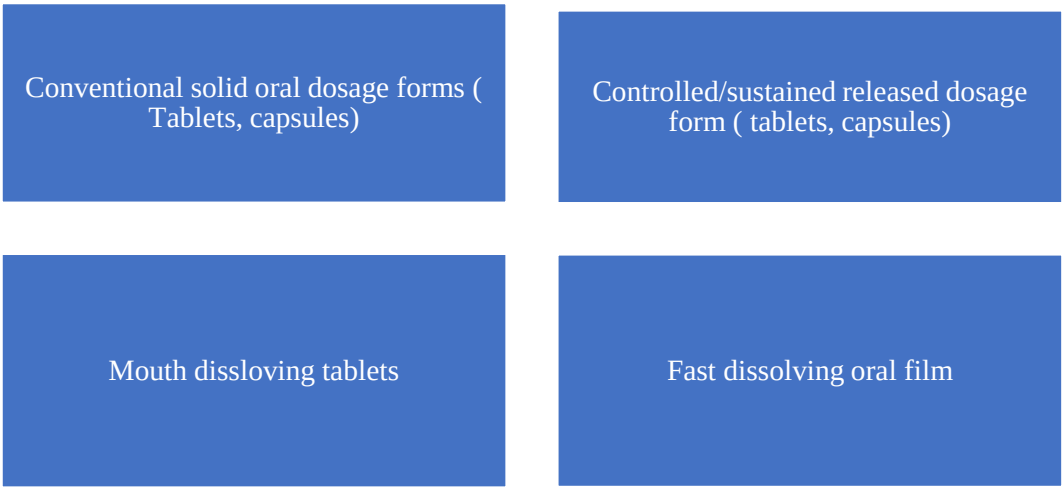

Figure 1: Development of fast dissolving oral film

Requirement of drug candidate into film formulation [(23)]

Mouth dissolving films can be manufactured with a wide range of medications. For a medicine to be utilized in an oral film, it must be lipophilic. A lipophilic medication absorbs quickly in the mucous membrane of the mouth due to its high permeability. Because oral films are highly permeable, class 2 (low solubility, high permeability) can be employed.

Ideal characteristics of drug: -

- Smaller and moderately sized molecules are the better choice for medications.
- Both in saliva and water, the medication should be well-stabilized and soluble.
- At the oral cavity's pH, it needs to be slightly unionized
- It needs to be able to penetrate oral mucosa tissue·

Special features of oral film

- Oral Film are thin, Elegant Film dissolve in mouth
- A variety of forms and sizes of films are available
- The film exhibits superb Mucho adhesion. Hence, during administration, the film does not separate from the oral cavity
- It disintegrates quickly—in less than a minute
- The drug has a quick beginning of action and is promptly released from the dosage form because of its rapid breakdown

Classification of oral films

Oral films are divided into three categories (table 2)

1. Flash release Films
2. Mucoadhesive melt- away films
3. Mucoadhesive sustained- release films

Properties	**Flash release Films**	**Mucoadhesive melt-away films**	**Mucoadhesive sustained- release films**
Area (cm^2)	2-8	2-7	2-4
Thickness	20-70	50-500	50-250
Structure	Single layer system	Single o multilayer	Multilayer system
Excipients	Soluble hydrophilic polymer	Soluble hydrophilic polymer	Low/ non-soluble polymer
Drug phase	Solid solution	Solid solution or suspended solution	Suspension and / or solid solution
Dissolution	60 sec	Few min	Max 8-10 hrs.
Application	Tongue	Gingival or buccal region	Gingival (another region in oral cavity

Table 2: - Classification of films

Method of preparation

1. Solvent casting method
2. Semi solid casting method
3. Hot melt extrusion
4. Solid dispersion extrusion
5. Rolling method

1. Solvent casting method

In this procedure, the drug and several additives should dissolve in an appropriate solvent, and the solvent should also use to dissolve water-soluble polymers. After that, both solutions should mix and stirred. After that, the solution should be degassed under vacuum to settle the air bubbles. Casting the bubble-free solutions into the Petri dish and allowing it to dry is the last step. Quickly dissolves in saliva without creating insoluble materials, the base of the present film formulation will be employed in oral hygiene products to alleviate bad breath.

Advantages

a. superior than extrusion in terms of uniformity of thickness and clarity
b. The movie shines nicely and is free of defects like die lines.
c. Film is more flexible and has superior physical properties.
d. While various thicknesses can be achieved to meet the needs of API loading and dissolving, a completed film thickness of 12–100 m is usually advised

Disadvantages

a. Water or a volatile solvent-soluble polymer is required
b. A stable solution with an appropriate minimum solid content and viscosity should be able to be produced
c. The production of a uniform film and its release from the casting support must be doable.

2. Semi solid casting method

A film -forming polymer solution that is soluble in water is produce by this process. Subsequently, an acid- insoluble polymer solution (such as cellulose acetate butyrate and phthalate) should combine with the resulting solution. After that, the appropriate amount of plasticizer should add to produce a gel mass. The gel bulk is then used to create the films or ribbons using heat- controlled drums. The thickness of the films should range from 0.015 to 0.05 inches. The film-forming polymers to acid-insoluble polymer ratio need to be 1:4**.**

3. Hot melt extrusion method

In this process, a hot-melted extruder should use. This process involves heating a polymer and shaping it into a film. Before being push out in molten form by the extruder, a mixture of dry pharmaceuticals substances, including API, is fed to the hopper, transported, mixed, and heated, then solidified molten mass should use to cast film. One important step is the molding and drying process. Numerous advantages of this approach include the potential for continuous operation, low product waste, and effective functioning. Characteristics, lack of organic solvents, scalability, and drug carrier mix residence durations and temperatures that are shorter.

Advantages

a. Water and solvent are not needed.

b. The compressibility properties of the API may not be important

c. An improved replacement for medications that are poorly soluble

d. Strong mixing and agitation result in a greater uniformity of dispersion.

e. Uses less energy than high-shear techniques

Disadvantages

a. Thermal degradation resulting from the application of high heat.

b. Processing requires an understanding of the polymer's flow properties

c. The dearth of polymers in supply.

d. Water or other volatile solvents cannot be present in any excipient.

Melt extrusion has been used in the pharmaceutical business to achieve several objectives by producing a solid dispersion or a solid solution, including:

1. increasing the drug's rate of dissolution and bioavailability.
2. Controlling or modifying the medication's release
3. Masking the bad aftertaste of a medication

The two main elements that influence a drug's oral bioavailability are its permeability and solubility. High throughput screening was introduced into the drug development process, which resulted in the synthesis of compounds that are often big in size, extremely lipophilic, and poorly soluble. Of the many methods available today to boost solubility and the pace of dissolution, the production of solid dispersion and solutions of solids is one.

4. Solid dispersion extrusion

The term "solid dispersion" refers to the process of dispersing several active chemicals in an inert carrier in a solid state whereas amorphous hydrophilic polymer molecules are present. Before being adding to a polyethylene glycol dissolve at a temperature below 70°C, medications are dissolve in appropriate solvents. Finally, solid dispersion mixtures are mould into the films using dies.

5. Rolling method

A drug-containing suspension or solution is roll on a carrier during the rolling process. The solvent is mostly composed of water and a combination of alcohol and water. After the film has dried on the rollers, it is cut into the appropriate sizes and shapes. Other ingredients, together with the active ingredient, are dissolved in a small volume of aqueous solvent using a high-shear processor. Water soluble hydrocolloids are dissolve in water to produce a uniform viscous solution (table 3).

Certain polymers that produce films

Synthetic polymers or Semi – synthetic polymers	**Natural polymers**
Polyvinylpyrrolidone	Starch
Polyvinyl alcohol	Pectin
Polyethylene oxide	Gelatine
Hydroxypropyl methylcellulose	Xanthan
Hydroxypropyl cellulose	Pullulan
Carboxymethyl cellulose	Maltodextrin
Polyethylene glycol, Poly(caprolactone)	Sodium alginate

Table 3: - Polymers used in Films

PATENT ON FAST DISSOLVING ORAL FILM

Application Number	Title	Application date	Status
202341089000	Dual Technology Oral Fast Dissolving Films For Controlled Levodopa Therapy in Dysphagic Parkinson's Patients	27/12/2023	Granted
202347038747	Oral Thin Film	6/6/2023	Granted
202221075688	Apparatus For Arrested Precipitation Technique (APT) For Deposition of Mixed Metal Chacogenide (MMC) Thin Films	26/12/2022	Granted
202247069394	Process For Producing an Oral Thin Film Comprising Microparticles	1/12/2022	Granted
202221059131	Oral Film Containing Self Nanoemulsifying Drug Delivery System of Anise Oil for Management of Migraine	17/10/2022	Granted
202241055645	A Novel Process for Making pH Adaptive Nanocarrier in Oral Biofilm Application	28/9/2022	Granted

Table 4: - Patent on fast dissolving oral film

Technologies for fast dissolving oral film

1. **Wafer Tab**

Pharmaceutical active ingredients are incorporated into an edible film strip as part of the Wafer Tab drug delivery system. When the strip comes into touch with saliva in the mouth, it offers quick disintegration and release of the active pharmaceutical ingredient. It is also possible to flavour the Wafer Tab film strip for even better taste masking. The film may be made in a range of sizes and forms and is a great way to give medications that need to release quickly, as well as for people who have trouble swallowing.

2. **XGEL**

Bio Progress's X Gel Film Technology was revolutionizing both product offers and manufacturing processes. It is not derived from animals, is acceptable due to religious beliefs, and is vegetarian-friendly. These films can include active pharmacological substances and can be colored, layered, taste-masked, and have enteric qualities. Any oral dose form can be encapsulated in XGELTM film systems, which are soluble in both hot and cold water.

3. **Foam Brust**

With this technique, gas is blasted into the film while it is being made, giving it a honeycomb structure. The film's spaces might be filled with gas, empty or loaded with additional ingredients to generate taste-burst qualities or to administer medications that are active. The construction is light and honeycombed, producing capsules that quickly dissolve and leave a melt-in-your-mouth texture feeling.

4. **Soluleaves**

A variety of oral delivery films with active chemicals, colors, and flavors can be made using this technology. Using this method, the film is made so that when it comes into contact with saliva, the active compounds will be released. These are made to stick to mucous membranes and release the medication gradually over the course of 15 minutes.

Application of fast dissolving oral films

Vaccines

Rotavirus vaccination, which is produced in the United States, is a fast-dissolving oral film that is stable at room temperatures and makes vaccinations almost as easy as mouthwash. This delivery system has several advantages, including better compliance among patients, increased bioavailability, and a reduction in the costs. associated with handling, administration, and storage.

Controlled and sustained release films

Hospitals use various polymers, such as chitosan and chitin derivatives, as excipients for preparing sustained-release buccal film

Taste Masking

For fast-dissolving tablets to be commercially viable, taste masking is a prerequisite. The active ingredients in fast-dissolving buccal films are released as they dissolve or break down in the patient's mouth**,** in contact with the tongue. Thus, this attribute is essential for compliance of the patient. Using

solvent evaporation and extraction techniques, and drugs that have an unpleasant, bitter flavour can be pH-sensitively microencapsulated into acrylic polymer. These polymer microspheres showed prompt and thorough breakdown in addition to efficient flavour masking.

Orally disintegrating film

The fast-dissolving oral film is a water- soluble polymer that breaks down when consumed. One of the advantages of oral film is that it dissolves swiftly without the need of water. It provides the alternative for individuals experiencing nausea and Swallowing difficulties including those who receiving chemotherapy.

Packaging of mouth dissolving film

Packaging plays an important role in the dosage forms stability, protection, and storage. Among the packaging possibilities for oral thin films are barriers film, single pouches, and aluminium pouches, blisters packs with many pieces, and aluminium paper or plastic pouches. Medications that are particularly moisture sensitive, for that barrier films are most frequently used. The films are created by a laminating process, and the cost of packaging is similar to that of tablets.

Mouth dissolving film in biopharmaceutical consideration

Biopharmaceutical considerations must be considered before developing a new dosage form. For example, fast-dissolving oral films dissolve instantly, facilitating the medicine's absorption through the oral mucosa of the mouth, throat, and oesophagus. Other biopharmaceutical considerations include blood flow, age, and the composition of the oral cavity. Drug interactions, tissues permeability, perfusion rate, and medication binding to tissue all have an impact on drug distribution. The speed at which the medicine exits your body determines how long it takes for it to reach its destination. Numerous factors, including the patient's age, sex, and health, affect the pharmacodynamic performance of the dosage form. Unfavourable events were recorded during the trial. Coatings and films that are edible could stop such a drop in food quality.

Challenges for developing fast dissolving oral film

Due to patients' preferences over tablets and capsules, Oral film is now available as an option. The OTC pain relief and motion sickness films are marketed in the United States. Prescription oral films are now authorized in the US, EU, and Japan, three significant nations. These authorized films may eventually overtake other dose variations of the same medications. It appears that the market for oral films will increase in value dramatically.

Following is some of the challenges in formulating fast dissolving oral film

1. Drug insolubility
2. Masking the taste of an unpleasant and harsh medicine (Taste masking)
3. Hygroscopicity
4. Mouth feel
5. Aqueous solubility
6. Amount of drug
7. Mechanical strength and disintegration time
8. Cost
9. A shorter film drying period
10. Incorporation of high dose in film
11. Combining medications
12. Films resistance to temperature and humidity
13. Require unique packaging
14. Uniformity of 4dose [1,2]

Drug insolubility: - When it comes to oral films, solubility is crucial in two contexts: first, when the medicine is soluble in the solvent during formulation, and second, when the film is placed in the mouth and dissolves in saliva. One of the most difficult components of creating an oral film is still the drug's solubility behavior

Masking the tase of unpleasant and harsh medicine: - One of the major formulation issues with many drugs is their unpleasant taste. Patients cannot tolerate bitter drugs in the form of FDTS. Manufacturer aim to administer bitter drugs orally with a level of palatability that is acceptable. Since most drugs have an unpleasant taste, rapid disintegrating drug delivery systems typically contain the medication in form that is disguised from taste. These delivery systems dissolve or disintegrate in the oral cavity of the patient, releasing the active ingredients that meet the taste buds. As result, taste- masking of the drugs becomes crucial to patient compliance. Technologies for taste masking are used for bitter tasting drugs such as macrolide antibiotics, non-

steroidal anti-inflammatory drugs, and penicillin. Sweeteners alone, however, are not always sufficient to cover the taste of highly potent, water- soluble bitter medications.

Hygroscopicity: - It is the ability of a product (such as cargo or packaging material) to react by absorbing or releasing water vapor in response to the air's moisture content. Undoubtedly, hygroscopicity is a crucial attribute of a powder. For a reasonably soluble chemical, it can be demonstrated that the hygroscopicity and solubility are correlated. The sensitivity of FDTS to humidity should be minimal. The use of numerous highly water-soluble excipients in formulation makes this challenge particularly difficult. Excipients that are very soluble in water are vulnerable to moisture: some will even melt at elevated humidity levels. An effective packaging design or alternative technique needs to be employed to safeguard FDTS against atmospheric circumstances.

Mouth Feel: - For the mouth cavity to feel comfortable, the particles produced following the FDTS's breakdown should be as little as feasible. Additionally, the oral feel is improved by the inclusion of tastes and cooling substances like menthol.

Aqueous solubility: - Drugs that are soluble in water present a few formulation challenges due to their formation of eutectic mixes, which cause freezing-point depressive disorders or a shape ion of a transparent solids that may collapse after drying due to the loss of supporting structure during the sublimate ion process. Sometimes, this kind of collapse can be avoided by employing different matrix- forming excipients, including mannitol, which can help the amorphous composite acquire rigidity by inducing crystallinity.

Amount of Drug: - The drug dosage for lyophilized dosage forms needs to be less than 60 mg for soluble pharmaceuticals and less than 400 mg for insoluble drugs. This parameter is especially difficult to formulate as fast-dissolving oral films. The amount of medication that can be added to each unit dose limits the deployment of FDTS technologies .

Mechanical strength and disintegration time: - FDTS are designed to achieve a disintegration time of typically less than 60 seconds. When FDTS comes into touch with saliva, it dissolves quickly in the oral cavity, causing the medication to be given in a suspension or solution. It goes without saying that increased mechanical strength will cause the disintegration time to be delayed. Thus, striking a fair balance between these two factors is always crucial. One of the biggest challenges while doing this is retaining adequate mechanical strength.

Cost: - Economical technology needs to be employed for FDTS. The adoption of special technology may result in higher product costs technology.

Evaluation of fast dissolving oral film

- Thickness
- Dryness test
- Surface pH
- Folding endurance
- Uniformity of drug content
- Percentage elongation
- Stability study
- Disintegration time
- Dissolution time

- **Thickness: -** This can be determined by using digital vernier calliper that has been calibrated or a micro meter screw gauge to check uniformity content.
- **Dryness test**: - This test is used to check the material adhesive ability.
- **Surface pH**: - A mixed pH electrode is used to assess the surface pH of the fast-dissolving film to minimize any potential in vivo negative effects and to maintain neutral pH, since an acidic and alkaline pH irritate oral mucosa.
- **Folding endurance: -** The folding endurance of a material is determined by repeatedly folding it in the same location until it breaks, with the number of folds required for breakage serving as the measure of its folding endurance**.**

Uniformity of drug content: - Determines consistency in medication content. A mean of three measurement is used to determine the drug content. Between 85-115% is the highest content uniformity

- **Percentage Elongation**: - %elongation = increase in length x 100/ original length
- **Stability study**: - Stability tests must be carried out in a humid chamber at accelerated temperatures (35 ºC and 65% relative humidity).
- **Disintegration time**: - The films in-vitro disintegration time is measured visually in a Petri dish filled with 25 ml of distilled water while being swirled once every ten seconds. The length of time it took for the film to fall apart is used as the disintegration time.

- **Dissolution time**: - The in vitro dissolution test is conducted using USP 1 basket dissolution apparatus.

MARKETED PRODUCTS OF FAST DISSOLVING ORAL FILM

Product	**Manufacturer**	**API**	**Uses**
Listerine	Pfizer	Cool mint	Mouth Fresheners
Triaminic	Novartis	Dextromethorphan	Cough Suppressants
Suppress®	InnoZen®, Inc	Menthol	Cough Suppressants
Gas-X	Novartis	Simethicone	Anti Flatuating
Theraflu	Novartis	Dextromethorphan	Cough suppressants
Ondansetron ODF	Setofilm	Ondansetron	Anti emetic
Donepezil Film	Labtec	Donepezil Hcl	Alzheimer's disease
Klonopin Wafer	Solvay Pharm	Clonazepam	Antianxiety
Benadryl	Pfizer	Diphenyhydramine	Antiallergic
Orajel	Del	Menthol/ pectin	Mouth Fresheners
Chloraseptic	Prestige	Benzocain/menthol	Sore throat
Sudafed PE	Wolters KH Inc.	Phenylephrine	Congestion

Table 5: - Marketed Products

Future possibilities

In the pharmaceutical industry, technologies for oral medication delivery have made great progress. From conventional pills and capsules to modern fast-acting tablets and films, the market has come a long way. The focus of pharmaceutical corporations has switched to developing novel oral dosage forms that address a variety of issues, such as the inconvenient delivery of injections, the inferior absorption of oral solid drugs, and incorrect administration by liquid formulations. Fast-dissolving oral thin films provide relief from most of these problems. The concept is not new; many oral thin films are available over-the-counter without a prescription. Growing demand for generic oral film solutions and favourable customer feedback have led to the transformation of prescription into oral thin films. Both new and established pharmaceuticals companies are paying attention to this developing field.

Conclusion

Schizophrenia are increases, so new strategies and products, as well as higher consumer literacy are needed. This review intended to draw attention to this new drug delivery system that use a promising technology and have been used for the incorporation of molecules into nervous system, among other system. The fast-dissolving oral film are prepared by using solvent casting method and water-soluble polymers and active ingredient olanzapine which is beneficial for the patients who have difficulty in swallowing.

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