IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2

Review Article: Oral Fast Dissolving Film: A Novel Formulation

Deshmukh Kanchan Bhiku[1], Shinde Tejaswini Sunil[2], Sonawalkar Sonali G.[3], Principal Dr. Naga Raju Potnuri[4]
Students, Bachelor of Pharmacy, Mandesh Institute of Pharmaceutical Science and Research Center, Mhaswad[1,2]
Guide, Department Pharmaceutical Science
Mandesh Institute of Pharmaceutical Science and Research Center, Mhaswad[3]
Principal (Department Pharmaceutical Science)
Mandesh Institute of Pharmaceutical Science and Research Center, Mhaswad[4]

Abstract: *Fast dissolving films are widely accepted and precise oral dosage forms that bypass first-pass hepatic metabolism and deliver a rapid therapeutic response. The pharmaceutical industry favours this dosage form because of its improved patient compliance, especially for paediatric and geriatric patients, as well as its industrial feasibility. Oral films have the potential to replace many over-the-counter (OTC), generic, and branded medications due to their low production cost and high consumer preference. When placed in the oral cavity, the film rapidly hydrates, adheres to the application site, and disintegrates to release the drug. Therefore, fast dissolving films offer several advantages over conventional solid oral dosage forms. This review provides an overview of the polymers commonly used for drugs belonging to Biopharmaceutics Classification System (BCS) Class I to Class IV and discusses the factors influencing drug absorption. For drugs classified under BCS Class II and Class III, solubility and permeability act as the major rate-limiting factors during the formulation of oral fast dissolving films. In addition, the review highlights various manufacturing techniques, evaluation parameters, pharmaceutical applications, and technologies employed in oral film formulation..*

Keywords: Fast Dissolving Oral Film, Orodispersible film, Rapid drug release, Oral mucosal delivery

I. INTRODUCTION

The oral route is considered the most convenient and widely accepted method of drug
administration among all available drug delivery systems. More than 70% of pharmaceutical products are marketed as oral dosage forms because they are painless, easy to use, and adaptable to different categories of drug molecules. However, swallowing difficulties, commonly known as dysphagia, are frequently observed in people of all age groups. Due to this condition, nearly half of the population, particularly pediatric and geriatric patients, avoid conventional solid dosage forms because of the risk or fear of choking.To overcome these limitations, Fast Dissolving Tablets (FDTs) were introduced during the early twentieth century, which eventually led to the development of Fast Dissolving Films (FDFs). These dosage forms have attracted significant attention owing to their rapid disintegration and dissolution characteristics. They can be administered without water, making them highly beneficial for children and elderly patients. Initially introduced as breath freshening strips, FDFs are now extensively used in pharmaceutical, food, and personal care industries.Both pharmaceutical manufacturers and consumers have recognized FDFs as an efficient alternative to traditional over-the-counter (OTC) products such as tablets, capsules, and liquid formulations. These films provide precise dosing in a safe, effective, portable, and user- friendly dosage form without the need for water or measuring devices. Different polymers are employed either individually or in combination to achieve the required film characteristics.

The prepared films should possess sufficient mechanical strength to resist damage during handling and transportation while also dissolving rapidly in the oral cavity to release the drug immediately. The excipients used in FDF formulations are generally hydrophilic, whereas the active pharmaceutical ingredient may be hydrophilic or hydrophobic in nature. Among all formulation ingredients, the film-forming polymer and plasticizer play a crucial role in determining film quality and performance. Generally, the polymer constitutes about 40–50% w/w of the total dry film weight, while plasticizers are used up to 20% w/w of the polymer content to improve flexibility and stability. The market growth of oral thin film technology has increased remarkably over the years. According to Technology Catalysts, the oral thin film market was valued at nearly $500 million in 2007 and was expected to exceed $2 billion by 2012. Due to continuous global demand, the fast dissolving dosage market was projected to generate revenues of around $13 billion by 2015. FDF technology is increasingly considered an advanced substitute for FDTs because it offers improved product differentiation and stronger resistance to generic competition. From a commercial standpoint, patented oral dissolving film technologies provide marketing exclusivity and enhanced revenue opportunities .Fast dissolving films are also referred to by various other names, including mouth dissolving films (MDFs), orally disintegrating films (ODFs), melt-in-mouth films, oro-dispersible films, quick dissolving films, and rapid disintegrating films.

Challenges in Oral Thin Film Technology

1. Incorporation of Larger Drug Quantities

Formulating oral thin films with high-dose drugs remains difficult because excessive drug loading may negatively influence film thickness, flexibility, and patient comfort.

2. Maintenance of Drug Stability

Preserving the physical and chemical stability of drugs, especially those sensitive to moisture and temperature, continues to be a critical concern.

3. Optimization of Mechanical Properties

Achieving an ideal balance between film strength, elasticity, and rapid disintegration presents a significant formulation challenge.

4. Advanced Taste Masking Requirements

Efficient masking of unpleasant drug taste without affecting dissolution behaviour or therapeutic efficacy remains a complex task.

5. Consistency in Drug Distribution

Uniform dispersion of active ingredients throughout the film matrix is essential to ensure accurate and reproducible dosing.

6. Discovery of Novel Film-Forming Materials

Continuous research is required to develop innovative polymers with superior film-forming ability, biocompatibility, and enhanced drug carrying capacity.

7. Commercial Scale Manufacturing Difficulties

Maintaining product quality, reproducibility, and uniformity during large-scale industrial production is challenging.

8. Protection Against Environmental Moisture

Because oral thin films are highly moisture-sensitive, the development of efficient and economical packaging systems is necessary.

9. Improving Drug Permeation and Absorption

Enhancing the bioavailability of poorly soluble and poorly permeable drugs through the oral mucosa remains an important research objective.

10. Regulatory Standardization Issues

The absence of universally accepted guidelines and standardized evaluation methods creates obstacles in regulatory approval and quality assessment.

11. Enhancement of Patient Convenience
Improving characteristics such as mouth feel, texture, flavor, size, and disintegration time is essential for greater patient acceptance.
12. Excipient–Drug Compatibility Concerns
Selecting excipients that are chemically and physically compatible with the active pharmaceutical ingredient is often difficult.
13. Reduction of Production Expenses
Developing cost-efficient manufacturing and packaging techniques while preserving product quality is important for market competitiveness.
14. Formulation Challenges with Hydrophobic Drugs
Incorporating water-insoluble drugs into oral thin films without affecting dissolution and absorption properties remains problematic.
15. Expansion of Therapeutic Applications
Future advancements are needed to extend oral thin film technology for delivery of peptides, proteins, vaccines, and controlled-release formulations.

Advantages of Fast Dissolving Oral Films
1. Simple to Use
Fast dissolving oral films can be administered easily without the need for water, making them highly user-friendly.
2. Higher Patient Acceptance
These films are especially beneficial for children, elderly individuals, bedridden patients, and people who have difficulty swallowing traditional tablets or capsules.
3. Quick Therapeutic Response
Since the film dissolves rapidly in the mouth, the drug is released quickly and produces a faster medicinal effect.
4. Improved Drug Absorption
Drug absorption through the oral mucosa may avoid first-pass metabolism, thereby increasing the effectiveness of the medication.
5. Precise Drug Delivery
Oral films provide an exact quantity of medication, ensuring uniform dosing.
6. Easy to Carry
Their thin and lightweight nature makes them convenient for transportation and storage.
7. Minimized Choking Hazard
Because the films dissolve instantly in saliva, they reduce the possibility of choking associated with solid dosage forms.
8. Enhanced Stability
Fast dissolving films generally possess better physical and chemical stability compared to liquid formulations.
9. Convenient Administration
They do not require additional tools such as cups, spoons, or measuring devices during administration.
10. Improved Taste and Mouth Feel
Flavouring and sweetening agents increase palatability and make the dosage form more pleasant for patients.
11. Flexible Formulation
Both water-soluble and water-insoluble drugs can be incorporated into oral film formulations.
12. Wide Consumer Acceptance
Due to their convenience and innovative nature, oral films are increasingly preferred in pharmaceutical and OTC markets.
13. Lower Gastric Irritation
Buccal absorption may help decrease stomach-related side effects caused by certain medications.

14. Rapid Disintegration
The films dissolve within a short period, allowing immediate drug availability in the oral cavity.
15. Economical Production
Fast dissolving oral films can be prepared using simple and cost-efficient manufacturing techniques.

Limitations of Fast Dissolving Oral Films

1. Restricted Drug Incorporation Capacity
Fast dissolving oral films are unsuitable for drugs requiring high dosage because only a limited quantity of active pharmaceutical ingredient can be incorporated into the film matrix.
2. High Hygroscopic Nature
These formulations are highly susceptible to moisture absorption, which may adversely affect their stability, texture, and dissolution characteristics.
3. Requirement of Protective Packaging
Specialized packaging materials are necessary to protect the films from environmental factors such as humidity, physical damage, and contamination.
4. Insufficient Mechanical Durability
Inadequately formulated films may exhibit poor tensile strength, leading to tearing or cracking during handling and transportation.
5. Complex Taste Masking Process
Formulation of films containing bitter or unpleasant drugs requires advanced taste masking techniques to ensure patient acceptability.
6. Limited Suitability for Certain Drugs
Drugs with high molecular weight, poor stability, or large dose requirements may not be appropriate candidates for oral film formulation.
7. Sophisticated Manufacturing Techniques
Preparation of films with uniform thickness, drug distribution, and consistent quality demands precise and advanced production methods.
8. Increased Manufacturing Expenditure
The need for specialized equipment, controlled processing conditions, and advanced packaging may elevate production costs.
9. Stability-Related Challenges
Certain active pharmaceutical ingredients may undergo degradation due to exposure to moisture, temperature variations, or salivary conditions.
10. Possibility of Non-Uniform Drug Distribution
Improper dispersion of drug substances within the polymeric matrix may result in dose inconsistency.
11. Handling Difficulties
Ultra-thin films may adhere to one another or become difficult to manipulate during packaging and administration.
12. Challenges in Excipient Compatibility
Selection of suitable polymers, plasticizers, sweeteners, and other excipients requires careful optimization to achieve desired film properties.
13. Potential Oral Mucosal Irritation
Certain formulation components may produce irritation or discomfort within the oral cavity.
14. Need for Controlled Storage Conditions
Maintenance of product quality often requires storage under regulated temperature and humidity conditions.

ISSN: 2581-9429 Volume 6, Issue 9, May 2026 Impact Factor: 8.2

15. Reduced Buccal Residence Time

Rapid disintegration of the film may decrease the duration available for complete drug absorption through the oral mucosa.

Classification of Fast Dissolving Technologies

Fast dissolving drug delivery technologies are mainly classified into three categories based on their formulation approach and manufacturing technique.

1. Lyophilized Drug Delivery System.

Lyophilized systems are prepared by dispersing or dissolving the active drug along with suitable excipients in a liquid medium. The formulation is then filled into preformed blisters or molds and subjected to freeze-drying (lyophilization). This process produces highly porous dosage units that allow immediate penetration of saliva or water, leading to ultra-rapid disintegration and quick drug release in the oral cavity.

2. Compressed Tablet-Based Technologies

These systems are developed using conventional compression methods, especially direct compression technology. Fast disintegration is achieved through the incorporation of water- soluble excipients, super disintegrants, and effervescent agents that enhance water uptake into the tablet matrix. Compared with conventional tablets, these formulations exhibit faster breakdown and dissolution while maintaining acceptable mechanical strength.

3. Oral Thin Film Technologies

Oral thin films, also known as oral wafers or dissolving strips, were initially introduced in the confectionery and oral hygiene sectors as breath-freshening strips. Due to their convenience and rapid dissolving nature, they later emerged as an advanced platform for pharmaceutical drug delivery. Today, Fast Dissolving Films (FDFs) are widely accepted for the administration of active pharmaceutical ingredients (APIs) in over-the-counter (OTC) products and are increasingly being investigated for prescription-based therapies. The commercial success of products such as Listerine Pocket Paks greatly enhanced consumer awareness and acceptance of oral thin film technology.

Selection of Drug Candidate for Oral Thin Films

An ideal drug candidate for orally dissolving or chewable film formulations should possess specific physicochemical and pharmacological properties to ensure effective performance and patient acceptability. The desirable characteristics include:

• The drug should have a pleasant taste, or its bitter taste must be effectively masked.
• It should exhibit good stability in aqueous conditions such as saliva and moisture.
• The drug dose should preferably be low to allow uniform incorporation into the thin film matrix.

On the other hand, certain categories of drugs are considered unsuitable for oral thin film formulations, including:

• Drugs with a very short biological half-life that require frequent administration.
• Drugs intended for controlled, sustained, or prolonged release delivery systems.

Based on these considerations, several studies have previously investigated the delivery of lidocaine through polymeric oral films for local anesthetic applications in dentistry. In recent years, advanced intraoral thin-film and strip technologies have been developed to provide rapid release of active pharmaceutical ingredients (APIs) when placed on the tongue or oral mucosa.

A number of pharmaceutical companies, including LTS Lohmann Therapie-Systeme, Zengen Inc., and Lavipharm Laboratories, have introduced innovative oral film technologies such as Quick-Dis™ and Slow-Dis™ systems. These technologies employ specialized solution-coating techniques in which the formulation is uniformly spread onto a continuously moving substrate at a controlled thickness. The films are subsequently dried in multi-zone ovens under carefully regulated temperature conditions to ensure product uniformity and stability.

Typically, these oral films dissolve rapidly within a few seconds after administration, resulting in immediate drug release. Furthermore, the drug release profile can be modified by adjusting the film thickness and selecting suitable polymeric matrices according to therapeutic requirements.

Standard Composition of Oral Fast Dissolving Films

An oral fast dissolving film is a thin, drug-loaded polymeric strip generally having a surface area ranging from 5–20 cm². These films are designed to dissolve rapidly in the oral cavity and typically accommodate a maximum drug dose of about 30 mg per film. From a regulatory perspective, all excipients used in the formulation should be approved for oral pharmaceutical use and classified as Generally Recognized as Safe (GRAS).

A conventional oral fast dissolving film formulation commonly consists of the following components:

1. Active Pharmaceutical Ingredient (API) – the therapeutic drug incorporated into the film.
2. Film-Forming Polymers – polymers responsible for providing structural integrity and film formation.
3. Plasticizers– agents added to improve flexibility, elasticity, and mechanical strength of the film.
4. Saliva-Stimulating Agents – substances that enhance saliva production and promote rapid film disintegration.
5. Sweetening Agents – ingredients used to improve palatability and mask unpleasant taste.
6. Flavouring Agents – additives incorporated to provide a pleasant mouth feel and enhance patient acceptance.
7. Surfactants – compounds that improve wetting, solubility, and uniform dispersion of the drug within the film matrix.
8. Colorants and Fillers– excipients used to improve appearance, texture, and overall film characteristics.

Sr. No.	Composition of Film	Quantity (%)
1	Active pharmaceutical agent	01-25
2	Film forming polymer	40-50
3	Plasticizer	0.-20
4	Saliva stimulating agent	2-6
5	Sweetening agent	3-6
6	Flavoring agent	10
7	Coloring agent	1

Formulation Of Fast Dissolving Oral Film

Fast dissolving oral films are manufactured using several advanced pharmaceutical techniques such as casting, extrusion, spraying, and rolling processes. These methods are designed to produce thin films with rapid disintegration, uniform drug distribution, and good mechanical properties. The major preparation methods include:

1. Solvent Casting Technique
2. Semisolid Casting Technique

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 9, May 2026 Impact Factor: 8.2

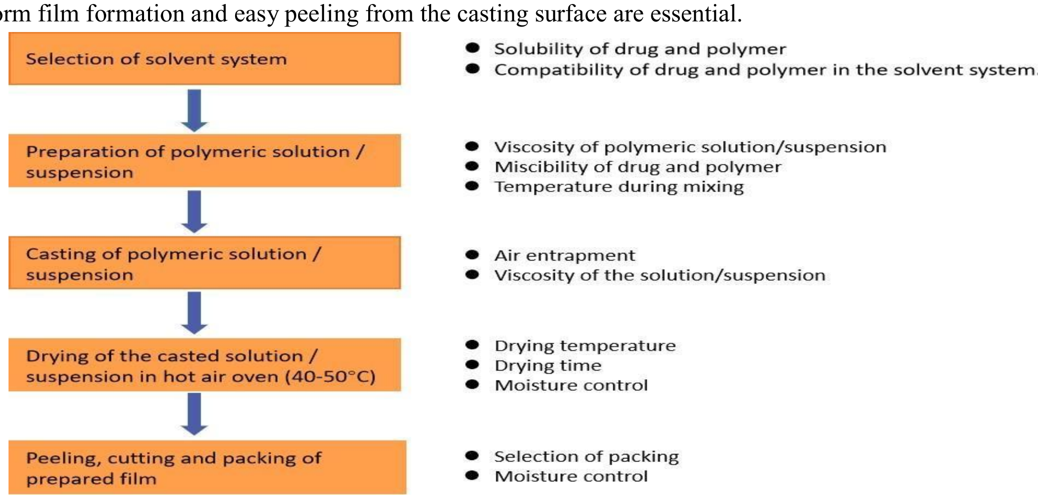
3. Hot Melt Extrusion Technique
4. Solid Dispersion Extrusion Technique
5. Rolling Technique

1. Solvent Casting Technique

The solvent casting method is the most commonly employed technique for preparing oral fast dissolving films. In this process, the active pharmaceutical ingredient (API) and other additives are dissolved in a suitable solvent system. Separately, water-soluble polymers are dissolved to prepare a polymeric solution. Both solutions are blended thoroughly to obtain a homogeneous mixture. Entrapped air bubbles are removed by vacuum deaeration, and the resulting solution is cast onto a flat surface such as a Petri plate or casting mold. The film is then dried under controlled conditions to obtain a smooth and uniform thin film.The resulting films dissolve rapidly in saliva without leaving insoluble residues and are extensively utilized in oral healthcare and drug delivery applications.

• Merits
1. Produces transparent and uniform films.
2. Provides smooth surface appearance without imperfections.
3. Improves flexibility and mechanical strength of films.
4. Film thickness can be adjusted according to drug loading requirements.

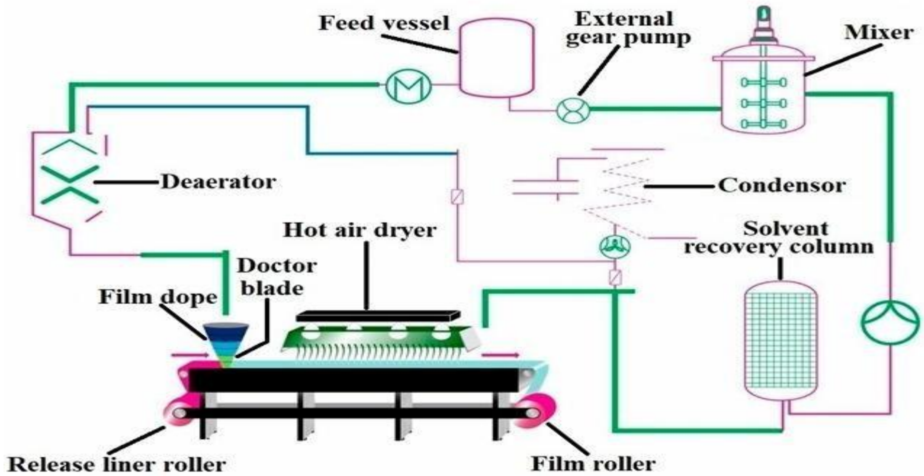
• Limitations
1. Requires polymers soluble in water or volatile solvents.
2. Proper viscosity and stability of the casting solution are necessary.
3. Uniform film formation and easy peeling from the casting surface are essential.



2. Semisolid Casting Technique

In this method, a solution of water-soluble film-forming polymer is prepared and mixed with an acid-insoluble polymer solution such as cellulose acetate phthalate or cellulose acetate butyrate. Suitable plasticizers are added to form a semisolid gel mass.The prepared gel is cast onto heated rotating drums to produce thin films or ribbons. Generally, the film thickness ranges between 0.015 and 0.05 inches. The ratio of film-forming polymer to acid-insoluble polymer is usually maintained at 1:4

ISSN: 2581-9429
Impact Factor: 8.2



3. Hot Melt Extrusion Technique

Hot melt extrusion is a modern pharmaceutical manufacturing technology used for preparing oral thin films without using solvents. In this process, the polymer and drug mixture are
introduced into an extruder, where they are subjected to heating, mixing, and melting.
The molten mass is forced through a die and subsequently cooled to form thin films. This method enables continuous manufacturing and efficient process control.

• Advantages

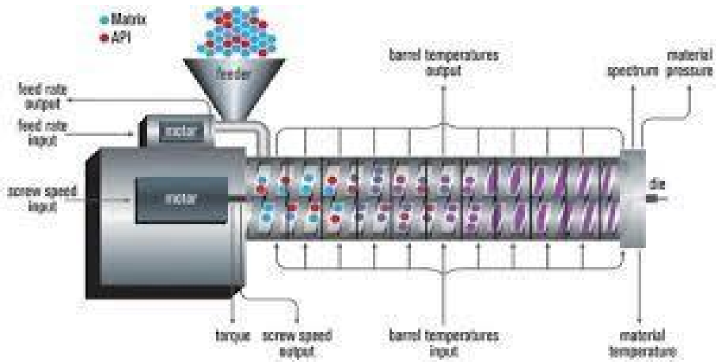
1. Eliminates the need for solvents or water.
2. Suitable for poorly compressible drugs.
3. Enhances uniformity of drug dispersion within the polymer matrix.
4. Requires comparatively lower processing energy.
5. Useful for improving dissolution of poorly soluble drugs.

• Disadvantages

1. High processing temperatures may degrade heat-sensitive drugs.
2. Polymer flow behaviour greatly influences processing efficiency.
3. Limited availability of compatible polymers.
4. Excipients must be free from moisture and volatile substances.

• Pharmaceutical Applications

1. Enhancement of drug solubility and bioavailability.
2. Modification of drug release characteristics.
3. Taste masking of bitter drugs.



o

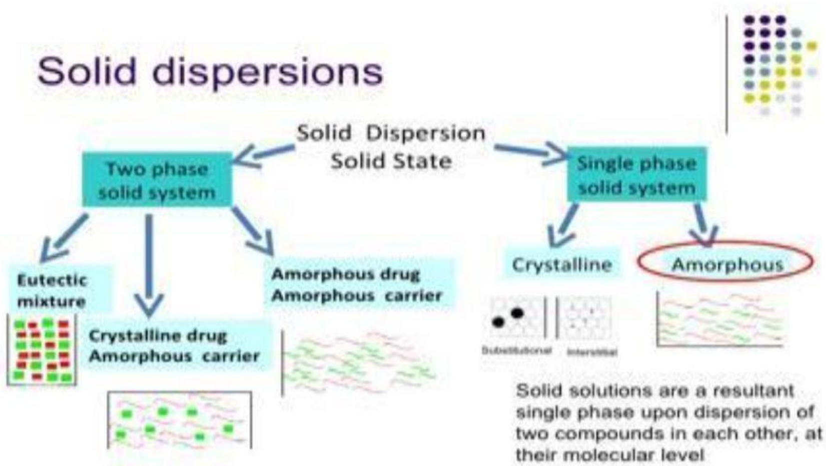
4. Solid Dispersion Extrusion Technique

Solid dispersion technology involves dispersing one or more active pharmaceutical
ingredients within an inert hydrophilic carrier matrix. In this method, the drug is dissolved in a suitable solvent and incorporated into melted polyethylene glycol below 70°C.

The prepared solid dispersion is then extruded and shaped into thin films using dies. This technique significantly enhances the dissolution rate and bioavailability of poorly water- soluble drugs by reducing particle size and improving molecular dispersion.

• Applications

1. Improves solubility and dissolution rate of APIs.
2. Enhances oral bioavailability of poorly soluble drugs.
3. Suitable for modern drug candidates identified through high-throughput screening.

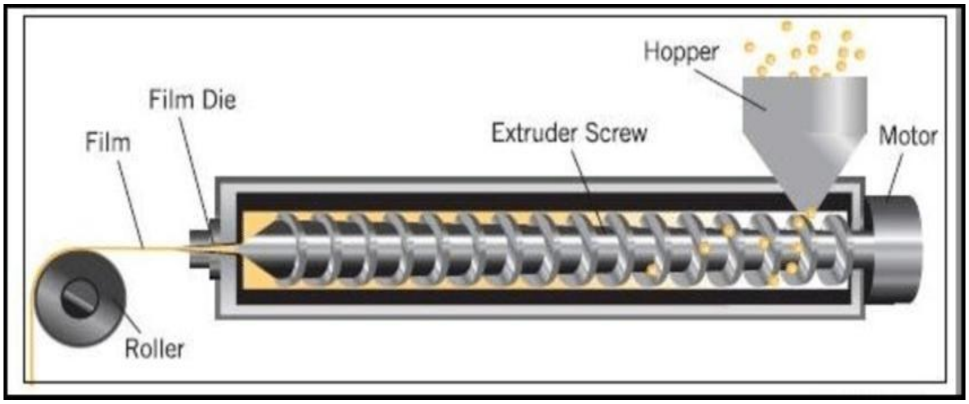


5. Rolling Technique

The rolling method involves continuously spreading a drug-containing solution or suspension onto a carrier surface using rollers. Water or hydroalcoholic solvent systems are generally
employed during preparation .Additional excipients and active ingredients are mixed using high-shear processing equipment to ensure uniformity. After drying on the rollers, the films are cut into the required dimensions and packaged appropriately.

This technique is particularly advantageous for large-scale industrial manufacturing because it supports continuous production and high productivity.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2



• Applications of Fast Dissolving Oral Film

Fast dissolving oral films are thin, flexible strips designed to disintegrate rapidly in the mouth without the need for water. These films have gained importance in modern drug delivery
because they are convenient, portable, and easy to administer.

1. Administration in Pediatric and Geriatric Patients

Oral films are especially beneficial for children and elderly individuals who experience difficulty swallowing conventional tablets or capsules.

2. Rapid Drug Action

Since the film dissolves quickly in saliva, the drug can be released and absorbed rapidly, making it useful for conditions requiring immediate therapeutic effect.

3. Improved Patient Compliance

The ease of use, pleasant taste, and no requirement for water increase patient acceptance and adherence to treatment.

4. Emergency Medication Delivery

Fast dissolving films are suitable for emergency situations such as allergic reactions, nausea, migraine, and motion sickness where quick relief is needed.

5. Delivery of Nutraceuticals and Vitamins

These films are also used for the administration of vitamins, herbal extracts, and dietary supplements due to their convenience and portability.

6. Buccal and Sublingual Drug Delivery

Drugs delivered through the buccal or sublingual route may bypass first-pass metabolism, which can improve bioavailability and therapeutic effectiveness.

7. Use in Central Nervous System Disorders

Oral films can be used for drugs treating anxiety, depression, epilepsy, and other neurological disorders where rapid onset may be beneficial.

8. Travel-Friendly Dosage Form

Their compact size and ease of administration without water make them suitable for travellers and patients with active lifestyles.

9. Smoking Cessation Therapy

Nicotine-containing oral films are used to support smoking cessation programs by providing controlled nicotine delivery.

10. Oral Hygiene and Cosmetic Product

Fast dissolving films are commonly incorporated into breath fresheners and oral care products for quick action and convenience.

• Evaluation Parameters of Fast Dissolving Oral Films

1. Organoleptic Evaluation

Organoleptic properties such as colour, taste, and aroma are important for fast dissolving oral films because the formulation dissolves directly in the mouth. The film should possess an attractive appearance and pleasant sensory characteristics to improve patient acceptance, especially in pediatric patients. Colour uniformity is generally examined visually. The odour of the formulation should also be acceptable, and flavouring agents are added to mask the unpleasant smell of drugs, polymers, or excipients. Taste evaluation is commonly performed using human volunteers or electronic tongue systems that can detect variations in sweetness and taste-masking efficiency.

2. Surface pH Determination

The surface pH of oral films is measured to ensure that the formulation does not irritate the oral mucosa. Ideally, the pH should remain close to neutral. For the test, the film is slightly moistened with distilled water, and the pH is measured by placing the electrode of a pH meter on the film surface. Multiple samples are tested to obtain an average value.

3. Thickness Measurement

Film thickness is evaluated using instruments such as a micrometer screw gauge or digital micrometer. Uniform thickness is necessary to ensure consistent drug content and proper mechanical strength.

4. Weight Variation Test

Individual films are weighed separately, and the average weight is calculated. The difference between the individual and average weights is used to determine uniformity among the films.

5. Texture and Physical Appearance

The texture, smoothness, transparency, and overall appearance of the films are inspected visually and by touch. Films should be free from imperfections such as air bubbles, cracks, or rough surfaces.

6. Folding Endurance

Folding endurance indicates the flexibility of the film. In this test, the film is repeatedly folded at the same location until it breaks. The number of folds the film withstands before breaking represents the folding endurance value.

7. Tensile Strength

Tensile strength measures the mechanical resistance of the film against breaking under tension.Higher tensile strength indicates better mechanical stability.

8. Drug Content Uniformity

Drug content uniformity ensures equal distribution of the active pharmaceutical ingredient within each film. The amount of drug present is determined using standard pharmacopeial assay methods.

9. Moisture Content

Moisture content affects the flexibility, stability, and brittleness of oral films. It can be determined by methods such as Karl Fischer titration or heating the film until a constant weight is achieved.

10. Disintegration Time

Disintegration time refers to the time required for the oral film to break down completely in the oral cavity. It is commonly evaluated using the USP disintegration apparatus. Fast dissolving films generally disintegrate within 5–30 seconds.

11. In Vitro Drug Release Study

The drug release profile of the film is studied using a USP dissolution apparatus. The film is placed in dissolution media such as phosphate buffer (pH 6.8) or 0.1 N hydrochloric acid maintained at 37 ± 0.5°C with controlled rotation speed. Samples are collected at regular intervals and analyzed spectrophotometrically.

12. Percentage Elongation

Percentage elongation measures the elasticity of the film and indicates its ability to stretch before breaking. It is determined from the increase in film length during tensile testing relative to the original length.

II. CONCLUSION

The present review highlights that fast dissolving oral films are widely preferred for patients suffering from dysphagia and for emergency conditions where rapid drug administration is required. These films improve patient convenience, enhance compliance, and are simple to use without water. Formulating drugs belonging to BCS Class II and BCS Class III can be challenging because the absorption process is often affected by poor solubility or permeability, especially in low-dose drugs. Such limitations can be minimized by the appropriate selection of polymers and formulation components. Among the different preparation techniques, the solvent casting method is the most frequently employed due to its simplicity and effectiveness. Technologies such as Wafer, Foamburst, and Micap are also utilized in the development of oral film formulations.

REFERENCES

1. M.D. Nehal Siddiqui, Garima Garg, Pramod Kumar Sharma, A NovelApproach in Oral Fast Dissolving Drug Delivery System and Their Patents, Advances in Biological Research, 2011; 291-303.
2. Sachin Gholve, Dr. Omprakash Gadgeppa Bhusnure, Formulation and Evaluation of oral fast dissolving sublingual film of propanolol HCL, Int J Pharma Res Health Sci. 2018; 2369-2673
3. Supriya Shidhaye, Sheetal Malke, V.J. Kadam, Formulation and evaluation of Oxacarbazine fast dissolve tablets, Indian J. Pharma Sci., 2007; 211-214.
4. Galey W R, Lonsdale H K, Nacht S, The in vitro permeability of skin and buccal mucosa to selected drugs and tritiated water, J. Investigative Dermatol,1976; 713-717
5. Dixit R.P., Puthli S.P., Oral strip technology Overview and future potential, Journal of Controlled Release, 2009; 94-107.
6. Vollmer, U., P. Galfetti, Rapid Film: Oral Thin Films as an Innovative Drug Delivery System and Dosage Form, Drug Development Report, 2006; 1-5.
7. . Mahajan, A., N. Chhabra, G. Agarwal. Formulation and Characterization of Fast Dissolving Buccal film: A Review, Der Pharmacia Sinica, 2011; 3(1); 152-165.
8. Suresh B., D. Halloran, L. James., Quick Dissolving Films: A Novel Approach to Drug Delivery, Drug Development Technology, 2006
9. Priyanka, Kapil Kumar, Deepak Teotia, A Comprehensive Review on Pharmaceutical Oral Dissolving Films, Journal of Drug Delivery & Therapeutics, 2019; 9(5-s);170- 174
10. Nibha K. P., Panchol, S. S., An overview on: Sublingual route for systemic drug delivery, Ijrpbsonline, 2012; 2; 913-23.
11. . Chowdary Y A, Soumya M, Madhu Babu M, Aparna K, Himabindu P,A review of fast dissolving drug delivery systems-A pioneering drug delivery technology,Bull Env Pharmacol Life Scien. 2012; 1(12):08-20.
12. . Soni MM, Patel KR. Formulation and evaluation of fast dissolving film of lurasidone Hcl. Int. J. Pharm. Res. Bio.Sci.2016; 5(2):101-123.
13. Haque SE, Sheela A. Development of polymer-bound fastdissolving metformin buccal film with disintegrants. Int. J. Nanomedicine.2015; 10(1):199-205.
14. Thakur S, Raju L, Soni A, Agnihotri B. Formulation and evaluation of fast dissolving film of losartan potassium.World J. Pharmcol. Res. Tech.2015; 3(6):179-189.
15. Rekha MS, Sultana SKS, Mahathi K, Parveen P, Prathima B, Devi AS. Formulation and evaluation of fast dissolving buccal film containing isradipine solid dispersion. Amer. J. Pharmtech. Res.2015; 5(2):221-247.
16. Pawar SV, Junagade MS. Formulation and evaluation of mouth dissolving film of risperidone. Int. J. PharmTech. Res.2015; 8(6):218-230.
17. . Jelvehgaril M, Montazam SH, Soltani S,Mohammadi R, Azar K,Montazam SA. Fast dissolving oral thin film drug delivery systems consist of ergotamine tartrate and caffeine anhydrous.Pharm.Sci.2015; 21:102-110.

18. Goutam K, Garg R, Sharma A, Singh A,Sharma P, Kaushal S. Formulation and evaluation of oral fast dissolving films of promethazine theoclate . Indo. Ameri.J.Pharm.Res.2015; 5(8):2536-2544.
19. . Mundada AS, Jain RA. Formulation, development and optimization of fast dissolving oral film of montelukast sodium. Int. J. Drug Dev. Res.2015; 7(4):40-46.
20. Dwivedy BN, Dabral P, Kumar R. Preparation and evaluation of mouth dissolving film of pantoprazole sodium. World J. Pharm. Pharmceut. Sci.2014; 3(8):1564-1576.
21. Kumar R, Pandey GS, Sharma R, Singh Y, Teotia UVS. Effects of maltodextrin and glycerin on mechanical properties of oral fast dissolving film of salbutamol sulphate. Int. J. Adv. Pharm. Bio. Chem. 2014; 3(1):199-209.
22. Prabhu P, Dubey A, kamath K. formulation and Evaluation of fast-dissolving films of lisinopril. Egyp. Pharm. J.2015; 14:56-64.
23. . Swamy NGN, Kumar SS. Formulation and evaluation of fast dissolving oral films of palonosetron hydrochloride using Hpmc-E5.Int.J. Pharm. Chem. Sci.2014; 3(1):145- 150.
24. Pandey P, Chauhan S.Fast dissolving sublingual films of zolmitriptan : A novel approach for migraine attacks.Ind.J.Pharm. Edu. Res.2014; 48(1):67-72.
25. . Deepthi A, Reddy V, Navaneetha K. Formulation and evaluation of fast dissolving oral films of zolmitriptan. Ameri. J. Adv. Drug Deliv.2014; 2(2):153-163.
26. . Kumar SK, Nagabhushanam MV, Sambasiva Rao KRS, Bhikshapathi DVRN. Formulation development and in vivo evaluation of zolmitriptan oral dissolving films.Int.J.Pharm.Bio.Sci.2013; 4(3):638-654.
27. Patel HJ, Patel PB,Kamdar KM, Patel KB,Shah AA, Patel ZP. Development and optimization of fast dissolving film of losartan potassium. Amer. J. Pharm. Health Res.2013; 1(2):35-44.
28. Kawale KA, Autade NB, Narhare HS, Mhetre RL. A Review on Fast-Dissolving Oral Film. Asian Journal of Pharmaceutical and Clinical Research. 2023;16(10):7-17. DOI: 10.22159/ajpcr.2023.v16i10.48099. (Innovare Academic Sciences)
29. Karthik DR, Keerthy HS, Yadav RP. A Review on Fast Dissolving Oral Films. Asian Journal of Pharmaceutical Research and Development. 2021;9(3):122-128. DOI: 10.22270/ajprd.v9i3.969. (ResearchGate)
30. Kathpalia H, Gupte A. An Introduction to Fast Dissolving Oral Thin Film Drug Delivery Systems: A Review. Current Drug Delivery. 2013;10(6):667-684. DOI: 10.2174/156720181006131125150249. (PubMed)
31. Purva K, Joshi A, Malviya S, Kharia A. A Comprehensive Review on Fast Dissolving Oral Films: A Recent Advancement in Drug Delivery Technology. Journal of Population Therapeutics and Clinical Pharmacology. 2022;29(04):3927-3950. DOI: 10.53555/jptcp.v29i04.6496. (Journal of Population Therapeutics)
32. Sheoran R. Fast Dissolving Oral Films: A Review with Future Prospects. International Journal of Pharmaceutical and Phytopharmacological Research. 2018;12(2). (ResearchGate)
33. Nagaraju T, Gowthami R, Rajashekar M, et al. Comprehensive Review on Oral Disintegrating Films. Current Drug Delivery. 2013;10(1):96-108. DOI: 10.2174/1567201811310010016. (PubMed)
34. Chaturvedi A, Srivastava P, Yadav S, Bansal M, Garg G, Sharma PK. Fast Dissolving Films: A Review. Current Drug Delivery. 2011;8(4):373-380. DOI: 10.2174/156720111795768022. (PubMed)
35. Sharma D, Kaur D, Verma S, et al. Fast Dissolving Oral Films Technology: A Recent Trend for an Innovative Oral Drug Delivery System. International Journal of Drug Delivery. 2015. (ijdd.arjournals.org)
36. Rathore L, Gehalot N, Jain V. A Short Review on Advancement in Fast Dissolving Oral Thin Films. Current Research in Pharmaceutical Sciences. 2021. DOI: 10.24092/CRPS.2021.110404. (crpsonline.com)
37. Chaturvedi K, Sharma PK, Dwivedi S, Sharma R, Darwhekar GN. Fast Dissolving Oral Film: An Innovative Approach for Drug Delivery. Current Research in Pharmaceutical Sciences. 2024. DOI: 10.24092/CRPS.2024.140101. (crpsonline.com)