

FORMULATION AND EVALUATION OF FAST DISSOLVING ORAL FILMS FROM THE EXTRACT OF *ZINGIBER OFFICINALE***Mrs. Anitha M.*¹, Mr. Anandha Priyan S.², Mr. Ganesh M.³, Mr. Nandha Kumar V.⁴**¹Associate Professor, P.S.V College of Pharmaceutical Science and Research, Krishnagiri, Tamil Nadu.^{2,3,4}IV Year B. Pharm Students, Department of Pharmacognosy, P.S.V College of Pharmaceutical Science And Research, Krishnagiri, Tamil Nadu.

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ABSTRACT

The present study aims to formulate and evaluate an herbal fast dissolving oral film containing ginger (*Zingiber officinale*) for the effective management of nausea and vomiting. Ginger rhizomes were processed to obtain an extract rich in therapeutically active constituents. Preliminary phytochemical screening confirmed the presence of gingerols, shogaols, flavonoids, and phenolic compounds responsible for anti-emetic activity. Fast dissolving oral films were prepared using natural excipients by solvent casting technique and evaluated for physicochemical and mechanical parameters such as thickness, weight uniformity, folding endurance, surface pH, disintegration time, and drug content uniformity. The films showed uniform appearance, good flexibility, rapid disintegration, and acceptable surface pH, indicating suitability for oral application. The study concludes that ginger-based fast

dissolving oral films are a promising, safe, and effective herbal dosage form for anti-emetic therapy.

KEYWORDS: Ginger, Anti-emetic, Fast dissolving oral film, Herbal formulation.

INTRODUCTION

Herbal medicine is one of the oldest healthcare systems and is widely used due to its safety and therapeutic effectiveness. Medicinal plants contain multiple phytoconstituents that act synergistically and produce fewer side effects than synthetic drugs. In the modern era, concerns about toxicity and long-term adverse effects of synthetic medicines have increased interest in herbal formulations.

Nausea and vomiting are common symptoms associated with gastrointestinal disorders, pregnancy, motion sickness, surgery, and chemotherapy. These responses are regulated by the vomiting center and chemoreceptor trigger zone through neurotransmitters such as serotonin and dopamine. Synthetic anti-emetic drugs often cause side effects like drowsiness, dizziness, and extrapyramidal reactions. Ginger (*Zingiber officinale*) is an important medicinal plant traditionally used to treat nausea, vomiting, and digestive disorders. It contains gingerols, shogaols, flavonoids, and phenolic compounds responsible for its anti-emetic activity.

Ginger acts by improving gastric motility and modulating serotonin (5-HT₃) receptors with minimal side effects.

Fast dissolving oral films are thin polymeric strips that dissolve rapidly in saliva, providing quick drug release, improved bioavailability, and better patient compliance compared to conventional oral dosage forms.

MATERIALS AND METHODS

Materials Used

Ginger rhizomes, ethanol, banana starch powder, honey, sweetening agents, flavoring agents, and distilled water were used.

Collection and authentication

The rhizomes was collected from Vaniyambadi, Tirupathur district and was authenticated at ST XAVIER'S COLLEGE, Palayamkottai.

Extraction procedure

Aqueous Extraction of Ginger

Fresh ginger rhizomes were washed, shade-dried, and powdered. The powdered material was macerated with distilled water for 24 hours with occasional stirring. The extract was filtered

and concentrated by gentle heating on a water bath. The concentrated aqueous extract was collected and stored in airtight containers for further use.

Alcoholic Extraction of Ginger

The dried ginger powder was subjected to Soxhlet extraction using ethanol as the solvent. The extraction was continued until complete exhaustion of the material. The alcoholic extract was filtered and concentrated by evaporating the solvent using a rotary evaporator or water bath to obtain a semi-solid extract, which was stored in airtight containers.



FIGURE 1: EXTRACTION BY SOXHLET APPARATUS.

Formulation of Fast Dissolving Oral Film

Fast dissolving oral films of ginger were prepared by the solvent casting method, which is widely used for producing uniform and flexible oral films. A required quantity of the film-forming polymer was accurately weighed and gradually dispersed in distilled water with continuous stirring until a clear and homogeneous polymeric solution was obtained. The solution was allowed to stand to ensure complete hydration of the polymer.

The ginger extract was weighed accurately and dissolved separately in a small quantity of distilled water or suitable solvent to ensure uniform solubilization. The dissolved ginger extract was then slowly incorporated into the polymeric solution under continuous stirring to achieve uniform distribution of the active ingredient throughout the formulation.

A plasticizer was added dropwise to the mixture to improve flexibility and folding endurance of the oral films and to prevent brittleness after drying. Sweetening agents and flavoring agents were subsequently added to mask the pungent taste of ginger and to improve palatability and patient acceptability. The final casting solution was stirred gently to remove entrapped air bubbles and to obtain a smooth, uniform solution.

The prepared solution was poured onto a clean, leveled glass plate or Petri dish and spread uniformly to obtain films of even thickness. The casted films were allowed to dry at room temperature under controlled conditions to prevent cracking or degradation of active constituents. After complete drying, the films were carefully peeled off and cut into uniform strips of required dimensions, each containing an accurate dose of ginger extract. The prepared fast dissolving oral films were wrapped in aluminum foil and stored in a desiccator until further evaluation.



FIGURE 2: ORAL FILMS.

PHYTOCHEMICAL SCREENING

Preliminary phytochemical screening of ginger extract confirmed the presence of flavonoids, alkaloids, glycosides, triterpenoids, saponins, phenols, tannins, carbohydrates, and proteins using standard qualitative tests. The presence of these phytoconstituents supports the pharmacological activity of ginger and its suitability for anti-emetic formulation.

TABLE 1: PHYTOCHEMICAL TESTS.

S.NO	Phytoconstituent	Test performed	Observation
1.	Flavonoids	Alkaline reagent test	Present
2.	Alkaloids	Mayer's and Wagner's test	Present
3.	Glycosides	Keller–Killiani test	Present
4.	Triterpenoids	Salkowski test	Present
5.	Saponins	Foam test	Present
6.	Phenols and tannins	Ferric chloride test	Present
7.	Fats and fixed oils	Stain test	Present

EVALUATION OF ORAL FILM

Physical Appearance: The oral films were visually inspected for color, transparency, surface smoothness, and presence of air bubbles or cracks. Films with uniform appearance and smooth surface indicate proper formulation and casting.

Thickness

The thickness of the films was measured at different points using a micrometer screw gauge to ensure uniformity. Uniform thickness is essential for accurate drug dosing.

Weight Variation

Individual films were weighed using an analytical balance. The average weight was calculated, and uniformity in weight indicates even distribution of the drug.

Folding Endurance

Folding endurance was determined by repeatedly folding the film at the same place until it broke. Higher folding endurance indicates good flexibility and mechanical strength.

Tensile Strength

Tensile strength was measured to determine the force required to break the film. This test reflects the mechanical integrity of the oral films during handling and storage.

Percentage Elongation

Percentage elongation was calculated to evaluate the elasticity of the films. Higher elongation values indicate better flexibility.

Surface pH

Surface pH was measured to ensure that the films do not cause irritation to the oral mucosa. Films with pH close to neutral are suitable for oral application.

Disintegration Time

Disintegration time was determined by placing the film in a small quantity of distilled water and recording the time taken for complete disintegration. Rapid disintegration is essential for fast onset of action.

In-Vitro Dissolution Study

In-vitro dissolution studies were performed to evaluate the drug release profile from the oral films using suitable dissolution media. Faster drug release indicates effective formulation.

Drug Content Uniformity

Drug content uniformity was evaluated to ensure uniform distribution of ginger extract in each film strip, which is essential for dose accuracy.

Moisture Content

Moisture content was determined by placing the films in a desiccator and measuring weight loss. This test indicates stability and brittleness of the films.

TABLE 2: EVALUATION PARAMETERS FOR ORAL FILM.

Parameter	Observation
Physical appearance	Smooth, uniform, translucent
Texture	Smooth, non-gritty
Flexibility	Good flexibility, no cracks
Thickness uniformity	Within $\pm 5\%$ variation
Weight variation	Within $\pm 7.5\%$
Surface pH	6.2 – 6.8
Folding endurance	>200 folds without breaking
Disintegration time	30 – 55 seconds
Moisture content	Low and within acceptable limits
Moisture uptake	Minimal moisture uptake

RESULTS AND DISCUSSION

The ethanolic extract of *Zingiber officinale* showed good yield and the presence of important phytoconstituents such as flavonoids, alkaloids, phenolic compounds, glycosides, and saponins, supporting its anti-emetic potential. Ginger fast dissolving oral films prepared by the solvent casting method were smooth, flexible, and uniform in appearance, indicating proper formulation.

The films exhibited uniform thickness and minimal weight variation, confirming even distribution of the extract. Mechanical evaluation showed satisfactory folding endurance and tensile strength, ensuring good handling properties.

The surface pH of the films was near neutral, indicating suitability for oral application without irritation. Rapid disintegration and efficient in-vitro drug release were observed, which can be attributed to the thin film structure and hydrophilic nature of the polymer.

Drug content uniformity and stability studies showed no significant changes, demonstrating formulation consistency and stability. Overall, the results confirm that ginger-based fast dissolving oral films are an effective and patient-friendly herbal dosage form for anti-emetic therapy.

CONCLUSION

The present study successfully formulated and evaluated ginger (*Zingiber officinale*)-based fast dissolving oral films using the solvent casting method. The prepared films showed satisfactory physicochemical and mechanical properties, rapid disintegration, uniform drug content, and good stability. Incorporation of ginger extract into fast dissolving oral films provided a convenient, safe, and effective herbal dosage form with improved patient compliance and rapid onset of anti-emetic action. Overall, ginger fast dissolving oral films represent a promising alternative to conventional anti-emetic formulations.

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