

# FORMULATION AND EVALUATION OF MOUTH DISSOLVING ORAL FILM CONTAINING EXTRACTS OF *OCIMUM SANCTUM*, *GLYCYRRHIZA GLABRA* AND *GUAVA LEAVES* TO TREAT MOUTH ULCER

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## Abstract

This study focused on the formulation and evaluation of mouth dissolving oral film containing extracts of *ocimum sanctum*, *glycyrrhiza glabra* and *Guava leaves* to treat mouth ulcer. The extracts of *ocimum sanctum*, *glycyrrhiza glabra* and *Guava leaves* was formulated as films by solvent casting method using various polymers viz. HPMC, Sodium alginate and Polyvinyl alcohol. Propylene glycol was used to create the films as a plasticizer, sodium starch glycolate as a super disintegrate, and honey as a sweetener. Furthermore, the films are evaluated for thickness, weight variation, folding endurance, surface pH, percentage moisture uptake, percentage moisture loss, disintegration time, in vitro drug release study and stability study. The extracts of both *ocimum sanctum* and *glycyrrhiza glabra* was collected by maceration process. The phytoconstituents study of the extract revealed the presence of alkaloids, flavonoids, tannins, steroids and saponins. The extracts were formulated into films by solvent casting method with various polymers such as HPMC, sodium alginate and polyvinyl alcohol. The idea of a quick-dissolving dose form has gained popularity as a new delivery method. By reducing dosing frequency, this approach will give better bioavailability and optimal stability. It will also avoid first pass metabolism of the medicines. From the above results it is evident that the developed formulation can be an innovative dosage form to improve the drug delivery, onset of action. Additionally, it will increase patient compliance.

**Keywords:** *Ocimum sanctum*, *Glycyrrhiza glabra*, *Guava leaves* Extracts, Oral films, Mouth ulcer, Solvent casting.

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## Introduction

oral route of administration is regarded as the most prevalent route for pharmacological systemic activities because of its versatility, convenience of use, patient compliance, and painlessness<sup>1</sup>. The demand for patient comfort is constantly rising. Because of its low cost of treatment and ease of administration, the oral route is the most popular method for administering therapeutic drugs. This increases patient compliance<sup>2</sup>. Fast-dissolving films that, when applied to the tongue or oral mucosa of a patient, breakdown and disintegrate in a matter of seconds, releasing the medication for oromucosal or intragastric absorption. As a result, they provide a variety of benefits over conventional solid dose forms, such as tablets and capsules, by removing swallowing issues and preserving water, which increases patient compliance. The wide surface area of the film, which is exposed to the wet oral area and causes speedy disintegration and dissolution in the oral cavity in seconds, is what causes the rapid release of the medicine from the films<sup>3</sup>. A mouth ulcer is a break or rupture in the mucous membrane that lines the interior of the mouth. It is usually yellow or white in colour and resembles a depression in the mouth caused by the mucous membrane<sup>4</sup>. Ulcer refers to a rupture in the continuity of the epithelium caused by molecular necrosis. Ulcers most usually occur in the oral region, for which the patient seeks medical/dental attention. The most common symptoms are redness, a burning feeling, and/or pain. They

can appear in any section of the oral cavity, but they become uncomfortable if they appear in the moveable area. Mouth ulcers are quite prevalent and usually result from trauma, such as ill-fitting dentures, shattered teeth, or fillings<sup>5</sup>.

### **Ocimum sanctum**

Tulsi, or *Ocimum sanctum*, is a member of the Lamiaceae plant family. Because of its numerous medical characteristics, it has made significant contributions to science since ancient times as well as modern study. Because of its lipoxygenase inhibitory, histamine antagonistic, and antisecretory properties, the fixed oil demonstrated considerable antiulcer action. *Ocimum sanctum* has long been used including the common cold, headache, cough, flu, earache, fever, sore throat, bronchitis, asthma, hepatic diseases, malaria fever, migraine headaches, fatigue, skin conditions, wounds, and insomnia. The leaves are beneficial to nerves and memory. Tulsi leaves can be chewed to treat oral infections and ulcers<sup>6</sup>.

### **Glycyrrhiza glabra**

Leguminosae member *Glycyrrhiza glabra* is well known for its expectorant and demulcent properties. Additionally useful for treating stomatitis-related mouth ulcer discomfort and inflammation is liquorice. To lessen the size of mouth ulcers caused by stomatitis and hasten healing, licorice root extract can be used. Clinical studies have shown that *Glycyrrhiza* possesses the following pharmaceutical properties, including anti-ulcer, anti-asthmatic, anti-diuretic, and anti-hepatotoxic properties<sup>7</sup>.

### **Guava leaves**

it contain an essential oil rich in caryophyllene, nerolidiol, beta bisabolene, aromandreno, p-selinene. Also contain flavonoids, beta sitosterol, titerpenoides, leucocyanidins and about 10% of tannins. Various parts of the plant, including the leaf and the fruit, are used as medicine. People use guava leaf for stomach and intestinal conditions, pain, diabetes, and wound healing. The fruit is used for high blood pressure. also use to treat mouth ulcer<sup>10</sup>.

## **Material And Methods**

### **Materials**

The leaves of the plant *Ocimum sanctum*, roots of *Glycyrrhiza glabra* and Guava leaves were collected directly from the local market. HPMC, PVA, sodium alginate, propylene glycol, and sodium starch glycolate were procured from Lab. All ingredients were pure.

#### **1) Extraction of *Ocimum sanctum***

The plants were obtained green and fresh of *Ocimum sanctum*. The leaves were cleansed with distilled water before being carefully separated from the branches. The separated leaves were weighed again and net weight was allowed for air drying under the room temperature to avoid destruction of active group in the leaves. The dried leaves were ground into very little pieces by hand. The crushed raw material was macerated with absolute ethanol in a round bottom flask, sealed with aluminium foil, and stored in the dark for seven days. The maceration extract residue and maceration filtrate were separated and retained inside the cabinet for further screening<sup>8</sup>.

#### **2) Extraction of *Glycyrrhiza glabra***

The dried roots of liquorice were collected and then dried powder of roots was used for extraction. In case of liquorice roots, the solvent used was ethanol and water (30:70 v/v) for liquorice root extract. For about 60 minutes, the root extract was immersed in this extraction solvent. The residue of maceration extract and filtrate of maceration were separated and being kept inside the cabinet for further screening<sup>9</sup>.

#### **3) Preparation of Guava leaves extract**

Soxhlet extraction apparatus comprises various components: thimble, water cooling system, reservoir, bypass tube, siphon tube, and condenser. 10 mg of solid material, such as leaves, is placed in the thimble. The thimble is loaded into the Soxhlet vessel, which contains a flask holding the extraction solvent. Solvent vapour rises up the column and floods into the chamber containing the solid material. Non-volatile compounds dissolve in the solvent. The process

repeats multiple times until the desired compounds are concentrated in the flask. Extraction is carried out at the boiling temperature of the solvent, and in this case, extraction is done using 100 ml ethanol for 3.5 hours<sup>10</sup>

#### Phytochemical screening of the extract

The extracts were tested for the presence of various active chemical constituents namely alkaloids, flavonoids, glycosides, tannins, saponins, steroids<sup>11,12</sup>.

#### Preparation of Fast Dissolving Oral Films

formulated by using solvent casting method. Polymer solution was prepared by using polymers such as HPMC, PVA and Sodium Alginate with continuous stirring using magnetic stirrer. Then after, resultant solution was kept for 3-6 hrs to expel the air bubbles within the solution. In separate beaker precisely weighed amount of herbal drugs (ocimum sanctum, glycyrrhiza glabra and Guava leaves), plasticizer (propylene glycol) and other excipients (SSG,honey) were dissolved in distilled water. The drug-plasticizer and all excipient solutions were added and properly mixed after the polymer had been fully hydrated with water. The volume was then finished with distilled water up to 10 ml. The resultant solution was poured into petri dish with defined surface area then left to dry using an oven supplying 40°C. The film was carefully taken from the petri dish, checked for flaws, and trimmed to the desired size (2 x 2 cm<sup>2</sup>) per strip. The resultant films were stored into aluminium foil<sup>13</sup>.

**Table 1. Formulation table of Mouth Dissolving Oral Films**

SR. NO.	INGREDIENTS	QUANTITY
1.	Ocimum sanctum extract	10 mg
2.	Glycyrrhiza glabra extract	10 mg
3.	Guava Leaves extract	10 mg
4.	Hydroxy propyl Methylcellulose (HPMC)	40 mg
5.	Ascorbic acid	2 mg
6.	Sodium Lauryl Sulphate	3 mg
7.	Sodium Starch Glycolate	1.5 mg
8.	Glycerin	1.5 ml
9.	Honey	2 ml
10.	Water	Q.S.

#### EVALUATION TEST

##### 1) Morphological properties

Visual observations were made of the morphological characteristics, such as the homogeneous nature of the films, colour, transparency, and surface texture. All the formulations were stored at room temperature 25±30 °C in air-tight containers<sup>14</sup>.

## 2) Weight variation

Films can be weighed on an analytical balance to determine the average weight for each film. It helps ensure that a film includes the appropriate amount of excipients and medication<sup>15</sup>.

Weight variation =  $((\text{initial weight} - \text{final weight}) / \text{initial weight}) \times 100$ .

## 3) Mouth dissolving time

The mouth dissolving time was determined by placing the film manually into a beaker containing 50 ml of 7.4 pH phosphate buffer. The time required by the film to dissolve was noted<sup>16</sup>.

## 4) Uniformity of film thickness

The thickness of the film was measured using a screw gauge with high accuracy. The measurements were taken from various strategic locations i.e. the centre and four corners of the film<sup>17</sup>.

## 5) Folding Endurance

The folding endurance of the film was evaluated by folding a tiny strip of film (2x2cm<sup>2</sup>) repeatedly until it broke. The number of times that the film could be folded at the same place without breaking gives the value of folding endurance<sup>18</sup>.

## 6) Percentage moisture loss

A percentage moisture loss test was carried out to check the integrity of films in dry conditions. Three films were weighed accurately and kept in a desiccator containing fused anhydrous Calcium chloride. The films were removed and weighed 72 hours later. Percentage moisture loss was calculated using the below-mentioned formula<sup>19</sup>.

Percentage moisture loss =  $((\text{initial weight} - \text{final weight}) / \text{initial weight}) \times 100$ .

## 7) Percentage moisture uptake

The films were placed in the desiccator containing saturated solution of potassium chloride. After 3 days the films were taken and weighed the percentage moisture absorption of the films was Section Research paper Formulation and evaluation of fast dissolving oral film containing extracts of *Ocimum sanctum* and *glycyrrhiza glabra* to Treat Mouth Ulcer found.

The percentage moisture uptake is calculated by the mentioned formula<sup>20</sup>.

Percentage moisture uptake =  $((\text{initial weight} - \text{final weight}) / \text{initial weight}) \times 100$

## 8) Surface pH

The film kept in a Petri dish was moistened with 5 ml of distilled water and kept for a few minutes. The pH was noted after bringing the electrode of the pH meter in contact with the surface of the formulation and allowing equilibration for 1 min<sup>19</sup>.

## 9) Disintegration time

In vitro disintegration time was determined visually in a glass beaker. 25 ml distilled water maintained at 37°C is taken in the beaker and the strip was added. The time taken for the film to disintegrate is noted<sup>20,21</sup>.

## 10) Dissolution test

The release rate of the mouth dissolving films was determined by the help of paddle Dissolution test apparatus. The release test was carried out in 900 ml of phosphate buffer, pH 6.8, at 37±5 °C and 50 rpm. The solution was

collected and replaced with fresh medium at every 2 minutes to maintain the sink conditions. Solution was filtered using wattman filter paper. Absorbance of the filtrate was measured at 280nm U.V. Spectrophotometer<sup>22, 23</sup>.

### Results and Discussion

The results of the alkaloids, flavonoids, glycosides, tannins, saponins, steroids preliminary phytochemical screening revealed the presence of chemical constituents present in herbal drugs

Sr.No.	Phytochemical constituents	Ocimum sanctum (Tulsi)	Glycyrrhiza glabra (Licorice)	Guava plant
1.	Alkaloids	Present	Present	Absent
2.	Flavonoids	Present	Present	Present
3.	Glycosides	Absent	Present	Present
4.	Tannins	Present	Present	Present
5.	Saponins	Present	Present	Present

**Table:- Phytochemical constituents data of herbal drugs**

Sr.No.	Test	R1	R2
1.	Morphological properties		
	a) Color	Greenish White (Translucent)	Greenish White (Translucent)
	b) Surface	Smooth	Smooth
	c) Film forming capacity	Good	Good
	d) Stickiness	No	No
2.	Weight variation	1.98 %	5.46 %
3.	Mouth dissolving time	16 sec.	21 sec.
4.	Uniformity of film thickness	0.35 to 0.40 mm	0.37 to 0.40 mm
5.	Folding Endurance	16 times	16 times
6.	Percentage moisture loss	2.418 %	1.973 %
7.	Percentage moisture uptake	2.32 %	0.74 %
8.	Surface pH	7.17	6.92
9.	Disintegration time	3 min. 32 sec.	4 min. 21 sec.
10.	Dissolution test	79.25 %	91.33 %

**Table - Evaluation test result**

### CONCLUSION

This study aimed to create and assess mouth-dissolving oral films containing extracts from *Ocimum sanctum*, *Glycyrrhiza glabra* and Guava leaves for treating mouth ulcers. The extracts were obtained using a maceration process

and Soxhlet extraction. Analysis showed that they contained flavonoids, tannins, and saponins, known for their antiulcer properties. The extracts were then turned into films using polymers like HPMC, sodium alginate, and PVA through a method called solvent casting. The films are tested for thickness, flexibility, moisture absorption and loss, surface pH, and drug release. All formulations looked good and had a smooth texture. Among them, this study suggests that using *Ocimum sanctum*, *Glycyrrhiza glabra* and Guava leaves extracts in mouth-dissolving films could be a promising treatment for mouth ulcers, ensuring ease of use for patients.

## REFERENCES

1. Al-Mogherah AI, Ibrahim MA, Hassan M.A. (2020). Optimisation and evaluation of venlafaxine hydrochloride fast-dissolving oral films. *Saudi Pharm J.* 28(11):1374-1382.
2. Sultana, S.K. & Rao, Kameswara & Vani T. (2018). Formulation and evaluation of herbal fast-dissolving buccal film containing curcumin. *World Journal of Pharmacy and Pharmaceutical Sciences.* 7(4):1617-1635.
3. S. S., M., Priya, N. S., Molly, B. A., & Nori, L. P. (2021). Fabrication And Characterization Of Fast Dissolving Films Of Eclipta Prostrate Leaves Extract To Treat Mouth Ulcers. *International Journal of Applied Pharmaceutics.* 13(5):263–271.
4. Shaikh S, Shete A, Doijad R. (2018). Formulation and Evaluation Pharmaceutical aqueous gel of powdered Guava Leaves for Mouth Ulcer Treatment. *Pharma Tutor.*6(4): 32-38.  
<https://my.clevelandclinic.org/health/diseases/21766-mouth-ulcer> types of mouth ulcers by Cleveland clinic.org, health and diseases
5. Salunkhe A., Kumar S., and Vaidya V. (2021).Formulation And Development of Quercetin And Monoammonium Glycyrrhizinate loaded gel for the treatment of mouth ulcer disease. *International Journal of Pharmaceutical Sciences and Research.* 12(3): 1789-98
6. Pandey, Govind & Sharma, Madhuri.(2010). Pharmacological activities of *Ocimum sanctum*(Tulsi) : A review. *International Journal of Pharmaceutical Sciences Review and Research.* 5: 61-66.
7. M., Siva, Shanmugam KR, Shanmugam B., Venkata G., Ravi S., Sathyavelu K., and Mallikarjuna K. (2016). “*Ocimum Sanctum*: a Review on the Pharmacological Properties.” *International Journal of Basic and Clinical Pharmacology.* 558–65.
8. Parse S., Umekar M. (2020). Formulation And Characterisation Of Mouth Dissolving Film Of Liquorice For The Treatment Of Mouth Ulcer. *International Journal of Modern Pharmaceutical Research.* 4(4):89-94.
9. Md. Kamrul Hasan, Iffat Ara, Muhammad Shafiul Alam Mondal, Yearul Kabir(2021). Phytochemistry, pharmacological activity, and potential health benefits of *Glycyrrhiza glabra*. *Heliyon.* 7(6):1-10.
10. Xia KZ, Perveen N, Khan NH.( 2018) Phytochemical analysis, antibacterial and antioxidant activity determination of *Ocimum sanctum*. *Pharmacy and Pharmacological International Journal.* 6(6):490-497.
11. Colvin, Dominic. (2018). A review on comparison of the extraction methods used in liquorice root: their principle, strength and limitation. *Medicinal & aromatic plants.* 7 (6):1-4.
12. Panchal, P & Parvez, N. (2019). Phytochemical analysis of medicinal herb (*Ocimum sanctum*). *International Journal of Nanomaterials, Nanotechnology and Nanomedicine.* 5(2): 008-011.

13. Sharma, Varsha & Pandey, Sonam. (2013). Phytochemical Screening and Determination Of Anti-Bacterial And Anti-Oxidant Potential Of Glycyrrhiza Glabra Root Extracts. *Journal of Environmental Research and Development*. 7(4A):1552-1558.
14. Bala R, Pawar P, Khanna S, Arora S. (2013). Orally dissolving strips: A new approach to oral drug delivery system. *International Journal of Pharmaceutical Investigation*. 3(2):67-76.
15. Bharti, Kanchan & Mittal, Pooja & Mishra, Brahmeshwar. (2018). Formulation and characterization of fast dissolving oral films containing buspirone hydrochloride nanoparticles using design of experiment. *Journal of Drug Delivery Science and Technology*. 49:420-432.
16. Ayalasomayajula, Lakshmi & Earle, Radha Rani & Murthy, A. (2016). Formulation and evaluation of rapidly dissolving films of zolmitriptan. 8:173-180
17. N.G.N, Swamy & ShivaKumar,. (2014). Formulation and Evaluation of Fast Dissolving Oral Films of Palonosetron Hydrochloride Using HPMC-E5. *International Journal of Pharmaceutical And Chemical Sciences*. 3:145-151.
18. Gade.R, Aynampudi.A, Makineni.A, Murthy.K, Babu Rao.C, Nama.S.(2014). Design and Development of Pravastatin Sodium Fast Dissolving Films from Natural Mucilage of Ocimum Bacilicum Seeds. *International Journal of Pharma Research & Review*. 3(2):17-27.
19. Baniya, Deepti & Pandey, Gaurav & Bajaracharya, Mijala & Dhungana, Bishwo & Amgain, Ejms. (2020). Formulation and Evaluation of Fast Dissolving Oral Films of Cetirizine Hydrochloride. *Europasian Journal of Medical Sciences*. 2(1):23-29.
20. Roy, Abhibrata & Arees, Reegan & Blr, Madhavi. (2020). Formulation Development Of Oral Fast-Dissolving Films Of Rupertadine Fumarate. *Asian Journal of Pharmaceutical and Clinical Research*. 67-72.
22. Aggarwal, Jyoti & Jindal, Keshav & Singh, Gurpreet. (2015). Formulation And Evaluation Of Oral Fast Dissolving Films Of Granisetron Hydrochloride Using Different Polymers. *International Research Journal of Pharmacy*. 6(10):724-728.
23. Patel J, Patel KR, Patel NM. Review on fast-dissolving film. *Int J Universe Pharm Bio Sci* 2013;2:149-62.
24. Aggarwal J., Singh G., Saini S., Rana A. C(2011).Fast Dissolving Films: A Novel Approach To Oral Drug Delivery. . *International Research Journal of Pharmacy*; 2 (12): 69-74.
25. Gavaskar, B., S.V. Kumar, G. Sharan and Y. Madhusudan, (2010). Overview of Fast Dissolving Films. *International Journal of Pharmacy and. Pharmaceutical Sciences*, 3(2):29-33.
26. Vibha Porwal, Pallavi Singh, Devendra Gurjar (2012). A comprehensive study on different methods of extraction from guajava leaves for curing various health problem *International Journal of Engineering Research and Applications (IJERA)* ISSN: 2248-9622 [www.ijera.com](http://www.ijera.com) Vol. 2, Issue 6, November- December 2012, pp.491