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FORMULATION AND EVALUATION OF ORAL THIN FILM OF MECLIZINE AND CAFFEINE”

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ABSTRACT :-Oral thin films (OTFs) are an innovative drug delivery system designed to improve patient compliance, especially in pediatric and geriatric people who experience difficulty in swallowing conventional dosage forms. The present study focuses on the formulation and evaluation of fast dissolving oral thin films containing Meclizine hydrochloride and Caffeine for the effective management of motion sickness.

The maine objective of the research was to prepare a fast dissolving oral thin film of meclizine and caffeine for motion sickness.The fast dissolving oral thin film was prepared using HPMC E15 lv, and sodium alginate with other excipients . Total four formulation were prepared and conducted using various physicochemical properties , including FTIR report. The analyte detection was carried out by using a UV detector set at a wavelength of 232 nm. The calibration curve exhibited a linear relationship between concentration and absorbance, indicating that the drug follows Beer-Lambert’s law within the selected concentration range.All formulations showed rapid disintegration within a few seconds. Among them, F3 showed the fastest disintegration time and the thickness of the films. Films prepared with HPMC Were flexible, smooth and F3 formulation showed the disintegration time of 8.57±0.13 Which is good for the oral thin film

KEYWORDS : Meclizine, Caffeine ,Fast dissolving Oral thin film, Motion Sickness.

IO**N**ra**T**l **R**ro**O**ut**D**e **U**is **C**a **T**m**I**o**O**st**N**pr**:**eferred route of drug administrationfor systemic effect due to its ease of administration, non-invasiveness, adaptability, patient compliance and acceptability. About 60% of all the formulations are solid dosage forms.

Tablet is the most preferred

dosage form due to ease of manufacturing, transportation and more patient compliance. Generally geriatric, pediatric, nauseous, bedridden and non-compliance patients experience difficulties in swallowing the conventional oral dosage form and do not take their medicines as prescribed. It is estimated that 50

% of the population was affected by this problem, which finally results

in a higher chance of non-compliance & ineffective therapy.Dysphagia or difficulty in swallowing is common problem, the disorder of dysphagia is associated with many medical conditions including stroke, Parkinson’s disease, AIDS, thyroidectomy, head and neck radiation therapy and other neurological

disorders including cerebralpalsy.The most common complaint with tablet is size, fear of choking followed by surface form and taste. The problem of swallowing tablets is more evident in geriatric and pediatric patients, as well as travelling patients who may not have ready access to water.

Fast dissolving oral thin films (OTFs) were developed in the (late 1970s).Oral thin films are the alternative of the Capsules, tablets,Syrups, for pediatric and geriatric as they experience swallowing difficulties.These dosage forms either dissolve or disintegrate generally within a 3 minute in mouth, without need of water.Oral fast Disintegrating dosage form have started gaining popularity & acceptance as new drug delivery system because they are easy to administer and lead to better patient compliance. Oral thin films .Oral thin films are thin,
flexible strips that transport medication directly into the bloodstream by dissolving swiftly in the mouth and passing through the oral mucosa. This innovative approach to drug delivery allows for quicker absorption and relief by skipping the digestive system. For conditions like motion sickness, where symptoms may manifest suddenly, this prompt response is essential.

There are three categories for OTFs.

1. Quick release, or flash release
2. Melt-away mucoadhesive wafers
3. Mucoadhesive extended-release wafers, also known as sustained-release wafers

Because they are more comfortable and flexible, fast dissolving oral films (FDOFs) are the most sophisticated type of oral solid dose form. It increases the effectiveness of APIs by dissolving in the oral cavity in less than a minute after coming into contact with saliva without the need for chewing or drinking. Because of the high blood flow and permeability of the oral mucosa, which is four to a thousand times larger than that of the skin, it provides rapid absorption and fast bioavailability of medications . FDOFs are helpful for patients who
have an active lifestyle, such as children, the elderly, bedridden patients,
diarrhea, sudden episodes of allergy attacks, or coughing. Additionally, it is helpful for any desired local action, such as a local anesthetic for teething, cold sores, oral ulcers, or toothaches.
OTFs are also known to have a shelf life of two to three years, depending on the API, but they are highly susceptible to moisture in the environment
According to Technology Catalysts, the market for pharmaceutical items in oral thin-film formulations was estimated to be worth $500 million in 2007 and may soon reach $2 billion Because consumers prefer fast-dissolving products over traditional tablets or capsules.

Meclizine - Meclizine is an antagonist at H1 receptors. It possesses an anticholinergic, central nervous system depressant, and local anesthetic effects.Antiemeticand antivertigo effects are not fully understood, but its central anticholinergic properties are partially responsible.
The present study aims at the formulation and evaluation of fast dissolving oral thin films of Meclizine hydrochloride and Caffeine, intended to provide rapid relief from motion sickness

MATERIAL AND METHODS

Material

Meclizinewas obtained as a gift sample from a pharmaceutical company. HPMCE15 lv,sachharin sodium, PEG400 , peppermint oil was procured form **chemdyescorporation, rajkot** . sodium alginate,citric acid,Caffeine was obtainedfrom **alpha chemika pvt.india**

Doubledistilled water was prepared freshly and used whenever required. All the chemicalsused in this work were of analytical grade.

Formulation of oral film of Meclizine and caffeine

sr.no	Name of ingredient (in mg)	Properties
1	HPMC 15 lv	Film former Fast disintegrant
2	Sodium alginet	plasticiser
3	PEG 400	
4	Meclizine caffeine	api api
5	Saccharin sodium Citric acid	Sweetener
6	Peppermint oil Distilled water	
7		Flavoring agent Vehicle
8		
9		

METHODS

The casting process for fast disintegrating oral films involves several available methods. Given that this is a fast disintegrating oral film, the solvent casting technique was utilized on a laboratory scale for the formulation of the films

Solvent casting method :

1. Meclizine containing fast dissolving films was fabricated by the solvent casting method.

2. The optimized amount of HPMC was dissolved in 30ml of water slowly (sprinkling method) and stirred manually continuously for 35 to 45 min

3. Add another polymer for fast disintegration (sodium alginate) and stirred for 20 to 25min manually

4. Then take amount of plasticizer (PEG 400)

5. and meclizine Hcl were dissolved in 5ml of ethanol : water (1:1) and caffeine was dissolved in 5 ml warm distilled water then added to the polymeric solution,

6. and then add an optimized amount of excipients (saccharin sodium,citric acid,peppermint oil) and keep it in the sonicator for proper dispersion.

7. Polymeric solution was stirred for 30 min using magnetic stirrer or manually and was kept in undisturbed condition till the entrapped air bubbles were removed.

8. The aqueous solution was casted in a glass mould or on a petri dish and was dried at controlled room temperature (25°-30°C, 45 %RH) as well as at increased temperature (microwave oven).

9. The film took approximately 48 hr to dry at controlled room temperature.

10. The dried film was carefully removed from the glass plates and was cut into size required for testing.

11. The films were stored in air tight plastic bags till further use.

Optimization of formulations

Tableno.1: Selection and Optimization of Film Forming Agents

F1	**F2**	**F3**	**F4**		
2000	1500	**2000**	2000		
40 0.5	40 0.5	**40 0.5**	40 0.5		
0.25	0.25	**0.25**	0.25		
0.20	0.20	**0.20**	0.20		
0.015	0.015	**0.015**	0.015		
0.10	0.10	**0.10**	0.10		
Name of ingredient (in mg)					

HPMC 15 lv

Sodium alginet PEG 400

Meclizine caffeine

Saccharin sodium Citric acid

Peppermint oil	qs	qs	**qs**	qs
Distilled water	40	40	**40**	40

(HPMC=Hydroxypropyl methylcellulose, PEG 400= Polyethylene glycol 400)

Evaluation of prepared film

1] Thickness - The thickness of film was observed and measured by vernier caliper . Three selected films from batches are selected respectively. The thickness is measured for each film in micrometres. Table -

Ideal thickness of film -

0.005 – 0.015 cm (i.e., 50–150 µm)

2] Weight Uniformity - The weight of the film was measured in electronic weighing balance .For each formulation, Three selected films were used. For weight variation test, 7 films from each batch were weighed individually by digital electronic balance and the average weight was calculated.

F1 - 5,7,5,6,7

F2 - 9,9,10,8,10

F3 - 5,5,4,6,5,4

3] Folding endurance -

Folding endurance was determined by repeatedly folding one film at the same place until it broke. The number of times the film could be folded at the same place without breaking/ cracking gave the value of folding endurance .

4] Percentage moisture content -

The films were weighed individually and kept in desiccatorr containing activated silica gel at room temperature for about 24 hours. Observe it uniformly. Individual films were weighed repeatedly until the film shows a

constant weight of each films respectively.The percentage of moisture content was calculated as the difference between initial weight and final weight with respect to its final weight.

5] Disintegration Time -

The disintegration time of film is measured by calculating the dissolution of the film .The film should get dissolved within few seconds. In vitro disintegration time was determined visually in a glass beaker of 25 ml distilled water with swirling every 10 seconds. The disintegration time isthe time when the film starts to break or disintegrates.

6] Drug content Analysis -

Thefilms (n=3) of specified area were taken into a 10 ml volumetric flask anddissolved in methanol and volume was made up with 10 ml methanol.
Subsequent dilutions were made
andanalyzed by UV spectrophotometer at 232nm.

7] pH value -

The pH of oral thin film was determined by dissolving the film in 2ml of distilled water and measure the pH value of the obtained solution. The pH was measured by pH meter with the help of buffer solution.
The pH value was neutral and constant for the film.

RESULTS AND DISCUSSION

In the present work and study of fast dissolving oral thin films of
meclizine and caffeine were prepared successfully by using different
polymers such as hydroxy propyl methyl cellulose (HPMC E15 lv),and sodium alginate as film former and fast disintegrant by using solvent casting method.there are total four formulations were prepared.hydroxy propyl methyl cellulose (HPMC E15 lv),and sodium alginate wae use as film former in formulation F1-F4.mixture of water and ethanol 96% (1:1) was used as solvent. The drying ime was 2 or more then 2 hrs
The film were evaluated for various properties including Thickness,pH value,Weight Uniformity,Folding endurance,Percentage moisture content,Disintegration Time,Drug content Analysis ,FTIR .

The folding endurance values ranged from 140 to 200, indicating good mechanical strength and flexibility of the films, The folding endurance of all the batches are shown respectively, F1 (156±5), F2 (140±5) , F3 (200±6) ,F4(175±4).
The disintegration time of all the films is about F1(11.14±0.36), F2 (11.36±0.29) ,F3(8.57±0.13), F4(10.52±0.30) , All formulations showed rapid disintegration within a few seconds. Among them, F3 showed the fastest disintegration time and the thickness of the films is F1 (60±4), F2(64±5) , F3(50±6) , F4(58±5).Among all formulations, F3 showed the least thickness, indicating uniform film formation.
Films were having thickness adequate for handling and use. The pH was measured using buffer solution/ phosphate buffer.

The pH was neutral (6.7), This indicates that the films are non-irritating and suitable for oral mucosal administration.The appearance of the film F1 to F4 by visual inspection was totally homogeneous, flexible and smooth
surface on both the sides. The difference in batches was so clear .
The percentage of moisture content was found to be acceptable.It indicates good stability and low risk of bacterial growth.
The drug content of all the formulations was found to be uniform and with proper mixing and distribution

of meclizine and caffeine within the film.

FTIRprovescompatibility and absence of interaction. Attheendasperoverallevaluation ,formulation F3 was found to be the optimized formulation.

ResultsofPreformulation study

- **Physical evaluation**

Tableno.2:Physical evaluation of drug

S.no	**Sensory Characters**	**Physical evaluation of drug Meclizine**
1	Colour Odor Taste	white crystalline powder.
2		Slight odor Tasteless
3		

Table no.3:Physical evaluation of drug

S.no	**Sensory Characters**	**Physical evaluation of drug Caffeine**
1	Colour Odor Taste	White crystalline powder
2		Odorless very bitter taste.
3		

- **Results of Solubility:**

Table no 4**:Solubility of Meclizine**

Solvent used	**Results of Solubility**
Distilled Water	Sparingly soluble
0.1N Hydrochloric acid	Soluble
Ethanol	Soluble
Methanol	Soluble
Chloroform	Sparingly soluble
0.1NNaOH	

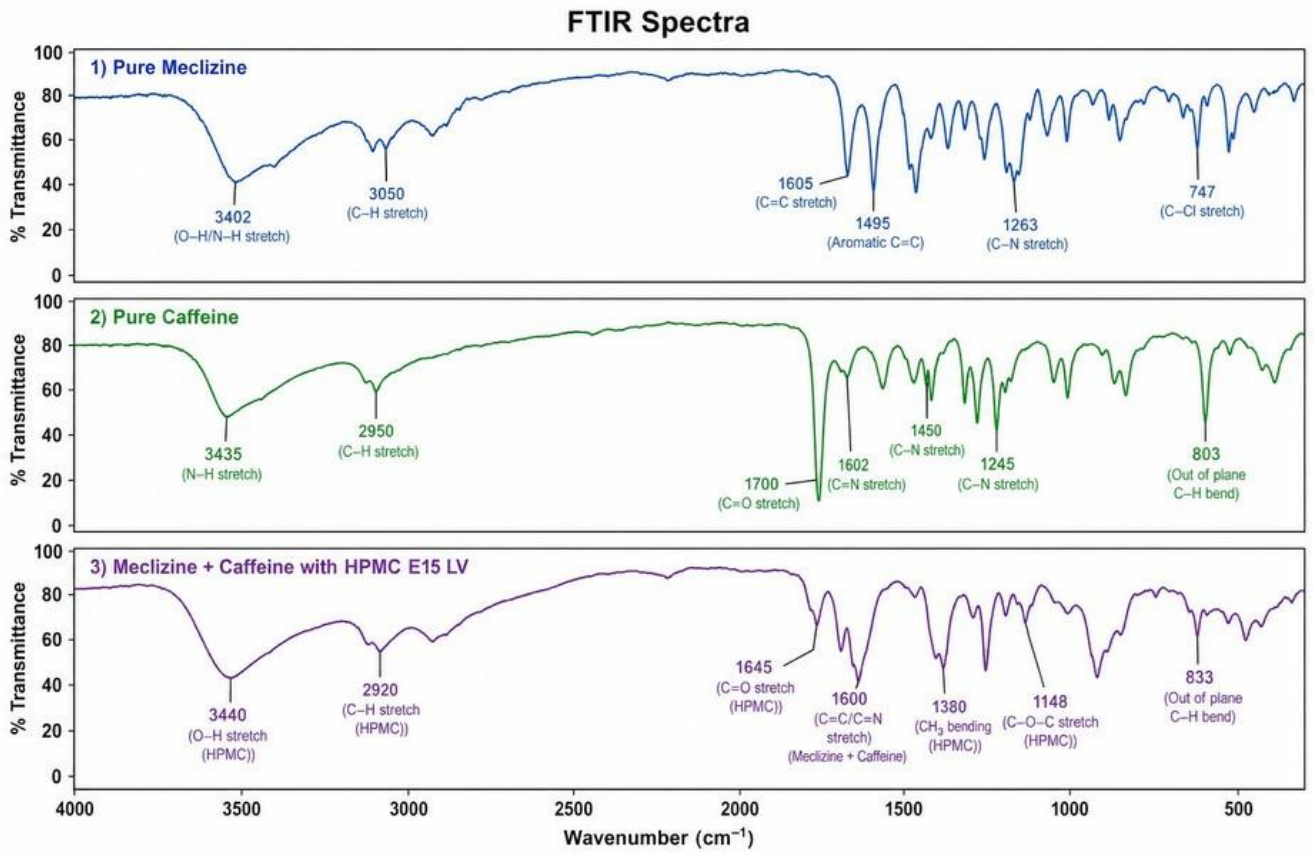
Table no 5 : **Solubility of Caffeine**

Solvent used	**Results of Solubility**
Distilled Water (warm)	highly soluble
Distilled Water (cold)	Sparingly Soluble
Ethanol	Sparingly Soluble
Chloroform	Freely Soluble
Other Solvents (acetone, ethyl acetate, and acetic acid)	Sparingly soluble

Results of Melting point:

s . n o	**D r u g**	**M e l t i n g p o n t (c)**
1	**meclizine Caffeine**	**223**
2		**237**

Identificationtest using FTIR Spectroscopy



ResultsofEvaluation of prepared Film

Results of Evaluation of prepared Film

Formulation code	General appearance	Weight (mg)	Thickness (µm)
F1	Translucent	60±4	600±2
F2	Translucent	64±5	800±1
F3	Translucent	50±6	500±2

F4	Translucent	58±5	600±3

Results of Folding endurance, Percentage moisture content, Disintegration Time,Drug content Analysis,pH value

Formulation code	pH value	Folding endurance,	Percentage moisture content	Disintegration Time (sec)	Drug content Analysis

F1	6.5±5	156±5	3.92±0.18	11.14±0.36	97.84±0.62
F2	6.0±3	140±5	3.45±0.14	11.36±0.29	98.36±0.58
F3	6.4±5	200±6	2.48±0.12	8.570±.13	99.12±0.45
F4	6.7±4	175±4	2.96±0.10	10.52±0.30	98.91±0.50

Result of optimized formulation F3 Name of ingredient Composition (g)

HPMC 15 lv

Sodium alginet PEG 400

Meclizine caffeine

Saccharin sodium Citric acid Peppermint oil Distilled water

2

0.4

0.5

0.25

0.20

0.015

0.10

qs 40

Conclusion and summary

From the research work it can be inferred that fast-dissolving oral films of drug release are preferable. Fast dissolving oral thin films are intended
for the application in the oral cavity and they are an innovative and promising dosage form especially for use in pediatrics and geriatrics.
The films are prepared by HPMC , PEG , API's and other excipients. F3 formulation has considered the better with less disintegrating time and
release in 15 min according to the results obtained. Percent drug release and disintegration time taken as responses for study which were found within the accepted ranges.Meclizine and caffiene are administered in the form of fast dissolving films will be potential novel drug dosage form for pediatric, geriatric and also for general population by providing faster
release and better patient compliance.
Among the formulations, optimized batches showed desirable

characteristics such as acceptable thickness, good folding endurance, neutral pH, and efficient drug content. The rapid disintegration of the films ensures quicker onset of action, which is particularly beneficial in
conditions like motion sickness where immediate relief is required. Further studies and scale-up processes can enhance their potential for commercial application.

Summary -

The present studied focused on the fast dissolving oral thin film of
meclizine and caffeine.Meclizine (MCZ) is a first-generation antihistamine of the piperazine class drug, used in the treatment of motion sickness (H1 receptor antagonist). MCZ is a white to light yellowish-white crystalline powder and practically insoluble in water. caffeine is soluble in water, but the extent depends on temperature.The film is prepared using polymers
like HPMC E15 and sodium alginate and PEG400 as a plasticizer and other excipients like Saccharin sodium dihydrate, Citric acid and peppermint oil.

Solvent casting method is used.Formulations (F1 to F3) were developed and evaluated physically as well as mechanical properties.
The results indicated that the films showed satisfactory physicochemical properties.Tests like Thickness , weight uniformity,Folding endurance, disintegration test, dissolution test, pH value, Drug content analysis, percentage moisture content.They are suitable for oral use ,shows a quick delivery and fast onset of action.

Reference

Maddela S., Naveena C. H., Hemanth V., Sruthi V., Pamula Reddy B., Lakshmi Pathi M., & Anusha K. (2021). Formulation and Evaluation of Meclizine Hydrochloride Mouth Dissolving Films. Journal of Cardiovascular Disease Research, 12(04),1586–1591

Available from https://www.jcdronline.org/index.php/JCDR/article/download/2347/2282/4512

Sultana, F., Arafat, M., & Pathan, S. I. (2013). Preparation and Evaluation of Fast

Dissolving Oral Thin Film of Caffeine. International Journal of Pharmacy and Biological Sciences (IJPBS), 3(1), 153–161.

Available from: https://ijpbs.com/view.php?iid=269

Zhao, Y., Quan, P., & Fang, L. (2015). Preparation of an oral thin film containing meclizine hydrochloride: In vitro and in vivo evaluation.
International Journal of Pharmaceutics, 496(2), 314–322. doi:10.1016/j.ijpharm.2015.10.008.

Available from: https://pubmed.ncbi.nlm.nih.gov/26456247/

Inventors: Yang, J., Liu, Y., et al. (2016). Meclizine Hydrochloride Oral Rapid-Release Film Agent and Preparation Method Thereof (Patent No. CN105055378A).China Patent.

Available from: https://patents.google.com/patent/CN105055378A/en

Singh P., & Modi S. (2024). Formulation and Evaluation of Fast Dissolving Oral Film of Meclizine. International Journal of Creative Research Thoughts (IJCRT), Volume 12, Issue 8, August 2024, Pages f520–f530.
Available from:https://ijcrt.org/papers/IJCRT2408605.pdf

Kumar S., et al. Preparation and Evaluation of Caffeine Orodispersible Films. Journal of Drug Delivery Science and Technology, 2023.

Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC10181256/

Preis M., Pein M., Breitkreutz J. Manufacturing Techniques of Orally Dissolving Films.Pharmaceutical Technology, 2013

Available from :
https://www.pharmtech.com/view/manufacturing-techniquesorally-dissolving-films Patel R., Patel D., Shah S. Preparation and Evaluation of Fast Dissolving Oral Thin Film.International Journal of Pharmaceutical and Biological Sciences.

Available from: http://ijpbs.com/ijpbsadmin/upload/ijpbs_51068bce2ee4c.pd

Bala R., Pawar P., Khanna S., Arora S. Orally Dissolving Strips: A New Approach to Oral Drug Delivery System. International Journal of Pharmaceutical Investigation, 2013; 3(2):67–76.

Zhang H., Zhang J., Streisand J. B. Oral Mucosal Drug Delivery: Clinical Pharmacokinetics and Therapeutic Applications.Clinical Pharmacokinetics, 2002; 41(9): 661–680.

Goel H., Rai P., Rana V., Tiwary A. K. Orally Disintegrating Systems: Innovations in Formulation and Technology. Recent Patents on Drug Delivery & Formulation, 2008; 2(3): 258–274.

Arya A., Chandra A., Sharma V., Pathak K. Fast Dissolving Oral Films: An Innovative Drug Delivery System and Dosage Form. International Journal of ChemTech Research, 2010; 2(1): 576–583.

FormulationBio Research Group. Energy Oral Thin Film Formulation Research. Available from:

https://www.formulationbio.com/oral-thin-film/energy-oral-thinfilm-formulation-rese
arch. html

Mali R. R., Gupta S., Goel V.Novel Study in Fast Dissolving Drug Delivery System:

A Review.Indian Journal of Pharmaceutical and Biological Research, 2015; 3(1): 93–107.

International Journal of Pharmaceutical Sciences and Research (IJPSR).Optimisation and Evaluation of Caffeine Orally Dissolving Films.

Available from: https://ijpsr.com/?action=download_pdf&postid=100929