A REVIEW ON FORMULATION AND EVALUATION OF BUCCAL FILM FOR ANTI-ULCER AND ANTI-INFLAMMATORY ACTIVITY

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ABSTRACT :-

Nowdays, the need for design and The creation of a novel dosage form aims to increase patient efficacy, safety, and compliance. Buccal film is a novel film technology that satisfies each criteria. A buccal drug delivery system is used to provide buccal film. Compared to alternative buccal drug delivery systems such wafers, lozenges, microparticles, gel, and tablets, buccal film is more acceptable due to its tiny size, dose, and easy administration. Because buccal film avoids first pass metabolism, it is an efficient dose method that increases bioavailability. It is economical, Due to its biodegradability, quick absorption, elegance, ease of handling, lack of irritation, and elimination of the need for drug swallowing, this dosage form is increasingly preferred by both pediatric and geriatric patients.

Many medications, including anti-diabetic, antispasmodic, emetics, anti-cancer, and antimicrobial drugs, are derived from plants. According to WHO estimates, 80% of people in underdeveloped nations still get their primary medical treatment from traditional medicine, primarily plant-based medications. The alternative name for bougainvillea is paper blossom. One common woody scandent shrub is bougainvillea. There are reports that the leaves of Bougainvillea glabra possess anti-inflammatory, anti-hyperglycemic, insecticidal, anti-hyperglycemic, anti-ulcer, antibacterial, anti-diarrheal, and antiviral properties.

Keywords:- Buccal film, buccoadhesion, bioavailability, Bougainvillea glabra .

INTRODUCTION

This article focuses on bucoadhesive drug delivery systems, which depend on binding to mucus-covered biological surfaces. There is currently an increasing need for research on patient convenience and compliance. The manufacturing of buccal films, which disintegrate on the patient's buccal mucosa, is another innovative technique. This drug delivery method is appropriate for medications with high first pass metabolism and it is utilized to increase bioavailability by lowering the frequency of doses to decrease plasma peak levels, which reduces unfavorable side effects. Additionally, it is economical and beneficial for both pediatric and geriatric patients.[1]

Further, due to films are thinner and smaller than, lozenges and tablets, they have better patient compliance. In the pharmaceutical sector, films as dosage forms have grown in significance as innovative, patient-friendly, and practical goods. Buccal film is currently being studied. Compared to the majority of commercially available oral disintegrating tablets, which usually require special packaging, this dosage form is less flexible. Some of these benefits are also shared by mucoadhesive buccal films.[2]

Buccal Mucosa :-

Oral medication administration in a novel system n is probably the one that is recommended to both the patient and the physician. But Hepatic first pass metabolism and GI tract enzymatic degradation are two barriers on oral drug administration that prevent the oral delivery of some pharmacological classes, especially peptides and proteins. Other absorbed tissue are thus considered to be potential drug delivery sites. These benefits include avoiding presystemic clearance in the GI tract, potentially avoiding the first pass effect, and, depending on the medicine, having a better enzymatic environment for drug absorption. [3]The two groups of oral mucosal drug delivery systems are buccal and sublingual. The buccal cavity is widely used for drug administration through the mucosa in the former scenario, while the sublingual route is primarily helpful for the quickest beginning of action, as in the case of angina pectoris. The inner cheek is lined with buccal mucosa [4].

Inside the oral mucosal cavity, delivery of drugs is classified into three categories: [5]

1. Sublingual Delivery
2. Buccal Delivery
3. Local Delivery

Anatomy of Oral Cavity :-

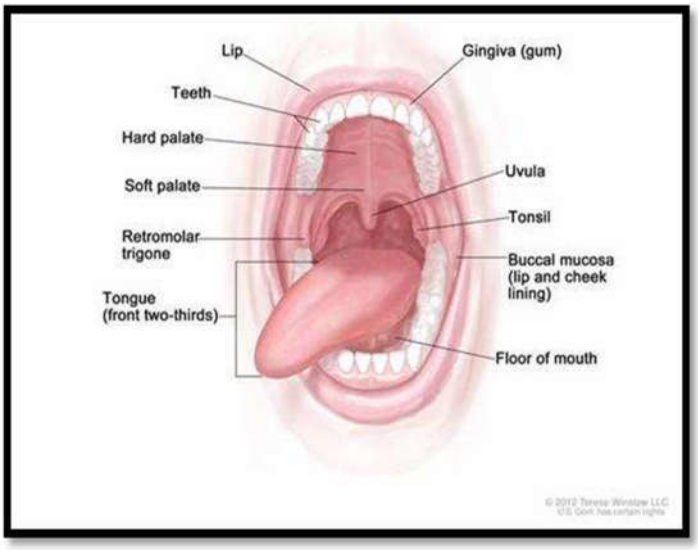

Fig.1. Mucosal region of mouth [6]

The floor of the mouth, lips, cheeks, and hard and soft palates compose the oral cavity (figure 1). There are two areas in the oral cavity. The outer oral vestibule is covered by the gingival (gums), teeth, lips, and cheeks. The hard and soft palates make up the roof of the oral cavity proper,which stretches from the teeth and gums back to the fauces, which lead to the throat. The tongue extends from the cavity's floor. [7]

Buccal Drug Deliver System :-

Given the oral cavity offers possible locations for medication delivery, a buccal controlled drug delivery device has been created. It avoids first-pass metabolism and acid hydrolysis. Constant salivary secretion influences the buccal film's ability to release drugs. The oral mucosa's mucin film provides a chance to create a mucoadhesive system that adheres to the absorption site and keeps it there for a lengthy period of time. [8]

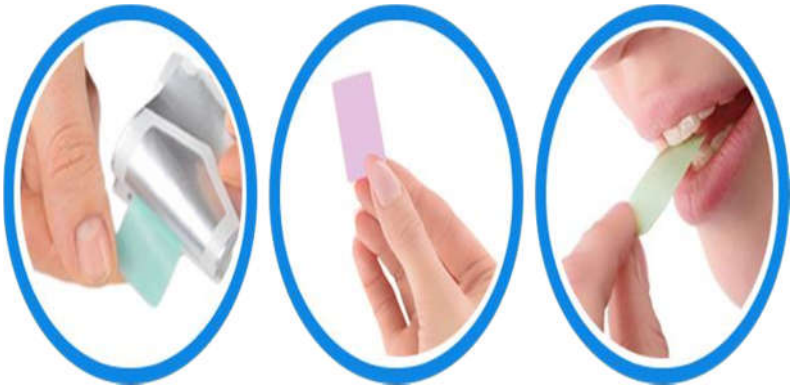

Fig. 2. Buccal Film

Advantages of Buccal films

- No need of chewing and swallowing.
- Rapid onset of action and minimum side effects.
- Accurate dosing compared dosage form.
- Taste masking is possible.
- Good mouth feel and good stability.
- Requires less excipient.
- More Economical
- Ease of administration to pediatric geriatric patients. Also to patients who are mentally retarded, disabled or non cooperative.[6]

Disadvantages of Buccal film

1.Saliva is continuously secreted into the oral cavity diluting drugs at the site of absorption resulting in low drug concentrations at the surface of the absorbing membrane. Instinctively
swallowing of saliva results in a maximum part of dissolved or suspended released drug being removed from the site of absorption. Moreover, there is risk that the delivery system
itself would be swallowed.

2. Drug characteristics can make boundary for use of the oral cavity as a site for drug delivery. Taste, irritancy, allergy and adverse properties such as discoloration or erosion of the teeth can limit the drug candidate list for buccal route.[7]

Bouganivelle Glabra :-

The health of people and communities is greatly impacted by medicinal plants. As the "Emporium of Medicinal Plants," India is widely recognized. The demand for medicinal herbs has multiplied many times because of their significance.[9]The genus Bougainvillea is one of the most widely distributed in the world. It is a member of the Nyctaginaceae family and has about 18 species, according to "The Plant List." Providing a current overview of Bougainvillea glabra with a focus on its morphological traits, phytochemistry, and pharmaceutical action are the goals of this paper. [10]

Fig.3. Bouganivelle Glabra Flower

Morphological description of *B.* glabra [11]

Leaves	Flower	Tree
		
The leaves are simple, ovate-acuminate, and alternating. Typically, 4–13 cm in length and 2–6 cm in width. Leaf arrangement: Alternate Leaf Venation : Pinnate Leaf persistence :Evergreen Leaf Type : Simple Leaf blades: Less than five leaf shape: lanceolate leaf textures: smooth Leaf Scent : No fragrance	The plant's blooms are small and typically white, but each cluster of three blossoms is encircled by three or six bracts that are the plant's vibrant colors—pink, magenta, purple, red, and white Flower Showiness: True Flower Sizes Range: 0 to 1.5	Woody, evergreen vine that climbs. Its growth range is 1–12 m (4–40 ft). The narrow stem bears dark green leaves and sharp thorns, and the woody trunk is prone to twisting.

Anti-inflammatory properties :-

According to Isiaka A. Ogunwande etal., Bougainvillea glabra is used extensively in Nigeria as a pain reliever and to treat inflammatory-related illnesses. This investigation was intended to define the volatile chemicals and assess the anti-inflammatory and anti-nociceptive qualities attributed to this plant species, given the lack of scientific research on the chemical ingredients and pharmacological activity of B. glabra essential oil.[12]

MATERIAL AND METHOD :-

Extraction of Bouganivillea Flower :- The leaves of bouganivellia glabra plant were shade dried until they were free from the moisture. Finally leaves were subjected to size reduction to get coarse powder and then passed through Sieve to get uniform powder. The resulting powder was then used for extraction**.**

Extraction Method of Drug :-

1. **Soxhlet Extraction:-**
   - The collected leaves were washed, shade dried and converted into moderately coarse powder by mechanical grinder.
   - The powdered material was extracted with methanol by using Soxhlet apparatus.
   - The solvent was removed under reduced pressure which yields respective extracts in the form of semisolid mass.
2. **Maceration :-**
   - collect the flowers and wash with distilled water.
   - flowers is soak in a solvent such as water, ethanol
   - soak the flowers for 7 days and shake it.
   - after maceration period the solution is filter with filter paper.
   - then heat the solution in a heating mental till the extract is obtaine.

Methods :-

1. Solvent Casting Method
2. Hot Melt Extrusion Method
3. Direct Milling Method

1. **Slovent Casting Method :-**

The solvent casting method involves adding the necessary amount of polymer and dissolving it in distilled water. A tiny amount of an active pharmaceutical Ingredient has been added to this solution. After being added to the solution, plasticizer is well mixed. After that, the solution is
placed on a petridish and dried at 400°C in a hot air oven. Once it had dried, cut it off the petriplate with a blade and left it in the desiccator for a full day. From now on, cut to the proper size and shape. [13]

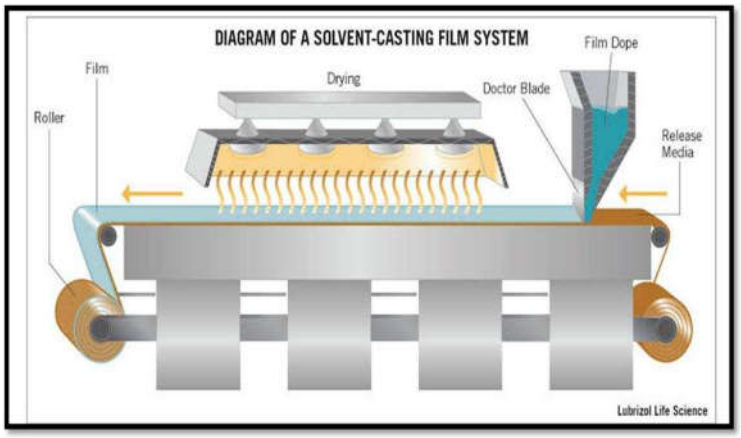

Fig.4. Solvent casting method[6]

2. Hot Melt Extrusion Method :-

The drug and other excipient mixture is melted in the hot melt extrusion process. then pushed through a hole to produce a more uniform substance in various forms, such as films, tablets, or granules. The transdermal drug delivery system used for it.[14]

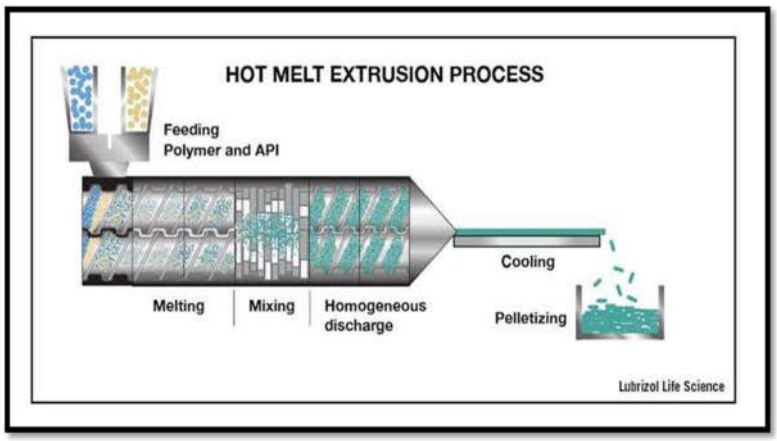

Fig. 5. Hot Melt Extrusion Process[6]

3. Direct Milling Method

This method, known as the solvent-free method, involves mixing the drug and excipients without the use of liquid by kneading or direct milling, and then rolling the resulting material on a release liner until the desired thickness is achieved. This method is typically preferred because it eliminates the possibility of residual solvent and any link to health problems related to solvents [15]

EXCIPIENT'S USE FOR PREPARATION OF BUCCAL FILM :-

1. **Polymers**

   There are numerous polymers that can be used to create buccal films that dissolve quickly. To achieve the required film qualities, the polymers can be utilized alone or in combination. The acquired film needs to be sufficiently strong to prevent damage during handling or transit. Cellulose derivatives, pullulan, gelatin, hydroxypropylmethyl cellulose, hydroxyethylcellolose,

hydroxypropylcellulose, etc. are among the different polymers that are most frequently used to prepare fast-dissolving films.[16]

2. **Plasticizers:**
   An essential component of the formulation for fast-dissolving buccal films is plasticizer . The inclusion of the plasticizer can enhance the films' mechanical qualities, such as their tensile strength and elongation. Additionally, it improves the strip's brittleness andincreases its flexibility. the examples of plasticizers are Glycerine, propylene glycol, sorbitol, polyethylene glycol, triacetin , triethyl citrate ,etc. The concentration of plasticizers used is usually between 0 and 20% w/w of the dry polymer weight [17]

3. **Surfactants:**
   Surfactants are employed as dispersing, wetting, or solubilizing agents to disintegrate films within few seconds and release active chemicals instantly. Also, surfactants increase the solubility of poorly soluble drugs in buccal films that dissolve quickly. some of commonly used are sodium lauryl sulfate, benzalkonium chloride, benzthonium chloride, [18]

4. **Sweetening agents**
   These days, sweeteners are an essential part of medications meant to dissolve or break down in the mouth. Traditionally, sweeteners are made of sucrose, dextrose, fructose, glucose, liquid glucose, and isomaltose. polyhydric alcohols like sorbitol, mannitol, and isomalt can be used together because they also provide a pleasant mouthfeel and a cooling sensation.[19]

5. **Saliva Stimulating Agents**
   The aim of using saliva stimulating agents is to increase the production of saliva, which will help the formulations of rapid dissolving strips dissolve more quickly. The few examples of salivary stimulants are citric acid, malic acid, lactic acid, ascorbic acid, and tartaric acid [20], while citric acid being the most preferred.

6. **Flavoring agents**
   Flavoring agents can be chosen from a variety of plant components, including leaves, fruits, and flowers, as well as synthetic flavor oils and oleo resins. Flavors can be combined or used separately. strong mints like peppermint, sweetmint, spearmint, wintergreen, cinnamon, clove; sweet flavors [21] like chocolate or vanillin; The type and strength of the flavor determine how much flavor is required to cover up the taste.

EVALUATION PARAMETER:-

1. **Thickness:**
   To measure the thickness of a film sample, use an electronic micrometer .The sample should be measured at five points (the center and four corners), and the mean thickness is computed.[22]
   Samples with air bubbles, nicks, or tears, as well as those with overall thickness variation greater than 5%, are not included in the analysis.

2. **Folding endurance**
   Folding endurance is measured by cutting a strip of film and folding it repeatedly in the same place until it breaks. The value of folding strength is determined by how many times the film could be folded in the same place without breaking.

3. **Tensile strength:**
   The property of a film that requires a load in order to induce load deformation failure is its tensile strength (psi) .[23] Specially sized film strips devoid of air bubbles or other physical flaws were held between two clamps spaced three centimeters apart. When the film broke, the force and elongation were measured after the strips were pulled by the top clamp at a speed of 100 mm/min.

4. **Disintegration test :-**
   The time (second) at which a film dissolves when exposed to water or saliva is known as the disintegrating time. The moment a film begins to break or dissolve is known as the disintegration time. The physical characteristics of dissolvable films are influenced by thickness and bulk. attributes [24]. Disintegration apparatus is used to perform disintegration tests.

Fig. 6. Disintegration Apparatus

5. **Dissolution test:-**
   The quantity of drug material that dissolves in a solution per unit of time under controlled conditions of temperature, solvent concentration, and liquid/solid interface is known as dissolution. The modified USP XXIII equipment (paddle over disk) is used for in vitro release experiments [25].

Fig.7. Dissolution Test

Table 2: List of marketed formulations of fast dissolving films is: [26]

Sr.No.	Product	Brand name	Manufactured by
1.	Dextromethorphan HBr (cough suppressant), Diphenhydramine Citrate(cough and cold), Breath Strips	Delsym, DexAlone	MonoSolRx
2.	Doneprezil rapid dissolving films, Ondansatron rapid dissolving films	Zofran.	Labtec Pharma
4.	Methylcobalamin fast dissolving films, Folic Acid 1mg fast dissolving films, Caffeine fast dissolving films	Methicol,Benadryl, Delsym,DexAlone.	Hughes medical corporation

FUTURE ASPECTS OF BUCCAL FILM

1. Buccoadhesive buccal films can be incorporated potent drug which fulfilled criteria for buccal film as drug delivery system. [13]
2. evaluate the dissolution of buccal film for drug release profile studies.
3. examine in-vivo studies for the prepared buccal film.
4. perform the stability study for buccal film

CONCLUSION:-

The Buccal Film Have Better patient compliance, a quick drug delivery method, direct absorption into the bloodstream, and the ability to prevent first-pass metabolism and gastrointestinal tract degradation have all contributed to the rise in popularity of buccal films. According to the current review, buccal film is the most tasty and acceptable dose form. Because of its unique characteristics, it avoids first-pass metabolism and improves the bioavailability of the active molecule compared to other innovative buccal drug delivery systems. Due to the numerous benefits it offers to geriatric , pediatric, and swallowing-disabled patients, buccal film is a novel dosage form.

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