FORMULATION AND EVALUATION OF NICOTINE BUCCAL FILM
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ABSTRACT
Nicotine is an organic compound found within the lycopersicaceae plant family of plants (Solanaceae) that acts as a nicotinic neurotransmitter receptor agonist. And possesses completely different medical specialty activities like, system Stimulant. Completely different preparation of nicotine in market like Nicogum and Nicorette except buccal film. Buccle film having various blessings like Convenient dosing, No water required, No risk choking, Taste masking therefore in presence study we tend to conceive to formulate buccal film of nicotine. The main aim of the study was to look at varied polymers thought-about to possess dissolving properties for the preparation of buccal films of nicotine and to guage the films for varied physical and chemical parameters and subject the simplest formulation for drug content and uniformity study. Solutions containing polymers at completely different concentrations and a plasticizer at varied concentrations were ready. These solutions were then went to prepare films. The films were casted using solvent evaporation technique ready films were then evaluated in terms of their physical look and film forming ability and their dissolving time. Among the varied concentration of polymers examined the results have shown that the F5 films were terribly versatile with good dissolving time furthermore as high folding endurance and drug uniformity content as compared to alternative concentration of polymers. Thus it should be complete that the films with HPMC at a level of 3% with propylene glycol at 1% w/w of polymer could be a good base for the preparation of buccal films of nicotine.

KEYWORDS
Nicotine, Buccal film, Nicogum and Nicorette and pharmacological activity.

INTRODUCTION
BUCCAL FILM
It is comparatively a brand new dosage type during which thin film is ready exploitation polymers fast dissolves in buccal cavity and on tongue.

Advantages and Disadvantages2
The oral cavity has been investigated as a site of drug delivery for an extended amount of your time. In 1847 Sobrero found that Nitro glycerine was absorbed from the oral cavity (Ponchel 1993). Since
then numerous active substances are investigated for local or systematic use (Kellaway1990). Drug delivery through oral cavity that offers several benefits.

**Advantages**

- The oral tissue layer is handily and simply accessible and so permits uncomplicated application of dosage forms.
- No water required.
- Drug that are unstable in acidic environment like stomach or destroyed in alkaline environment like intestine are often given by this route.
- No risk of choking.
- The delivery of Drug through the oral tissue layer offers straight forward application, prevents drug degradation by gastrointestinal fluids, avoids first-pass metabolism and probably improves bioavailability with fast drug absorption and quick onset of action.
- Drug with short half life are often administered by this methodology. (2-8 hrs) e.g.: Nitroglycerine (2 hrs) Isosorbide mononitrate (2-5 hrs).
- The oral tissue layer is powerful against native stress or injury and shows quick cellular recovery when such incidents.
- Improved patient compliance.
- Active substances are often administered regionally to treat oral diseases like periodontitis microorganism and flora infections or aphthousstomatosis.
- Systematic actions are often achieved via drug permeation through the tissue layer epithelial tissue.
- Drug administration via the oral cavity provides new prospects within the administration of Drug to “problematical” subpopulations like youngsters and also the old. These patients have special drug administration necessities as they are typically unable to swallow solid dosage forms.

**Disadvantages**

- The poor stability of aqueous liquids is problematic.
- Substances like benzalkonium chloride, benzyl alcohol or parabens are unremarkably used as preservatives. Preservatives are often cyanogenic because of immature metabolic pathways in children.
- Only those Drugs that are absorbed by passive diffusion are often administered by this route.
- Drugs that are unstable at buccal pH like (6.5-6.8) cannot be administered by this route.
- Over hydration might cause formation of slippery surface and structural integrity of the formulation might get noncontiguous by the swelling and hydration of the bio adhesive compound.
- Drug that irritates tissue layer e or objectionable odour cannot be administered by buccalroute.

**Buccal film drug delivery system**

Buccal drug delivery system utilizes property of bioadhesion of certain water soluble polymers that become adhesive on hydration and thus are often used for targeting particular site. Buccal delivery is the administration of the drug through buccal tissue layer (lining of the cheek) to the circulation. Drug delivery via buccal has recently become a crucial route of drug administration numerous bioadhesive tissue layer dosage forms are developed, including adhesive tablets, ointments patches, gels and additional recently films. The use of polymeric films for buccal delivery has not nevertheless been wide investigated, though they need been extensively used environmental extremes, improve look, mask undesirable taste, and management the drug release. Buccal film could also be most well-liked over adhesive tablet in terms of flexibility and luxury. Additionally, they will circumvent the comparatively short duration of oral gels on the tissue layer that is definitely washed away and removed by saliva. Moreover, the buccal film is in a position to safeguard the wound surface, thus reduce pain and additionally might treat oral diseases additional effectively.

A perfect buccal film ought to be versatile, elastic, soft nevertheless adequately robust to face up to breakage because of stress from oral cavity activities. Moreover, it should additionally possess good bioadhesive strength in order that it is often maintained within the oral cavity for a desired
period. Swelling of film, if exists must not be too expensive to prevent discomfort. As such, the mechanical, bioadhesive, and swelling properties of buccal film are critical and essential to be evaluated.

**Special features of oral cavity dissolving films**
- Thin elegant film.
- Out there in numerous size and shapes.
- Unconstructive.
- Wonderful mucoadhesion.
- Quick disintegration.
- Fast release.

**METHODOLOGY**

**Preparation of calibration curve of nicotine**

The standard curve was drawn by preparing nicotine stock having concentration 1 mg/ml and makes different dilution like 10 µg/ml-50 µg/ml and takes absorbance at 592 nm.

**Formulation of Buccal film**

The different five concentration of film were prepared having same dose of nicotine. The concentrations of film are mentioned in Table No.1.

**Preparation of Nicotine buccal films**

To prepare the Nicotine buccal film, required quantity of Drug (0.1 gm) was dissolved in 100 ml of water in beaker. Plasticizer (Propylene glycol) was added to beaker. Then required quantity of polymer (HPMC) was added in small quantities and properly mixed well to dissolve. Tridishes having the area of 63.58 cm² and kept in hot air oven for drying at 50˚ C. After drying film were removed film with the help of sharp blade and kept in desicator for 24 hrs then cut into small piece having area of 6.8 cm². These films were subjected for different evaluation parameters.

**Evaluation parameter for the prepared film**

**Weight variation of the film**

Weight variation (selected buccal film) was done for randomly selected ten individual patches. The weight uniformity is measured by using digital weighing balance.

**Thickness of the film:**

Thickness (selected buccal film) was done for randomly selected ten individual films. The thickness is measured by using digital vernier calliper.

**RESULTS AND DISCUSSION**

**Calibration curve of nicotine: Weight of buccal film**

The Average weight of buccal film of each formulation (F1 to F5) was tested and results are provided in table No.9. The maximum and minimum average wt. were found to be $50\pm0.00$ and $35.33\pm0.16$ respectively.

**Thickness of film**

The Thickness of film of buccal film of each formulation (F1 to F5) was tested and results are provided in Table No.9. The maximum and minimum thicknesses of film were found to be $0.09\pm0.00$ mm and $0.07\pm0.001$ mm respectively.

**Folding endurance**

The randomly selected film (without backing membrane) was determined by repeatedly folding one film at the same place till it break or folded maximum 250 times.

**Dissolving time**

The dissolving time was determined by placing the film in 50 ml of simulated saliva (pH 6.2) in beaker. Time required by the film to dissolve completely was noted.

**Drug Content**

Preparation of Calibration curve of nicotine

The standard curve was drawn by preparing nicotine stock having concentration 1 mg/ml and makes different dilution like 10 µg/ml-50 µg/ml and takes absorbance at 592 nm.

**Drug Content**

A film of area 6.8 cm² was placed in a volumetric flask containing 50 ml of phosphate buffer of pH-6.6 and kept aside for some time to release the total drug present in the film and the volume was made up to 100 ml with the same buffer. Then the absorbance was measured after suitable dilution at 592 nm against drug devoid polymer blank solution in phosphate buffer of pH-6.6, and the content of Nicotine was calculated using standard graph.

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Dissolving time
The buccal film dissolving time of each formulation (F1 to F5) was tested and results are provided in Table No.9. The maximum and minimum dissolving time were found to be 103.7±1.7 and 63.67±1.2 respectively.

Drug content
The Drug content of buccal film of each formulation (F1 to F5) was tested and results are provided in Table No.9. The maximum and minimum drug content were found to be 97.83±0.33 and 90.5±0.50 respectively.

Table No.1: Formulation details of HPMC films with Nicotine

<table>
<thead>
<tr>
<th>S.No</th>
<th>Formulation code</th>
<th>Amount of a Nicotine per 100 ml</th>
<th>Amount of polymer per 100 ml</th>
<th>Amount of PG per 100 ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F 1</td>
<td>0.1gm</td>
<td>1000 mg</td>
<td>0.2 ml</td>
</tr>
<tr>
<td>2</td>
<td>F 2</td>
<td>0.1gm</td>
<td>1500 mg</td>
<td>0.4 ml</td>
</tr>
<tr>
<td>3</td>
<td>F 3</td>
<td>0.1gm</td>
<td>2000 mg</td>
<td>0.6 ml</td>
</tr>
<tr>
<td>4</td>
<td>F 4</td>
<td>0.1gm</td>
<td>2500 mg</td>
<td>0.8 ml</td>
</tr>
<tr>
<td>5</td>
<td>F 5</td>
<td>0.1gm</td>
<td>3000 mg</td>
<td>1.0 ml</td>
</tr>
</tbody>
</table>

Table No. 2: Propylene glycol with HPMC in different concentrations

<table>
<thead>
<tr>
<th>S.No</th>
<th>Formulation Code</th>
<th>Wt (mg)</th>
<th>Appearance</th>
<th>Thickness (mm)</th>
<th>Folding Endurance</th>
<th>D.T. (sec)</th>
<th>Drug Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F 1</td>
<td></td>
<td>Unable to peel out</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>F 2</td>
<td>35.33±0.16</td>
<td>Flexible</td>
<td>0.07±0.001</td>
<td>292 ±3.215</td>
<td>63.67±1.2</td>
<td>96.5±0.76</td>
</tr>
<tr>
<td>3</td>
<td>F 3</td>
<td>40.23±0.06</td>
<td>Greasy look</td>
<td>0.075±0.003</td>
<td>281.7±2.963</td>
<td>71.33±1.4</td>
<td>95.6±0.44</td>
</tr>
<tr>
<td>4</td>
<td>F 4</td>
<td>44.87±0.08</td>
<td>Transparent</td>
<td>0.081±0.001</td>
<td>230±3.786</td>
<td>89±1.1</td>
<td>90.5±0.50</td>
</tr>
<tr>
<td>5</td>
<td>F 5</td>
<td>50±0.00</td>
<td>Transparent</td>
<td>0.09±0.00</td>
<td>264.7±1.453</td>
<td>103.7±1.7</td>
<td>97.83±0.33</td>
</tr>
</tbody>
</table>

The value represent in above table is mean ± Standard error.

Figure No.1: Advantages of Buccal film [www.pharmainfo.net]

Figure No.2: Standard calibration graph of nicotine

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CONCLUSION
Among the five formulations in F5 formulation the Dissolution time was found to 103.7 ± 1.7 sec which is good as compare to other. Drug content of 97.83% ± 0.03 which is also good from other. In formulation F5 Nicotine with HPMC 3% showed satisfactory thickness, weight, folding endurance and dissolving time. Hence it may be concluded that the films with HPMC at a concentration of 3% with propylene glycol at 1% w/w of polymer is a good base for the preparation of buccal films of Nicotine.

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CONFLICT OF INTEREST
We declare that we have no conflict of interest.

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