Research Article **CODEN: IJRPJK** **ISSN: 2319 – 9563**

International Journal of Research in Pharmaceutical and Nano Sciences

Journal homepage: **www.ijrpns.com**

FORMULATION AND EVALUATION OF NICOTINE BUCCAL FILM

Prashant Deore[*1], Rajveer Bhaskar[1], Monika Ola[1], Prakash Patil[1]

[1*]Department of Pharmaceutics, R.C. Patel Institute of Pharmaceutical Education and Research, Shirpur, Maharashtra, India.

ABSTRACT

Nicotine is associate organic compound found within the ligneous plant family of plants (Solanaceae) that acts as a nicotinic neurotransmitter receptor agonist. And posseses completely different medical specialty activities like, system Stimulant. Completely different preparation of nicotine in market like Nicogum and Nicolette except buccal film. Buccle film having varios blessings like Convenient dosing, No water required, No risk chocking, 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 wont 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.

Author for Correspondence:

Prashant Deore,
Department of Pharmaceutics,
R.C. Patel Institute of Pharmaceutical Education and Research, Shirpur, Maharashtra, India.

Email: prashantdeore92@gmail.com

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 Disadvantages[2]

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 chocking.
- 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 aphthousstomatis.
- 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[13]

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 that 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 Nicotinebuccal 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 cm^2 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 cm^2. These films were subjected for different evaluation parameters.

Evalution 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.

Folding endurance[9]

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 6.8cm^2 was placed in a volumetric flask containing 50ml 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 100ml with the same buffer. Then the absorbance was measured after suitable dilution at 592nm against drug devoid polymer blank solution in phosphate buffer of pH-6.6, and the content of Nicotine was calculated using standard graph.

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 50mg ±0.00 and 35.33mg ±0.16 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 ±0.00 mm and 0.07 ±0.001 mm respectively.

Folding endurance

The buccal film folding endurance of each formulation (F1 to F5) was tested and results are provided in Table No.9. The maximum and minimum folding endurance were found to be 292 ±3.215 and 230 ± 3.786 respectively.

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

S.No	Formulation code	Amount of a Nicotine per 100 ml	Amount of polymer per 100 ml	Amount of PG per 100 ml
1	F 1	0.1gm	1000 mg	0.2 ml
2	F 2	0.1gm	1500 mg	0.4 ml
3	F 3	0.1gm	2000 mg	0.6 ml
4	F 4	0.1gm	2500 mg	0.8 ml
5	F 5	0.1gm	3000 mg	1.0 ml

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

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

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

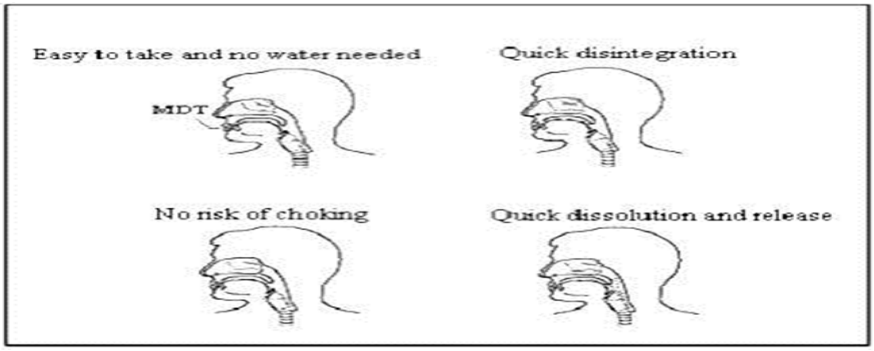

Figure No.1: Advantages of Buccal film [www.pharmainfo.net]

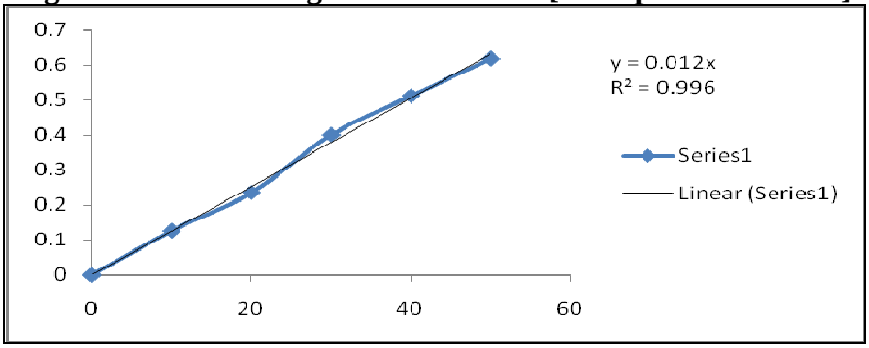

Figure No.2: Standard calibration graph of nicotine

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.

ACKNOWLEDGEMENT

The authors are highly thankful to R.C. Patel Institute of Pharmaceutical Education and Research, Shirpur, Maharashtra, India for providing all the facilities to carry out this work.

CONFLICT OF INTEREST

We declare that we have no conflict of interest.

REFERENCES

1. Alagusundaram M *et al.* "Formulation and evaluation of Mucoadhesive buccal films of ranitidine", *International Journal of Pharm Tech Research,* 1(3), 2009, 557-563.
2. Radha Madhavi B, Varanasi S N. Murthy. Buccal Film Drug Delivery System-An Innovative and Emerging Technology, *Molecular Pharmaceutics and Organic Process Research,* 1(3), 2013, 1-6.
3. Arya Arun, Chandra Amrish, Sharma Vijay and Pathak Kamla. "Fast Dissolving Oral Films: An Innovative Drug Delivery System and Dosage Form", *International Journal of Chem Tech Research,* 2(1), 2010, 576-583.
4. Benowitz N L, Herrera B, Jacob P, Herrera B, Jacob P. "Mentholated Cigarette Smoking Inhibits Nicotine Metabolism", *J Pharmacol Exp Ther,* 310(3), 2004, 1208-15.
5. Benowitz N L, Porchet, H, Sheiner L, Jacob P. Nicotine absorption and cardiovascular effects with smokeless tobacco use: Comparison with cigarettes and nicotine chewing gum, *Clinical Pharmacology and Therapeutics,* 44(1), 1988, 23-28.
6. Visa S P and Khar R K. Controlled Drug Delivery, *CBS Publishers and Distributors, New Delhi,* First edition, 1997, 259- 260.
7. Kulkarni A S, Deokule H A, Mane M S and Ghadge D M. "Exploration of different polymers for use in the formulation of oral fast dissolving strips", *Journal of Current Pharmaceutical Research,* 2(1), 2010, 33-35.
8. Chein Y W. Novel Drug Delivery Systems, revised and expanded, *Marcel Dekker, Inc. New York,* 2nd edition, 1992, 195-224.
9. Choy F W, Kah H Y, Kok K P. Formulation and evaluation of controlled release Eudragit buccal patches, *International Journal of Pharmaceutics,* 178(1), 1999, 11-22.
10. Davis R, Rizwani W, Banerjee S *et al*, Pao, William. "Nicotine promotes tumor growth and metastasis in mouse models of lung cancer", *PLoS ONE,* 4(10), 2009, 1-9.
11. Dawson R F, Christman D R, D'Adamo A, Solt M L, Wolf A P. "The Biosynthesis of Nicotine from Isotopically Labeled Nicotinic Acids", *Journal of the American Chemical Society,* 82(10), 1960, 2628-2633.
12. Dixit R P, Puthli S P. Oral strip technology: Overview and future potential, *Journal of Controlled Release,* 139(2), 2009, 94-107.
13. Gandhi R B and Robinson J R. Oral cavity as a site for bioadhesive drug delivery, *Adv. Drug Del. Rev,* 13(1), 1994, 43-74.
14. Jain N K. Controlled and Novel drug delivery, *CBS Publishers and Distributors, New Delhi,* First edition, 1997 (reprint in 2001), 238.
15. Khanna R, Agarwal S P, Ahuja A. Title of work, *Indian J. Pharm. Sci,* 59(3), 1997, 299-305.
16. Kok Khiang Peh, Choy Fun Wong. "Polymeric Films as Vehicle for Buccal Delivery: Swelling, Mechanical, and Bioadhesive Properties", *J Pharm Pharmaceut Sci,* 2(2), 1999, 53-61.
17. Komamine, edited by Hiroshi Ashihara, Alan Crozier, Atsushi. Plant metabolism and biotechnology, *Cambridge: Wiley,* ISBN 9780470747032.
18. Lockhart LP. "Nicotine poisoning", *Br Med J,* 1(3762), 1933, 246-7.

19. Medical-dictionary, free dictionary.com [date- 22 feb 2013, 11.49 pm.].
20. Murata Yoshifumi *et al*. "Preparation of Fast Dissolving Films for Oral Dosage from Natural Polysaccharides", 3(8), 2010, 4291-4299.
21. Okamoto M, Kita T, Okuda H, Tanaka T, Nakashima T. "Effects of aging on acute toxicity of nicotine in rats", *Pharmacol Toxicol*, 75(1), 1994, 1-6.
22. Shojaei A H. Buccal Mucosa as A Route for *in vitro*, *Toxicology Letters*, 26(2-3), 1998, 153-157.
23. Aggarwal Jyoti *et al.* Fast dissolving film: A novel approaches to oral drug delivery, *International research journal of Pharmacy*, 2(12), 2011, 69-74.
24. Wale A, Weller P J. Handbook of Pharmaceutical Excipients, 2nd edition, 24, 27, 1994, 352, 448, http://www.watson-inc.com/film_edible.php.
25. Wu W K, Cho C H. "The pharmacological actions of nicotine on the gastrointestinal tract", *J. Pharmacol. Sci*, 94(4), 2004, 348-58.

Please cite this article in press as: Prashant Deore *et al*, Formulation and Evaluation of Nicotine Buccal Film, *International Journal* of *Research in Pharmaceutical and Nano Sciences,* 5(2), 2016, 39 - 44.